Doctoral Dissertation

EFFECTS OF THE PLANNING SYSTEM AND PUBLIC PROGRAM ON URBANIZATION CONTROL FROM THE VIEWPOINT OF COMPACT CITY

- A Case Study of Yinchuan City in Western China

コンパクトシティの観点からみた計画制度と公的事業の市街化制御に対する影響

–中国西部に位置する銀川市を事例として–

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Abstract

Yinchuan, an inland city locates in Western China, has been undergoing rapid urban growth in recent years, which arises the concerns of sustainable urban development and imposes great challenges on urban planning and urban management. It is argued that in the present context of rapid growth of market economy, states still play a dominant role in the urban development of China. Political measures employed by the local governments could have far-reaching effects on urban forms and land uses. Thus, clarification of the effects of these measures on the urban development is critical for understanding current urban conditions in a local city and making improvement of the measures for promoting more sustainable urban forms in Yinchuan city. In this research, three questions were raised from the perspective of compact city: a. what political measures the local government of Yinchuan has prepared and implemented for the ongoing urbanization; b. how are the effectiveness of these measurements in promoting sustainable urban development; c. what are the critical problems in the implementation of these measurements. Based on these questions, this research targeted on the main political measurements contemporarily employed by the governments of Yinchuan, aiming to estimate: 1. the effects of urban planning on urban expansion control; 2. the effects of public programs on housing development; 3. the effects of the specific zoning on land use pattern. Addressed on these research aims, both qualitative and quantitative methods were adopted, including intensive field survey, document and data analysis.

Firstly, in order to estimate the effects of urban planning on urban expansion control, a contextualized framework was developed to systematically analyze the mutual influences between the planning concepts presented in the city's master plans, the implemented planning tool of specific zoning and the urbanization in the Central Urban Area of Yinchuan city, in light of the social-economic transition from a centrally planned economy to a rapid growth of market economy. The study has clarified that the focus of city's plans had significantly shifted from constraining urban expansion to development promotion in the tandem of rapid market growth, in line with the intentions of the city government. However, the planning still does not function well in leading the urban development, which can be seen in the frequent adjustments of the plans to incorporate the special zones promoted by local governments. Excessive zoning has been revealed in the repetitive industrial zones with low land use efficiency. Moreover, it has been assessed that the designated specific zones have not been effective in promoting or controlling

market-based developments since sprawl has been observed outside the zones.

Secondly, based on the analysis of housing supply in relation to population growth in the city, the study started from revealing the critical housing supply issues in Yinchuan. Then, the impacts of public programs on promoting market-based housing development were explored. Further, the study estimated effectiveness of these public promoted programs in achieving housing expansion pattern intended by the city's housing promotion strategies, by comparing the housing expansion with the planning. The main findings are: 1. large public housing projects and key amenity facilities are main public programs promoted by local governments in inviting private housing investment; 2. However, the distribution of these public promoted programs was not consistent with city's housing promotion strategies, thus might contribute to undesirable housing development that seen in the imbalance between the east and west of the city. This suggests that the public program strategy is key to the spatial management.

Thirdly, the study closely investigated the implementation of the planning tool- specific zoning, including financing, spatial considerations based on the key functions and detailed land use plans of the specific zones within the institution framework; subsequently, the effects of specific zoning on land use pattern were estimated by the comparison of explicit case zones of different implementation features. As a result, it was revealed that scattered and chaotic land use pattern are more likely occurring in the specific zones that planned as excessive supply of a single specialized land use, the planning intentions of the specific zones were not always maintained. It seems that these homogeneous and inordinate zoning were attributed to the unconsciousness of the position of these zones in the urban growth of the entire city, or from the ignorance of the connection between the zone development and surrounding local areas during the implementation.

Ultimately, based on the discussion on the critical planning and local urban issues revealed from the analysis, this research gave explorations on improving the performance of these political measures, in order to achieve a compact city vision and more sustainable development within the local context of Yinchuan. It is suggested developing a comprehensive development strategy that holds capacity to guide the urban development through the coordination of implementation of public programs and planning tools such as specific zoning may provide a promising future for the city of Yinchuan. During this process, the attitude and perception of city government on the sustainable urban development may play a vital role.

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Chapter 1 Introduction

1.1 Background

Faced with rapid population growth, deprivation of natural resources as well as environment changes at the global scale, sustainable development that highlighted harmony between natural environment, economic growth and social needs, remains a main challenge across the world. Today, more than half of the world population is living in the cities and a large proportion of economic activities are concentrating in the urban area (Bak, 2014)[1]. Urban form and urban development pattern significantly influence economic efficiency, well-being of inhabitants and quality of natural environment (Alberti, 2000)[2]. Thereby, in the agenda of sustainable development, sustainable urban development has been brought out as a core theme.

In the field of urban planning, there is a widespread discussion that more compact urban development could contribute to sustainable urban development, not only for the developed countries that have experienced substantial suburbanization and urban sprawl, but also for developing countries that are undergoing rapid urbanization. The compact city, characterized by a dense and mix used development pattern that well organized by public transport, is argued as a urban form with a wide range of benefits, such as preservation of precious open space around the city and rural landscape, less automobile dependency and thus fewer CO^2 emission, high efficiency of land use and low cost of infrastructure development, more viable living atmosphere and social equity and so forth[3]. Compact city is currently becoming one of the most discussed growth management concepts in the field of urban policy and urban planning.

A large amount of studies have focused on the explorations of characteristics and effects of the compact city, however, the most important and difficult topic - applying the concept of compact city into a specific city or local area, is rather slowly advanced[4]. There are a variety of political measurements, such as local plans, zoning and public budget/fiscal programs that long utilized by the local states to manage urban development, these measurements could have lasting effects on the urban form and land use conditions at city-region and also local scale, which demonstrates their potential as important instruments in the local practice of compact city. This necessitates the careful policy design and adjustment of these measurements to fit the requirements and guidelines of

the compact city. Most importantly, the effectiveness of these urban policies is largely dependent on their capacities to cope with the local context. It is essential to design and implement the political instruments closely response to the local circumstances.

Cities in China have experienced tremendous changes since the "Reform and Opening up" in 1978. The dramatic restructuring of the urban form and the rapid urban expansion of Chinese cities, was fueled by the high-speed economic growth. While extensive urbanization has been observed across the country, growing numbers of researchers have concerned with the critical issues brought by this unprecedented urbanization: massive loss of green lands, social inequality, environment damages, etc., and they questioned the sustainability of the current urban development (Ding, 2009)[5]. Increasing numbers of studies show their interests in the urban development of China, nevertheless, available studies are quite insufficient, especially in the domain of urban planning and management in seeking of efficient measurements to guide the urban development toward more sustainable way[6]. For instance, the study areas are mostly located in the economic stronger areas like mega cities in east coast[7], while studies on the areas in the central and western regions where economic development lagged behind but also experienced rapid urban growth in recent year are rare.

Yinchuan, a central city of local region in northwestern China, is undergoing rapid urban growth in the late decade, which is brought about by the 2000's central strategy "China Western Development" that promoted massive public investments and intensified economic reforms in the end of 1990s that facilitated abundant private investments. The abrupt urban growth is evidenced in the dramatic land use changes and urban restructuring. As a historical agriculture center, abundant farm lands in the city are disappearing in an astonishing speed, replaced by the mushrooming of large gated communities on the peripheries of the city. These proliferating housing projects are seemingly spreading in an unordered pattern and consume the green lands in a consumptive way. On the other hand, special development zones designated by local governments occupied vast land, they are leading the urban expansion toward further frontier while the efficiency of the land use inside the zones is questionable. By 2015, the built-up urban area of the city had reached 169.1 km^2, which is triple the size compared to 2000, while the urban population just doubled in the same time span. These unprecedented urban development has imposed great challenges on urban planning and policy decision to effectively guide the urban expansion toward more sustainable form. At present, developing a comprehensive development strategy accompanied with efficient political instruments, in order to balance local economy and development pressure, is an urgent task for the city; yet, the issue has been barely addressed.

Therefore, it seems that compact city could provide a promising prospect for the fast-growing city like Yinchuan. However, the implementation of the compact city in this local city is never an easy task, it requires a clear understanding of the specific local settings within which the local urban policies are operated and making a range of effects, as an initial step and solid base before putting any measurements into place.

1.2 Research question and objective

Public sectors had played an overwhelming role in leading the urban development of Chinese cities in the socialist planned economy (1949-1977). Along with the initiation of administrative decentralization and market economy reform from 1978, the direct intervention in urban development from the public sectors were significantly weakened. Despite this, in the advanced market economy, market failure has been always blamed for chaotic and sprawled urban developments, in China, the explanation of rapid and uncontrolled urban expansion is still much beyond the market force (Deng and Huang, 2004)[8]. The power of states stays strong and there is still a significant role of public sectors in promoting urban development. The pro-growth coalition and entrepreneurial characters of empowered local states in the emerging market economy, especially after the formation of the land market in 1988 that legalized paid land transfer and fiscal reform that redistributed tax-sharing between the central government and local government in 1994, is broadly argued as the major driver of urban growth of Chinese cities at present[9][10][11].

On the other hand, in response to the rapid and unordered urban expansion noticed across the country, China's first City Planning Act was enacted in 1989, a strict top-down plan-making and planning control system was enforced to guide and regulate the urban growth towards a more reasonable pattern (Yeh and Wu, 1999)[12]. Since then, local government have gained autonomy not only in the organization of economic activities, but also the urban plan-making and plan implementation, they are borne with double roles of urban growth promotion and urban development regulation. Local governments are facing stringing conflicts between the development pressure, conservation of natural resources as well as social stability. For example, while the local governments rely their fiscal source heavily on the land leasing fee, which impulse them to expropriate cheap farm lands and open lands as much as possible, the employment and social insurance of the farmers who lost their land during the land expropriation are currently becoming a big burden for the local governments as well. Since the local governments still hold substantial financial resource and administrative power to manipulate urban

development, it seems safe to say that, present urban development pattern in Chinese cities is largely a consequence of local governments' strategy in reconciling and balancing between various conflicts. Thus, understanding political willing of local government and effects of measurements adopted by the governments in the local urban development would serve as a straight path to clarify the formation process of present urban form and critical elements within current urban development conditions. Therefore, in this research, the study objects are placed on the development strategies and comprehensive planning, political instruments and programs employed by the local government of Yinchuan city, which may help to comprehend government intentions and actions.

Although in Yinchuan city, the term "compact city" has not been cited in any official documents, "sustainable development" has long been put as a main policy guidance and planning goal since 1990s. The development targets declared in city's Tenth(2000-2005), Eleventh(2006-2010) and Twelfth(2011-2015) of "Five-year Economic and Society Development Plan" all highlighted the words of "environment friendly", "resource conservation", "harmonious society", "comprehensively coordinated development" and "sustainable development". Also, in the city's master plans of 1996-2010 and 2007-2020, "coordinating economic development, society and environment, establishing a sustainable mechanism of production, resource and environment", "an innovative city of beautiful landscape and a garden city suitable for living" "realizing comprehensively coordinated and sustainable development" were set as development targets of Yinchuan city. Despite these declared planning efforts, the main question still remains: how these development targets concerning "sustainable development" could be approached and substantiated.

A variety of political measurements have been employed by Yinchuan's local governments to guide, promote and control urban development. At first, city government is in charge of making the master plan to guide the overall urban growth of the city toward an organized and reasonable form by providing a whole vision for the future urban development. Based on this envisioned urban structure, different urban functions and land use are coordinated and the economic efficiency is maximized, green land conservation and economic growth is balanced and environmental impacts are minimized. Also, designation of specific zones with detailed land use regulation are utilized by local governments as a basic planning tool to regulate urban development in the near future. The zoning, focused on a specific area at the local scale, aims to promote and control the urban development into a planned and ordered pattern. It is expected that under the organization of master plan, urban development is well developed by the specific zones and land use efficiency is promoted by the designated zones. Moreover, a considerable proportion of urban developments are still planned, financed or directly carried out by the

government bodies, such as public facilities and public housing projects. And also local governments are actively involving in a wide range of investment-promotion development through public-private cooperation. These public promoted projects could have indirect and extensive impacts on the urban development in a market-oriented context. It is likely that these political measurements have great potential in contributing to achieve the targets of more sustainable urban development as long as they are effectively and properly implemented.

It is thus fundamental to comprehensively understand and carefully evaluate these local urban policies within the local context before taking steps to enhance the effectiveness of the measurements, or design and implement a new policy in promoting sustainable development. **Therefore, following questions raised as main concerns in this research:**

What political measures are prepared and implemented by the local government of Yinchuan for the ongoing urbanization, in response to the changes of local economic and political conditions?

Are these adopted political measurements have been effectively and appropriately utilized in promoting and controlling the urban development, from the viewpoint of sustainable urban development and compact city?

What factors underlie beneath and affect the performance of these measurements in the implementation process? What are the critical problems in the policy implementation? How to improve their performance by remedy policies?

Therefore, the **overall objective** of this research is to clarify the effects of the urban political measurements implemented by the local governments of Yinchuan city on the urban development:

1) Examining the effects of urban planning on urban expansion control in the social-economic transition from planned economy to market economy.

2) Examining the effects of public programs in promoting private housing development in the market-oriented economy and the effectiveness of these public programs in achieving reasonable housing expansion.

3) Examining the effects of specific zoning on the development of land use pattern.

These topics serve the purpose to identify the “missing link” between the local circumstances and policy response, and further make clear the problems in implementing

the urban planning and urban policies. By this way, possible improvement of institutional structure, policy design, and implementation approaches of the planning and other tools in the practice of sustainable development or compact city could be drawn forth based on a solid ground.

1.3 Literature review

1.3.1 A set of relationships during the planning process

Local plans are the mainstay of the urban development policies. In the twentieth century of advanced Western countries, urban planning is evolving from traditional land use blueprints to the participatory, broad-based strategies for managing urban change. The consensus is reached that to meet new challenges and more complex issues, such as growing number of interest groups, turbulence of policies and market conditions, environmental sustainability and so forth, the meaning of planning should be enriched to deal with public participation, economic and social management, fiscal programs and effective implementation, seen in the contemporary hybrid plans that included land use design, policy measurements and development management programs (Kaiser and Godschalk, 1995)[13]. These changes of urban planning is deeply embedded in the understanding of the complicated process of the planning that involves a variety of elements.

Relationships between the planning and urban development are not linear and neat. Urban planning impose control power and effects on forms and patterns of urban development, while the planning decision are made in response to the changes and conditions of urban development and thus in turn influences the urban planning. Moreover, implementation of local plans (master plans/ general plans/comprehensive plans or other guidelines) by using planning tools, for example, zoning or development management programs, is a crucial link between the planning and urban development. Based on the "vision" drawn by the local plans, the implemented planning tools directly shape the urban development pattern in combination of other factors, such as market forces and environmental conditions. Thus, focused on the both in the planning process : 1) rationale of the plan-making and contents of plans, and 2) plan implementation – how the master plans are integrated into the subsequent development management programs like zoning codes, the roles of local plans and planning tools in the planning process become clear. Local plans are communicative policy acts crafted by the locality that articulates citizens' shared vision for the development of their landscapes over time, it functions to identify policies and regulations to be adopted through a development management program in

order to achieve that vision, and justifies both the reasoning behind the plan's goals and reasonableness and efficacy of the means selected to achieve those goals. Thus, zoning code itself exceeds reasonable government regulation if it is inconsistent with the rationales provided by the plans. These understandings brought the holistic comprehending of a set of relationships during planning process into the centerpiece of planning studies.

Moreover, within a planning framework of larger scale, the most straightforward way to accomplish growth management policies are local zoning and subdivision regulations as well as the planning of capital improvements, and recently, more flexible planning tools and programs. Most of these techniques were developed to correct for "imperfections" in land markets and thus have straight relationship with land use outcome. However, the state or regional planning and policies provide broader perspective to channel urban growth of the whole region and giving standards as well as prescriptions to coordinate regulations. Consequently, the land use outcome at region scale depends heavily on the regional planning institution and characters of the locally implemented tools. From this point of view, single evaluation of effects of instruments could lead misleading understanding of effects of planning program and failed to identify critical underlying factors of planning ineffectiveness. It is necessary to build an inductive analysis model to show the effects of growth management, which is featured by the convergence of the program design and institutional structure. Finally, through the mediating influences of regional land markets shaped by the demands factors and supply constraints (planning), land use outcome could be presented by the indicators of property value, land use density, spatial pattern (urbanized area) and public services(Carruthers, 2002)[14].

The pragmatic role of master plans play in informing the decision-making of development management programs (planning tools such as zoning codes) as well as key position of planning tools in the whole growth management are further stressed by Norton(2008)[15], whereby he employed the approach of content analysis to investigate the role of master plan in yielding the neo-traditional development, by probing into the quality of plans and how the message of plans are conveyed into zoning, in another word, *consistency of the plans.* He presented a range of criteria to evaluate the master plans and zoning codes, such as fact base in plan-making, internal consistency of the plans and coordination in the process of implementation.

From these previous theoretical builders, it could be concluded that an integrated and systematic studies of interconnected elements in the planning process: overall city or region plans, implementation of local planning tools and political measurements (institutional coordination and plan consistency), and the resulted urban developments,

will provide particularly valuable and comprehensive insights in estimating the effects of planning efforts and clarifying critical issues in the planning practice.

1.3.2 Urban planning and urban expansion control

Urban sprawl- characterized as low-density, discontinuous and unordered urban expansion encroaching into rural lands, is considered as urban development pattern that is less sustainable. With the purpose to curb urban sprawl, a number of planning regulations and programs were implemented to control the urban expansion in fast-growing areas. For example, green belts in the UK and Urban Growth Boundary (UGB) in the US have been broadly adopted as the fundamental programs of the urban growth management to constrain urban expansion in a city-region. Also, designation of Growth Priority Areas and other special zones are utilized to channel the development into a concentrated pattern, together with the designation of agriculture preservation areas, they both serve to prevent urban constructions in the precious green lands and support the growth management policies.

There is a large volume of studies targeted to estimate the effects of these regulations and programs on urban expansion or focused on evaluating whether these planning tools have achieved their objectives. Shen (1996) examined the cumulative regional impacts of locally enacted growth regulations in the San Francisco Bay Area by projecting population growth before and after the regulation implementation. He found that there were substantial spillovers of urban growth from jurisdictions that enacted strict growth restrictions to the rest of the region due to decentralized management system and political fragmentation, and thus an undesirable form for the region as a whole occurred[16]. Nelson and Moore (1996) assessed effectiveness of growth management programs in Oregon, they described changes of developed areas (number of lots and resident density) in four types of areas: urban, urbanizable, urban fringe and exurban, according to the designated UGBs. Their analysis showed mixed results - in some situations, urban developments were not effectively directed into the growth boundary, while in other administrations, urban development were effectively directed away from resource lands. They suggested that the policy of UGB should be combined with other measurements to effectively control urban expansion, for instance, minimum lot size for rural residential use in UGB expansion area and allowing infill and more efficient land use inside UGB[17]. Studies by Anthony (2004) evaluated effects of growth management on urban growth from the perspective of population density, he found that in the states adopted growth management regulations, the decline of urban density was alleviated[18].

For the planning control of Asian countries, Hebbert revealed that in the *Senbiki* (zoning for urbanization control in Japan) system, the UPA (Urban Promotion Area) drawn by the local planning authority provided lavish urban expansion room, in addition of that UCA(Urban Control Area) were designated in a sparse way while large-scaled projects, public investment projects and agriculture-related developments (especially when agriculture promotion zone overlays with UCA) were permitted in the UCA, developments characterized as *desakota*(spatial juxtaposition of village and town, mix of rural and suburban landscape) were encouraged. This is seen by the loosely knit internal urban structure with large stocks of undeveloped lands within urbanized area, and largely matched by the scattered and piecemeal new building activities in the periphery of Tokyo[19]. Tang et.al. (2007) comprehensively examined evolution, implementation and performance of green belt concept in Hong Kong, based on cross-section examination of local zoning plans and planning application cases, they found that the intention of green belt in Hong Kong is not fully restrictive against urban development, local plans covered residual and leftover parcels wait to be developed into urban built areas, and thus the implementation of green belt is flexible and ambiguous, considerable variation of green belt function and objective is existing in local zoning plans across the whole territory, and this have caused loosed control in permissible land use and development scale. As a result, green belt was more functioning as a transition zone rather than a zone for conservation. This finding is also confirmed with findings in other countries like Australia[20].

In regarding the designation of special areas to prevent urban sprawl. Howland and Sohn (2007) looked at the issue from the viewpoint of distribution of infrastructure investment, they found that although the development projects were primarily located inside the designated priority funding area, a significant proportion of both state funded and locally funded projects were outsides the designated areas, and the variations of this situation across Maryland State is related to the population growth rate and local tax bases[21]. Shen and Zhang(2007)[22] used binary logit models to characterize land use conversion from non-urban and urban in the two period before and after implementation of smart growth programs-establishment of Priority Fund Areas(PFA) and Rural Legal Areas(RLA) in Maryland, the results showed that in general the Smart Growth Areas Act has been successful in achieving the objective, where areas designated as PFA reinforced more concentrated development and RLA reinforced protection of open lands, however, the effects varied across different counties, which indicated significant effects from local context.

Most of these studies pointed out not only characters of implemented plans, but local institution setting - the extent of cooperation and consistency of local planning programs

and regulations have significantly affected effectiveness of urban expansion control at the regional scale, thus a centrally coordinated network and overall growth strategy are highlighted. For example, it was evident that the Metro of Portland, a regional institution that have extensive control over land use and transport planning in the metropolitan, has largely contributed to the coordination of local planning efforts and thus a better performance of urban growth control in the whole Portland, in comparison with other states.

1.3.3 Public promoted programs and urban development

Apart from the regulatory tools, public investment program is another approach widely employed by the governments to intervene urban developments based on the market and thus to help realize spatial strategies. For example, the capital improvement programs, the programs of the expansion of urban infrastructure, the development of community facilities and services, may play significant roles in directing private developments into targeted areas.

There are few studies conducted to examine the effects of public programs on the urban development in the market economy. Based on the analysis of process of urbanization in Niigata city, Jitsu (1975) found that the sites of public housing programs lead in the advance of urban front, since the construction of public houses functioned to promote fulfillment of transportation services and municipal facilities, and consequently stimulated construction of the private housings[23]. Shen (2010) closely investigated the roles of local government and municipal government in promoting suburbanization in one of Shanghai's designated new town-Songjiang, through flagship and strategic public investment projects, such as university towns, comprehensive-planned community, metro-railway, and she found that these projects have significantly contributed to the development of the planned new town by raising land market prospects and improving image of the area[24].

1.3.4 Planning tools (zoning) and land use pattern

As a conventional regulatory tool, zoning is probably one of the most debated planning programs. Early in the 1920s, it has been employed to control land use at local level in US. It was originally utilized for preventing the hazards on public health and protecting value of private properties. Zoning codes specifies minimum lot size, types of development allowed, and amount of parking requirement, standard street width and so forth. These regulations impose direct and significant impacts on the land market, seen in the land use density, land use layout and development pattern in a local area. Abundant of previous

studies focused on the effects of zoning on land market that represented by the land or housing prices, it is revealed that conventional zoning constrained land supply and increased land demand, and thus generated higher property price.

Mayer and Somerville (2000) described relationship between land use regulations and new urban construction based on the economic theory, and estimated effects of these regulations by using panel data across the US, their result suggested that extensive regulation lowered level of the steady-state of new construction, and the effects varied with different regulations, while less-regulated tools have little impact. In more studies, conventional zoning has frequently been blamed for fostering the sprawled urban development[25]. Pendall (1999) investigated relationship between the land-use regulations (adequate public facility ordinance, building permit cap, low-density-only zoning, residential moratoria and urban growth boundary) and urban sprawl, which he defined as low-density urbanization. His estimation found that land-use controls that shift the cost of development onto builders and away from the public reduced sprawl. For example, the county adopted adequate public facility ordinance (APFOs) grew more compactly, whereas regulations that mandate low densities cumulatively increased sprawl. He thus suggested that low-density zoning and annual limits on residential permission should be discouraged to let growth pay its own way[26]. Using propensity score matching methods combined with a difference-in-difference econometric strategy, Towe et al. (2011) examined rural down zoning policy – residential subdivision of minimum lot size zoning in Baltimore County, Maryland and its potential effect on creating urban growth spillovers in adjacent counties, they concluded that autonomous local land use regulations constrain part of development and led to a more scattered and low density development pattern in the whole region[27]. Talen (2013) argued that conventional zoning has a significantly detrimental impact on the urban pattern and form at the local scale by promoting random, homogeneous and disorganized land use pattern. Based on the localized comparing of Euclidean zoning and the new Form Based zoning, he uncovered how the sprawl-inducing zoning differentiate with sprawl against zoning[28].

As a brief summary, from the effects of detail land use regulations on land use pattern in the local area varied with the types of control: it is dependent on how the specific planning tool-zoning is designed and implemented, as well as local setting, particularly institutions (difference of expect in urban growth between higher government and lower government, fiscal arrangement among regional and local government, etc.)

1.3.5 Effectiveness of urban planning in post-reform China

1. Studies on urban expansion and urban planning in Chinese cities

The restructuring of cities and dramatic urban growth in post-reform China have been attractive research topics for both domestic and international scholars, from the aspects of land use change and urban redevelopment (Wu and Yeh, 1999)[29], patterns and process of urban morphological/urban structure changes (Gaubatz, 1999; Yue et al., 2010)[30][31], suburbanization process of population and industry (Feng and Zhou, 2005)[32], social-spatial configuration (Gu et al., 2014)[33] as well as determinant factors of urban expansion with approach of modeling the urban growth pattern(Chen and Masser, 2003; Luo and Wei, 2009; etc.)[34]. In their models to explain the urban growth, Chen and Masser (2003) included variable of urban planning (if the land parcel is planned as built area) to estimate the effects of urban planning on urban land conversion yet, they found that infrastructure and density of already developed area have most significant effects while plans have tiny effects on urbanization, which implies urban growth is out of control of city's master plans.

In recent years, increasing numbers of studies began to question the effectiveness of urban planning in Chinese cities. Theoretically, a few of them built an analysis framework to understand the rationale and practice of Chinese urban planning in association with the changes of social-economic and institutional context, and thus to discuss reasons behind the poor performance of the urban planning. These researchers argued that in the new demand-constrained economy, incompatibility between the planning system and the transitional institutions raised problems since the frequent reforms and rapid growth of the city made the traditional urban planning inefficient in adapting to the rapid changes[35][36][37]. Particularly after the formation of the land market in 1988 and the fiscal reform of 1994, the pro-growth coalition and the entrepreneurial character of empowered local states have brought about the dominance of "development states" in urban planning. Thus, through the examination of the master plans and real urban development in Nanjing city, Zhu (2013) demonstrated that master plans are employed by the local state as a tool to realize the economic target, and also plan adjustment are inevitable to alleviate the tension between plural agents. Other researchers focused on the behaviors of local governments to entangle the process of plan formation and implementation, and found that the poor interaction between local governments was the main reason behind ineffective planning (Luo and Shen, 2008)[38], and the urban constrain strategy initiated by the municipality is often challenged by the unauthorized development promoted by the lower governments (Zhao, 2010)[39]. Mostly based on the structure – agent models, these

studies have pointed out the dilemma of Chinse planning control in the transformation toward market economy and increasing desire of economic growth of the local governments facilitated by the policy changes.

Moreover, among the studies a few of them have employed empirical methods to quantitatively evaluate the effectiveness of urban planning. For example, Zhao (2011) adopted indexes of land use mix and intensity to evaluate the effects of urban constrain strategy in Beijing and revealed unexpected urban development at the periphery of Beijing where urban constrain strategy is challenged by economic activity of local governments[40]. Referring to the methodology previously adopted by the western scholars, Tian and Shen (2011) introduced three criteria (accordance, un-fulfillment and deviation) to identify the degree of conformity between the implemented plans and actual land use of Guangzhou city, they found that the plan attribute (flexibility) and the capacity of government in guiding market economy may influence the implementation of the plan[41].

In the field of housing development management within a market context, began in the 1980s, commercialized housing development has become a heating topic in China. Many researches have analyzed the marketization of urban housing from the aspects of policy change, housing tenure restructuring, provision of affordable housings, physical form of housing projects and so forth. The emerging pro-growth feature of local governments, brought by the administrative decentralization, "land reform of 1988" and "Fiscal reform of 1994", was usually argued as a prominent engine in promoting the rapid growth of housing development. Ineffective planning control was discussed as well, however, these studies mainly analyzed the sprawled urban development with an analysis framework of transition progress of the housing system or actors' behaviors in an institutional and economic context [42][43][44]. Empirical study on the effects of public programs or projects on the housing development growth were absent in the available studies.

The designation of special development zones for special development purpose with detailed land use plans have been widely utilized by the local governments in China to promote urban development. Started from the east coastal cities, 14 national Economic and Technology Development Zones (ETDZs) were firstly established during 1984-1986, and in 2015, there have been total 364 national ETDZs in China, and the share of these national ETDZs in GDP have reached 25%. These development zones have significantly contributed to the national "Open-door" strategy as well as the local economic growth. Furthermore, prompted by the land reform in 1988 and Central State's decision of establishing a socialist market economy in China in 1992, a proliferation of designating

special development zones at local level was initiated across the whole country. This "Zone Fever" even lasts to present days, under the various names of "Industry Zone", "Technology Park", "new CBD", "Ecological Tourist Park", "Logistic Center", "University Town" and so forth. These designated zones have benefited from the priorities of well-equipped infrastructures, attractive investment environment and preferential financial terms. Also, they are planned with structured infrastructure and dedicate land use layout, which could be perceived as a fundamental planning tool.

The important roles of special development zones played in the urban development of Chinese cities have drawn amount of attentions from the scholars in the field of urban planning, geography and land use management. Focusing on the planning, implementation and performance of the special zones, previous researches are mainly categorized into two topics:

Many researchers concern economic and land use efficiency of these development zones by adopting a diversity of indicators to evaluate the performance of designated zones, including investment intensity, economic output, building density, land vacancy as well as completion of the planning targets. For example, Ding (2009) argues that the CBDs planned by local governments in China generally have low land use intensity, it is manifested by the comparison of building density and FAR with other CBDs across the world. He also criticized that the University Towns are always over scaled that cost of physically separated universities may exceed the gains from clustering of different universities. Zhao and Wang (2013) evaluated performance of the new CBD of Hangzhou by analyzing the consistency of construction projects, economic condition, spatial development, management system and society effect with the zone plans[45]. Paying particular attention to the global influences in the zone planning and development, Wu and Barnes (2007) further investigated the process of implementing Pudong New Area of Shanghai and estimated the development consequences. They revealed that the land use planning of the themed zones in Pudong is still limited in the physical design and thus could not coordinate with the global and local factors. It is the manipulation of land market by the Development Corporation of the Zones played decisive role in zone planning, physical expansion of the zone, and moreover urban growth pattern. The competitive and entrepreneurial approach of land management of different themed zones, in combination of imperatives of global firms have diminished effectiveness of the original planning intentions[46].

Another broadly discussed topic is the role of special development zones in the whole city-region structure or urban growth, with a bulk of studies discussed the spatial

relationship between development zones and the mother city. Empirically, using patch analysis of GIS, Li etc. al. (2014) analyzed urban growth dynamic inside and outside the development zones in Shanghai, they concluded that local planning and local policy still drive the urban expansion which is evident in the variation of growth dynamic across the development zones. Also, they found that state power influenced urban development more inside the development zones while market force is more influential outside the zones[47]. A lot of other studies estimated the development process of a case zone and pointed out that isolation from existing urban area have impeded development of the special zones. They suggested that urban planning now needs to promote transformation of traditional development zones toward a comprehensive urban districts, in order to cope with global competition, industry and economic transition as well as the requirements from sustainable development (Wang, 2003; Hua, 2006; Mai, et. al., 2011, etc.)[48][49][50][51].

2. Studies on the urban development of Yinchuan city

Several researches have been conducted to explore the urban issues in Yinchuan city. Some of them contributed to review the history and process of urban development in the city, while most of the studies focused on the transformation of urban structure in the city and attempted to figure out determinant factors underlying the urban restructuring. Economic growth, industrial restructure, policy change as well as urban planning were mostly raised as important factors. For example, Wang (2006) and Liu (2008) examined urban expansion process of the city based on the analysis of urban density change and direction of urban growth, they pointed out the problems of low land use efficiency, spatial imbalance of urban development as well as unreasonable land use layout in contemporary Yinchuan[52][53][54]. While Liu and Mi (2002) compared development quality of residential development in Yinchuan city with other cities in terms of housing area, infrastructure service and living environment[55]. Li et.al. (2002) analyzed characters of housing development in *Xixia* District of Yinchuan, they anticipated development trend in this district and proposed several planning principles to guide spatial distribution of housing development in coordination with the urban function[56]. Ma and Mi (2003) further introduced theory of analyzing relationship between urban planning and real estate development to analyze the functions of urban planning in managing housing development of the city, they pointed out that the inner conflicts between the urban planning and housing development has contributed to eastern sprawl[57]. Zhang (2012) used GIS spatial analysis tools to analyze spatial and temporal change of land use price of different land use types in Yinchuan, her results presented that changes of land price followed planning guidance of the city, meanwhile, clusters of high land price were closely related with the distribution of attractive amenities[58].

1.4 Significance of the research

The previous studies have provided profound insights on the issues of urban development and urban planning in Chinese cities. Yet, the focus of these studies were mainly on the nature of urban planning in relation to the institutional structure and agent-actors in the planning process, or limited on the quantitative measurement of the accordance between the real development and the plans. Moreover, these studies have separately evaluated the effects of master plan on urban development or the effects of a specific planning tool on the urban development. According to the previous studies in the advanced market economy, this may lead to the misunderstanding of the effects of urban planning and failure in identifying crucial problems in the plan implementation. Thus, there is a gap in the studies of Chinese cities in comprehensively interpreting the inter-mechanism of the urban planning and urban development with careful considerations of the local context. It would be more insightful if the examination of the effects of urban planning is based on the integrated analysis of the set of relationships and mutual influences during the planning process that involves various planning elements, such as planning strategies, implemented planning tools or public programs, and resulted urban development.

Besides, majority of the previous study areas are located in the economically stronger regions in east coast or mega-cities like Guangzhou, Shanghai, Beijing and Shenzhen, which experienced explosive population increase triggered by rapid economic growth and massive migration from inland. Cities in the central and western region of China have experienced a quite different development process compared to those in the east after 1978. In the inland areas, the economic growth lagged behind after the reform of 1978, however phenomenal urban expansion has been observed in the very recent years. Thus, the balance between the development pressure and the local economy is currently a specific planning issue for the Chinese inland cities. However, the study that pay attention to the planning and urban issues in western China is rare. Hence, this research may shed light on the strategy and approaches employed by the local governments in promoting and controlling the urban developments as well as special situations faced by the urban planning in the inland Chinese cities.

Therefore, the originality of the study is placed on:

1) Theoretically, the study developed a systemic framework set by the integrated analysis of the mutual influences between the overall planning strategy, planning tools or management measurements, as well as the affected urban developments, in order to

provide a comprehensive approach for evaluating the effects of government implemented political measurements on urban development and understanding local urban conditions. Further to advance the comprehension of the complex relationships during the planning process in the specific local context of inland Chinese cities.

2) Empirically, a deep understanding of the inner mechanism between urban planning and urban development would provide conditions for making clear critical problems and obstacles in the plan implementation, thus contributes to seeking for possible remedied policies and finally improving the performance and effectiveness of the urban planning and political tools in the fast-growing cities like Yinchuan.

The results of the study enrich the knowledge of planning issues in the Chinese inland cities, and serve as enlightenment for improving the corresponding urban policies and the implementation of urban planning in coping with the local circumstance. Based on this, the development of a more efficient strategy in combination with effective measurements, guided by the objectives associate with sustainable development and compact development, would be pushed forward.

1.5 Research methodology

1.5.1 Document analysis

In the beginning, in order to obtain a thorough understanding of the modern urban development process of the study area, previous literatures and documents of development process of Yinchuan city were collected and reviewed; historical chronicle of Yinchuan city (until 1985) and Annual Chronicle of Yinchuan city from the year of 2000 to 2015, which recorded annual events were went through, special focus was put on the records of key construction projects, policies in terms of urban development and management, housing development, special development zones and so forth. Moreover, local chronicle of urban district: chronicle of *Xixia* district (until 2008), chronicle of *Jinfeng* district (2007-2012) and *Xingqing* annual book (2012) were reviewed.

Next, legislation documents of national and local planning, for example, Urban Planning Act, Urban Planning Ordinance of Yinchuan etc., urban policies, for example, Land Management Regulations, were studied in order to acquire a basic and systematic comprehension of the planning and land management context in Chinese cities and Yinchuan city. Further on, chronicle of urban planning in Yinchuan city (1958- 2005) was analyzed for clarifying the background of plan-making, planning principles, planning intention and ideas, and changes of the successive master plans and detailed planning

along with the social economic transition. The work is deepened by analyzing the planning maps and documents in the master plans of Yinchuan city (plan of 1958, master plan of 1981-2000, revised master plan of 1994, master plan of 1996-2010, master plan of 2007-2020 and modified master plan of 2010-2020, 2011-2020). The maps include plans of regional-urban system, land use layout plan in the Central Urban Area (CUA), concepts of prospect spatial structure (CUA), plan of infrastructure arrangement and distribution of public facilities, map of green land conservation and so forth.

Also, official documents that issued approval of establishing special development zones and elaborated outlines of the development zones, official documents of work scheme of special zone development, planning maps (general strategy plan, detailed land use plan, etc.) of special development zones, annual report of development procedure and present situations of special development zones were collected from city's planning bureau, specific zone's management committee and official websites of the development zones, for the purpose to analyze the planning, implementation and development status of the designated specific zones.

In the study of housing developments and public promoted programs. Documents includes Yinchuan housing development chronicle Ⅰ(1980-1989) and Ⅱ (1990-1999), previous publications and literatures of housing policies were analyzed for understanding the transition of housing system in China and Yinchuan. Subsequently, Yinchuan housing plans (2006-2010) (2009-2012) (2012-2016) issued by the city's Housing and Construction Bureau and planning maps were analyzed together with planning ideas of housing developments in the corresponding master plans from 1980, to clarify the housing promotion strategy and spatial intentions of the city.

1.5.2 Field survey

The first field survey was carried out in July of 2014, the main work was carpet observation of present urban structure and urban development conditions of the study area. Major observations were the historical areas of Old Town and New Town, the new housing developments around a key high school in the outskirt of the Old Town, national Technology and Economic Development Zone which is previously Yinchuan's first special high-tech zone, New Civic Center in the New Urban Zone planned in 2002, housing developments around the new forest park, three "work units" located in the old industrial area in the west of *Xinshiqu*, and two large-scaled social housing projects in the central area of the city. Moreover, interview with and hearing from the professor of planning department of Ningxia University, officers of planning bureau and the committee stuffs of

the communities (*Juweihui*) were conducted to support deeper understanding of the urban policies and situations of urban development in the city.

In March of 2015, the author conducted second field survey for collecting the data of housing developments in Yinchuan city. Development data of totally 669 housing projects were obtained. The data of housing projects from 1980 to 2015, including the location, built year, completed year and housing units of each project, were obtained from the records in Yinchuan's Construction Archive and Housing Chronicles, maps of distribution of the housing projects (2005, 2014) published by city's Housing Bureau, maps of social housing projects and lists of completed commercialized projects provided by Yinchuan Housing Bureau, as well as site plans of projects under construction from the city's Planning Bureau. Besides. Maps of basic residential land price in the year of 2001, 2007, 2009 and 2013 were obtained from the Land Resource Bureau of Yinchuan. Also, site visiting and field observation in the projects that lack of precise record was conducted by author, based on the methods of counting housing units with assistance of arterial photos from Google Map and hearing from the managers of the housing projects.

The third survey was carried out in August of 2016. Detailed land use plans of special development zones were collected from Planning Archive of Yinchuan and Administrative Management Committee of Economic and Technology Development Zones, hearing from the stuffs of management committee of development zones were conducted as well. The author also carried out field survey in the special zones to observe land development statutes in the zone areas.

1.5.3 Data analysis

At first, annual data of urban built up area, urban population, investment on housing development, urban housing construction, economic growth (GDP, industry growth, real estate growth, etc.), and development data of special development zones were extracted from the Yearbook of Yinchuan city during the period from 1980 to 2015 as well as materials from the Statistic Bureau of Yinchuan. Based on the raw data, charts were made from these data for analyzing overall trend and changes of the urban development. Moreover, maps of urban built-up area in the year of 1950, 1997, 2005, 2012 and 2014 from the Survey Institution of Yinchuan, urban land use map of 1992, 2008 and 2010 in the master plans were digitalized to analyze the urban expansion process and land use changes in the city.

In the study of the effects of urban planning on urban expansion control, Maps of urban built area, designation of specific zones and maps of land use layout plan in master

plans of different planning period were overlaid with each other. Then, content analysis was employed to further analyze the data, through entangling relationships of elements during the planning process: in light of the social-economic transition, planning concepts and planning intentions presented in the master plans in relation with the designation of specific zones was reviewed; secondly, the actual urban expansion, in relation to the specific zoning, was examined from the perspective of the planning concepts in each planning period.

In the study of the impacts of the public promoted programs on the housing developments. The information of housing development projects and public promoted projects were input into GIS, and plotted on the maps of land use plans and basic land price. Tools of spatial overlay and spatial statistic in GIS were employed to count numbers and volumes of projects in corresponding areas, whereby the confirmation ratio of housing development with urban planning could be measured. Next, in light of the transition of housing supply from public dominated to market-oriented, the roles of public promoted housing projects and facilities in promoting private housing developments are analyzed; further, in comparison with city's housing promotion strategies, the effectiveness of the public programs in achieving planning intentions are revealed, which implies the significance of the public programs in the present housing management.

In the study of the effects of specific zoning on land use pattern. The content analysis is built on the clarification of the institution of the specific zoning, the implementation of the specific zoning in relation to the institution organization, and relations between implementation characters and land development and land use conditions. Land use condition and development process of the specific zones were mainly analyzed from the data of land leasing (2010-2016), including the location of released land parcel, releasing year and price, planning conditions of designated land use type, planned FAR, scale, all recorded in the Land Resource Transaction System of Ningxia and by the Land Resource Bureau of Yinchuan. In addition, land use map of Yinchuan city in 2008 and 2011, published by Survey and Planning Institution of Yinchuan, arterial photos from Google Map (2004 -2015) were used as a base for analyzing the change of land use conditions.

1.6 Structure of the research

There are seven chapters in the thesis.

Chapter 1 introduces background of the research. From this, the research questions and study aims were set up. Subsequently, based on the literature review of the previous

studies, theoretical and empirical significances of the research are explicated with the implication of practice of sustainable development and compact city. At last, data source and analysis methods, structure of the research are described.

Chapter 2 outlines the concept of compact city, which is the viewpoint and concept framework of the whole thesis. In this chapter, sustainable urban forms are firstly discussed; and then the evolution of concepts of the compact city is reviewed. Secondly, key principles of compact city in this research are defined, political instruments have potential in the practice of compact city are discussed as well.

Chapter 3 firstly provides basic information of urban planning in Chinese cities. From the aspects of transformation of the planning system, the institutional structure of the planning authorities and their powers are specified according to the condition of the political-economic transition, and thus legal functions of two layers of urban planning and the development control have been observed. Secondly, the study area is defined and its local context is examined and described.

Chapter 4 addresses on the estimation of effects of urban planning on the urban expansion control in Yinchuan city. At first, in light of social-economic transition, planning concepts presented in the master plans in relation to the designation of specific zones are reviewed; secondly, the urban expansion, controlled or promoted by the designated specific zones, are estimated based on the planning concepts. As a result, mutual effects between the planning concepts, designation of specific zones and urban development are clarified. Ultimately, the implication of urban planning on the critical urban expansion issues is discussed.

Chapter 5 deals with the effects of public promoted programs on the housing development in Yinchuan city. Based on the analysis of housing supply and urban population growth of the city, critical housing supply issues are firstly revealed. Then, start from the case study of designated development zones, the impacts of public housing projects in promoting private housing investment is revealed, and then the roles of public promoted housing projects in leading the expansion of housing developments are clarified. Meanwhile, the effects of public facilities that promoted as local amenities in promoting housing investment environment are made clear based on the analysis of two case areas around the public amenities and also residential land price distribution in the city. At last, the effectiveness of these public promoted programs in achieving city's housing promotion strategies is evaluated and suggestions for efficiently managing housing developments are provided.

Chapter 6 is aimed at estimating the effects of specific zoning on land use pattern in Yinchuan city. Institutional organization of the specific zones is reviewed at first, within this institution setting, the implementation of specific zoning is interpreted in terms of zone development financing, spatial considerations in key functions and detailed land use plan of the specific zones. Subsequently, the impacts of specific zoning on the land use pattern inside the zone area are analyzed, through comparative study of case zones with different implementation characters. Finally, the problems in the specific zoning implementation are identified and improvements of specific zoning for promoting high efficient and ordered land use are discussed.

Chapter 7 concludes the research. This chapter summarizes main findings in the estimation of the effects of urban planning on the urban expansion control, effects of public promoted programs on the housing development as well as effects of specific zoning on the land use pattern in Yinchuan city. Ultimately, from the perspective of compact city concepts, the implication of these findings on the planning practice and urban policy-making for the future vision of sustainable development in Yinchuan city is discussed.

Fig. 1-1 The Structure of research

Chapter 2 The concept of compact city

In this research, the Compact City is placed as the study perspective when the effects of urban planning and public programs are estimated. At first, among a variety of concepts in the sustainable urban development, the concept of Compact City is principally placed at the city-region scale and it is listed as a prime solution against the land consumptive and unordered or sprawled urban expansion[59], which means the ideas of the Compact City could be better suited to the conditions of study object in this research - a rapid-growing city. Secondly, as an extensively adopted vision of the sustainable urban form and development pattern, and since the "compact city" is broadly set as the guidance and development goal in the policy-design, policy improvements and planning actions worldwide, the characters and principles of Compact City could serve as a benchmark based on which the performance of a political decision and planning action is assessed and readjusted. Thirdly, global debates and practices on the strategies to achieve a compact city have provided rich references to the implementation of political measurements in achieving more sustainable urban development in a local city. While the main topics in this research: the control of urban expansion, the spatial organization of private housing developments, the land use pattern, are mainstreams in the discussion of the compact city agenda, the estimation targets of this research - urban planning, planning tool of zoning and public investment direct programs, are perceived as fundamental political tools with great potential in realizing the compact city. Therefore, it is necessary to clarify the concept of compact city before the evaluation and analysis work start in a specifically urban context. This chapter begins with the discussion of sustainable urban form which the "compact city" subjects to, and further draws forth the concept of compact city. Based on a summary of previous definitions of the compact city, in couple with the consideration of special urban issues for the city of Yinchuan, the compact city in this research is defined. Moreover, policy measurements and state strategies that are the potential tools to achieve the compact city are reviewed.

2.1 Sustainable urban development

Sustainable development has become a globally debated topic after the Brundtland Commission Report of *Our Common Future* was published (WCED, 1987). In the report,

sustainable development was defined as ***"development that meets the needs of the present without compromising the ability of future generations to meet their own needs",*** a definition reached most consensus across the world. Later in 1992, a comprehensive action plan named *Agenda 21* promulgated with the Rio declaration was issued by UN, the integration of economic, social and environment values that promoted by the public participation was underlined as a core concept in the strategy of sustainable development. These announcements have become widely accepted concepts in the concerns of sustainability. Nevertheless, more works are needed to substantiate the sustainable development.

Sustainable urban development has always been the main concern of and a great challenge for the sustainable development. In fact, sustainable urban form have long been discussed in the study field of urban development. The discussions can retrospect to the early age of industrialization, the most well-known one is the "Garden City" proposed by E. Howard in 1898. He designed a multi-core city where the towns and counties are connected by the railway and segmented by the farm lands. His proposal has also showed concerns with financial and social practice to realize the Garden City, which could be seen as the initiative effort in realizing a more sustainable urban form.

In 1990s, in cope with the prevailing rapid urbanization in the developing area and dispersed suburbanization in the developed areas, discussions on the sustainable urban development significantly increased. A diversity of terms of "urban villages" (Newman and Kenworthy, 1992), "Traditional Neighborhood Development (TND, Duany, 1992)" "Transit oriented development (TOD, Calthorpe and Associates, 1992)" under the heading of "New Urbanism" (*Charter of the New Urbanism, 1993*), and "Compact City" (Compact city: A sustainable urban form? 1996) as well as "Smart Growth" began to show up, especially under the circumstance of widespread urban sprawl noticed in developed countries.

These concepts were created within varied context and thus lay on different prisms of the urban planning, in terms of spatial scale and contents[60]. The term of "New Urbanism" and "Smart Growth" were more used in U.S. and the term of "Compact City" was generally coming from Europe. The "New Urbanism" more focused on the urban design at the community /neighborhood or district scale; while "Smart Growth" emphasis development strategy and policy implementation in achieving anti-sprawl urban growth at the city-region scale; "Compact city" is more comprehensive, containing both visions of urban form and policy strategies to realize the compact urban development within a city-

region. However, a number of common principles could be found among these concepts, such as self-contained area with clear boundary between urban and rural area, median-high density, mix-use land use, easy accessibility to public facilities and open space, pedestrian friendly and public transport dependence. See summaries in Table 2-1 and Table 2-2. These characters are thus broadly argued as key elements of sustainable urban form.

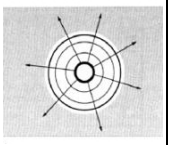
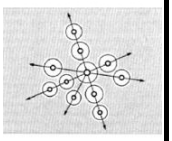
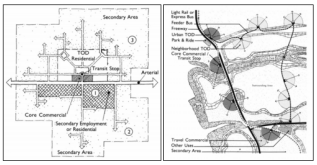
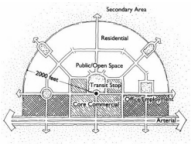
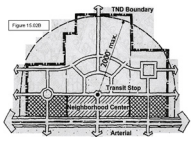
As Jenks et al. concluded in the book *Achieving sustainable urban form* (2000) and the book *Future forms and design for sustainable cities* (2005), there are a variety of urban forms that are more sustainable than the typical present development pattern, in the main they are characterized compactness (in various forms, mostly polycentric urban forms and culturally appropriate high density), mix of uses and interconnected layouts that enables accessibility, closely linked by strong public transport networks, environment controls and high standards of urban management[61].

Table 2-1 Characters of different sustainable urban forms

	Compact city	**New urbanism (TND, TOD, Urban Village)**	**Smart growth**
Main principle	• Contained urban agglomeration of distinct urban boundaries; • Appropriate high-density; • Mixed land use & social diversity; • Efficient public transport and good accessibility; • Self-sufficiency;	• Traditional urban form and self-contained community • Restructuring cities of diverse neighborhoods, • pedestrian and transit oriented; • cities and towns shaped by universally accessible public spaces; • Respect local history and ecology	• Limiting outward extension • compact settlements and open space conserved; • Raising residential densities; • mixed land uses • pedestrian friendly layouts; • Emphasizing public transit; • Revitalizing older neighborhood
subject	urban planning, urban strategy, policy measurement	urban design	urban policy/ planning regulations
scale	region/city	Neighborhood/region(TOD)	region/city

The application of any of these sustainable urban forms needs to be embedded in the local context. For example, in his book *Designing the City-Towards a more sustainable urban form,* Frey (1999) proposed the sustainable city as "people-friendly, works efficiently and has a sustainable relationship with the regional and global hinterland". Based on the summary of general characteristic of sustainability, from the aspects of land consumption, land use pattern, transportation, local social, economy and environment as well as the urban design, he firstly defines the sustainable city is with a structure that enables a high degree of mobility and access to a large variety of different services and facilities without causing congestion; a structure that allows a symbiotic relationship between city and country; a structure that generates highly legible and imaginable settlements forms. Subsequently, he described a sustainable urban form –polycentric network that suit for the region city and applied the model to the city of Glasgow[62].

Table 2-2 Image of different concepts of sustainable urban forms

	Compact city		**New Urbanism**		
Urban form	monocentric	polycentric	TOD	TND	Urban village
	-compact form core to edge -large concentrated center -open space outside the city	-Decentralized compact settlements -linked by public transport -open space may be in between the settlement	-A compact, mixed-use community, centered around a transit station -The transit station connect residents with the rest of region	-mixed-use core, within walking distance for most residents, as employment centre	-A variety of uses -A choice of tenures -A density of development -A strong sense of place
Concept diagram			City-region network  Community vision 		

Source: Frey (1999), "*Designing the City-Towards a more sustainable urban form";* Calthorpe (1993), *"The Next American Metropolis-Ecology, Community, and the American Dream";* Neal(2003), *"Urban Villages and the Making of Communities".*

2.2 Main principles of the compact city

Since the study scale in this research is city and the research scope is focused on the realm of urban planning, political strategies and plan implementation. It seems that "compact city" is the most proper concept could be used as study perspective in this research, based on which the effects of urban planning and outcome of urban policies of Yinchuan city could be evaluated, and implication of the urban planning could be more appropriately discussed. Therefore, the concepts of compact city needs to be clarified at first.

2.2.1 Evolution of compact city

Dantzig and Saaty (1973) are considered as the pioneers in raising up the concept of "compact city", which was crated particularly aimed at reducing urban sprawl and preserving open countryside. In their visions of compact city, a quarter of a million people would live in a two mile wide, eight-level tapering cylinder. In a climate-controlled interior, travel distances between horizontal and vertical destinations would be very low, and energy consumption would be minimized[63]. Since then, compact city is perceived as a city of high dense settlement, clear boundary from surroundings and highly self-sufficient or autonomous. After that, some scholars, such as Newman and Kenworthy (1989), Breheny and Rockwood (1993) further proposed the compact city as an urban form of intensive land use, centralized activity and high-density that development is limited within the existing urban areas[64]. It was argued that this compact urban form would generate benefits of shorter commuting and less reliance on automobile, and thus contributes to alleviating the global warming and resource shortages.

In 1996, the book *The Compact City: A sustainable Urban Form?* Edited by Jenks et.al. stirred up a new wave of discussion of the compact city under the broad discussion of sustainable development. While the benefits and livability of a highly centralized city is frequently questioned, the major points of discussion were turned to the spatial form of the compact city - "Centralization" or "Decentralization". For instance, breaking the traditional image of compact city as "an intense medieval city, whose limits are clearly visible, and where the hubbub of activity is confined within the city's walls", and also standing against the dispersed form of settlements, Thomas and Cousins argued a more neutral "decentralized concentration" of development may provide the settlement pattern opportunities to meet the demand of economic growth, political favor and environmental sustainability[65]. Scoffham and Vale entangled definition of the compact city from the viewpoint of urban management, they stated the city could gain autonomy and

independence by controlling of city size and securing adequate open space, which is the important element of sustainability[66]. These discussions have greatly contributed the theoretical base of the compact city.

Afterwards, in a more practical and dynamic way, Churchman(1999) and Burton(2000) gave a more general definition of compact city that include the intensification of the use of space within the city through higher residential densities and centralization, mixed land uses, limits on development beyond the periphery of the city and efficient public transport and dimensions encourage walking and cycling, which may be achieved by increase of population density, intensive use of buildings, re-use of brown field and conversion of existing development[67][68]. Later, Burton (2002) outlined three principle of compact city: high-density, mixed use and intensified, based on the three principles, he proposed 12 indicators to measure the compactness of cities in UK. For instance, increase in population (reurbanisation), subdivisions and conversions, reuse of empty buildings, increase in density of sub-centers and so forth[69].

In 2005, Neumanan presented a more inclusive definition of compact city with 14 characteristics: a. High residential and employment densities; mixture of land uses; b. fine grain of land uses(proximity of varied uses and small relative size of land parcels); c. increased social and economic interactions; d. contiguous development (some parcels or structures may be vacant or abandoned or surface parking); e. contained urban development, demarcated by legible limits; f. urban infrastructure, especially sewerage and water mains; multimodal transportation; g. high degrees of accessibility: local/regional; high degrees of street connectivity internal/external, including sidewalks and bicycle lanes; h. high degree of impervious surface coverage; low open-space ratio; i. unitary control of planning of land development or closely coordinated control; j. sufficient government fiscal capacity to finance urban facilities and infrastructure[70]. This definition covered aspects of urban form and land use, social and economic elements, engineering, as well as planning control and policy tools. As new elements, social diversity and economic vigor were appraised as important factors to evaluate compact city, and the practical meaning of compact city was further pushed forward. Similarly, Daneshpour and Shakibamanesh(2011) presented a definition that also included social, economic and environment elements, such as high life quality, preservation of green space, enhanced business and trading, high open space ratio and population diversity[71].

In 2012, OECD Green Growth Studies of *Compact City Policies-A comparative assessment* explored the definition of compact city and attempted to make clear of some related terms of “Density”, “Proximity”, “City size” and “urban structure”. According to

OECD, the key characteristic of compact city is A. Dense and proximate development patterns: urban land is intensively utilized, urban agglomerations are contiguous or close together, distinct border between urban rural land use and public spaces are secured; B. Urban areas linked by public transport systems: effective use of urban land, public transport systems facilitate mobility in urban areas; C. Accessibility to local services and jobs: Land use is mixed, most residents have access to local services either on food or using public transport. In this sense, compact city is a policy approach to sustainable urban development and urban form at the metropolitan scale, while no specific urban structure is applied to the compact city and building form of compact city is not necessary high-rise buildings.

As a conclusion, from the beginning, the compact city was more perceived as a physical vision for urban form mainly serve the purpose of the urban design and planning. In this early age, the focus of compact city is on the physical urban facts, and is borrowed from the image of the medieval-age cities that highly centralized. Accompanied with the advance of discussions of sustainability toward tri-pillar of environment, society and economic in 1990s, social and economic dimensions were concordantly incorporated into the concept of compact city as well, and it is realized that for the cities already expanded in the period of rapid-urbanization and suburbanization, compact urban forms are not necessarily to be single-core centralized. Most recently, the concept of compact city is more utilized as a development approach toward sustainable development and green growth, which is infused in the urban policy decisions and development strategy making, and thus evolved into a comprehensive and more applicable concept in the domain of urban planning.

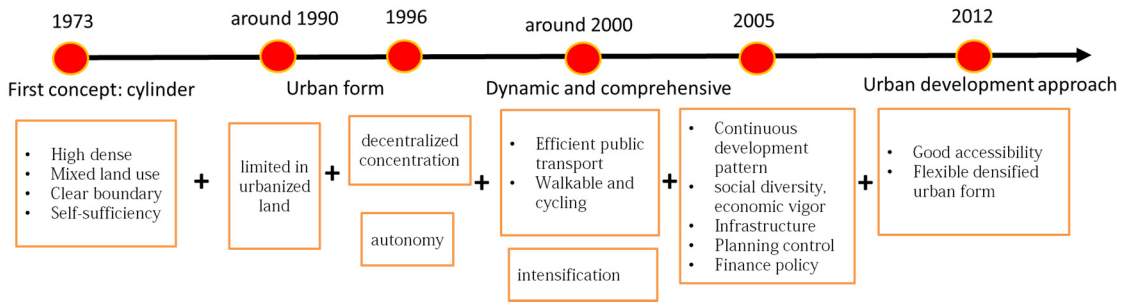


Fig. 2-1 Evolution of the compact city

2.2.2 Principles of compact city

Various definitions of compact city were presented from the viewpoints of urban form, environment, social and economic as well as policy strategies, the definition of compact city is still undergoing heated debate. No single answer exists, however, from the summary of previous definitions of the compact city, some common characteristic of compact city become clear, for example, dense development, mix land use that facilitates good accessibility and public transport oriented development. Moreover, despite the substantial variations of urban context around the world, and the adoption of concept of compact city in a specific city needs adjustment of common visions to fit local situations, yet, a general understanding of the principles of compact city and certain broadly accepted standards is quite necessary in comprehending and evaluating the development condition of a specific city[72]. Not only for a global consensus and cooperation, but also for setting more clear targets in the practical actions. Hence, based on the above discussions of the common features of compact city, in general, **the compact city could be characterized as**:

1) Constrained urban growth: for either monocentric or polycentric city-region, urban expansion is properly contained. This means an anti-sprawl form of a more contiguous development pattern, and urban development are tightly-organized and concentrated in urban agglomerations. Excessive occupation of green field is well controlled while the unordered urban expansion (scattered, leapfrogged) is prevented. In addition, through reutilization and efficient use of existing urbanized area, adequate open space is secured.

2) Mix and intensive urban land use: intensive land use based on reasonable building pattern and appropriately high building density, whereby high land use efficiency could be achieved and clear boundary between urban and rural area could be identified. Moreover, mix of compatible land use are preferable: jobs and housing developments are balanced, while good accessibility to public facilities and daily services is promoted. Consequently, long commuting is avoided, while pedestrian and cycling are encouraged, thus dependence on automobile is decreased.

3) Coordination between the public transport system and land use development: public transport is prioritized, and urban agglomerations are effectively connected by the public transport system; the transit-oriented development is preferred for the land use development around the transit nodes and thus efficiency of public transport is guaranteed.

2.3 Practices to realize the compact city

While the concept of compact city have been widely discussed, to date much less efforts were made to move toward how to realize the compact city in the local context. Although it is well recognized that the practice of compact city is highly crucial, giving the considerations of complicated factors involve in the substantiating of a planning concept, the grounded research have advanced slowly[73]. Nevertheless, according to the report of OECD (2012), in recent years, many countries have incorporated compact city in their urban development strategy and policies, both at national level and local level. The terms of compact city have increasingly been mentioned in amount of political documents, and there are growing numbers of discussions on the specific political measurements to support these policies. Based on the categories developed by OECD, the policy instruments of compact city could be categorized as:

2.3.1 Regulatory tools

Urban planning has long be employed by the governments to guide urban development towards a strategic structure and to promote rational development pattern for the future development. Thus urban planning is a fundamental instrument that helps to regulate building activities and to realize the compact city.

1. Strategic plans

Urban policies (development strategy), master (general) plans and zoning or urban design guidelines are essential and basic parts in the urban planning. By incorporating principles of sustainability or compact city into the planning concept, an overall development guidance that built with sustainable goals could lead and inform subsequent plan implementation and citizen actions toward this common goal. For example, UK has actively adopted compact city policy in its planning strategy. In the PPG 13 on Transport in 1994 (DoE and DoT), higher urban density around transport nodes and development plans to reduce the need to travel by car were proposed as planning guidelines. Later on, the PPG 1 (DoE, 1997) also demanded local authorities to promote mixed land use through planning, particularly in transport-accessible town centers. These plans demonstrate the intentions of the central government and stand at the centerpiece in the planning activities of the whole country to guide and regulate local planning practices.

2. Planning regulation

Based on the guidance of general plans and strategic policies, planning regulation are

the most broadly implemented tools in the practice of compact city.

A. Urban growth management programs

The most popular programs in the urban growth management for controlling city-region urban expansion and urban land consumptions are Urban Growth Boundary (UGB, the well-known one is Maryland in 1970s) and green belt (The Great London Plan, 1935). These growth management tools are physical boundaries delineated to contain urban growth within a certain area. The lines are drawn to strictly restrict the urban development beyond the boundary based on a reasonable prediction of development demands, usually the UGBs are periodically modified to meet new demands. The other tools, such as "down zoning" and "housing cap" are based on the similar principle to physically limit urban growth, while urban service boundary is designated with similar function of the UGB, but in fact, it is implemented as a fiscal tool, which manipulates development projects through infrastructure supplies. By containing the urban development within a tightened amount, it is believed that concentrated development and more infilling development in the existing urban area would be stimulated, as a result, precious green land and open space are conserved.

B. Land use regulations

As the most widely utilized planning tool, land use zoning is considered as an instrument that directly affect land market and thus impose controls on the land use pattern and urban form. By prescribing land use types, building density, building forms, requirement of parking and open space, street patterns and so forth, zoning is designed to control the expected urban development in the designated districts or specific areas. Traditional zoning was mostly used to promote exclusive land use and protect the private property values, however, along with the recent rising of principles of sustainable urban forms and compact city, zoning has shown its potential to promote land use pattern that contribute to whole urban sustainability. Firstly, by designating targeted areas that attached with special regulations, specific zoning is used to coordinate planning strategies. For example, in the Smart Growth strategy of Maryland in 1997, "Priority Growth Areas" are designated and funded by the state to accommodate new developments into strategic locations. Also, a number of overspill centers designated outside the existing cities as a confirmation of the "concentrated deconcentration" strategy in Netherland, are argued as effectively eased development pressure on central city and prevented sprawl into rural lands, and thus contributed to the protecting of the "Green Heart" in Randstad. Moreover, imposing proscriptive zoning codes for development projects, such as minimum

floor area ratio (FAR), minimum building density, or establishing a mix used district where diverse but compatible types of land use close to each other are arranged, or providing design codes for pedestrian friendly street pattern, building activities are regulated to an intensive and mixed manner. For instance, in recent decades, regulation tools for promoting mix land use were introduced, including Planned Unit Development (PUDs), special districts, form-based zoning and performance zoning. Sometimes, more flexible and prescriptive zoning codes are introduced, called as "smart codes", to induce certain type and quality of development, for example, cluster zoning for preserving open space. By either way, the targets of compact city are expected to be substantiated.

C. Development procedure control

Development impact fee is another widely employed regulation tool to control the development projects. Through the review of a specific project site, for instance, based on the performance zoning, the developers are required to meet certain development standard of compact city in order to obtain the development permits; otherwise, payment of the impact fee or provision of other planning gains are required. The tool of development impact fee is usually used to fund public cost, but it could be also used to encourage efficient development pattern.

2.3.2. Fiscal tools

At present days, it is realized that the implementation of traditional regulation tools are becoming increasingly difficult in a free market economy and democracy society, more market-oriented tools are thus innovated in order to remove the obstacles in promoting dense and mix used development and help to effectively channel the developments toward compactness.

1. Incentives

In New York City of the US, zoning bonus and development right transfer have been initiated as early as 1970s, mainly aimed at encouraging supplies of public space in private commercial development and the protection of historical districts. The effectiveness of these incentive measures has brought about prospects of the fiscal tools for achieving compact city. For example, transferring the development right from urban development control area to other areas appears more acceptable for the private developers then compulsive zoning requirements. Also, density bonus could be utilized to promote more dense development in the development priority area. Another innovative approach is the split-rate property tax to stimulate redevelopment of the buildings, and

the location efficient mortgage is used for attracting residents to inhabit in walkable and dense neighborhoods.

2. Public funds and investment promotion

The second type of financial tools for putting the compact city into practice is the fiscal funds or development programs promoted by the public sectors, these programs serve to direct private investment into the targeted areas. For example, financial support for brownfield redevelopment, credits or subsidies provided for affordable housing development are introduced in the Smart Growth Strategy in US. Moreover, public programs, like capital investment program (infrastructures), amenities, public facilities or flagship projects developed or led by the governments, may have promising effects on leveraging private investments into development promotion areas.

3. Other tools

A. Partnership

Public promoted projects could also be carried out by the cooperation with private partners or other bodies, agreement between public and private sectors could help enhance public effects in private development and release the risk for both public and private developers.

B. Public purchase

Public land acquisition is usually used to protect green land and open space in the peripheries of the city. Recently, public ownership of natural parks and other green infrastructure is introduced. The measurement is considered as a tool of most lasting effects for accomplishing conservation of open space and the constrained urban development, however, the public purchase cost high price and imposes heavy burden on the public budget (Talen and Knaap, 2003)[74].

As pointed out by Bengston etc. al (2004), the implementation of these political instruments are critical, their performance are dependent on the administrative efficiency, institutional structure and participation of stakeholders during the process, yet, the evaluation of effectiveness of these political instruments is always inadequate[75]. As a variety of above instruments have been put in place in many countries, as stated by the report of OECD (2012), it is essential to understand **local circumstances** and adjust policy goals, strategies and political measurements accordingly to achieve a successful compact city in a specific city. Moreover, coordination of governance **horizontally** and **vertically** are

crucial for the efficient policy outcomes. Careful examination of the effects of these instruments is definitely needed to clarify the problems in the policy implementation. Contemporarily, in the city of Yinchuan, master plans, specific zoning with land use regulations, and public investment are major political tools adopted by the local governments to control and intervene the urban development. Thus, in this research, the study focus is mainly placed on the estimation of the effects of these already implemented instruments, however, based on the close estimations of the existing tools, more innovative measurements are expected to be introduced to cope with ongoing issues in the practice of compact city.

Chapter 3 Chinese planning system and local conditions

This chapter gives a whole picture of urban planning system in China. Modern urban planning of Chinese cities began after the socialist state was founded in 1949. At the beginning, the urban planning of China was predominantly borrowed from the Soviet, which mainly served the socialist industrialization. After the economic reform in 1978, western planning concepts were gradually brought into China and the present planning system of China are largely based on the western ideas. In this chapter, the planning system of China is unfold through the reviewing of the transition of planning system along with the social-economic changes and the straightening out the planning institutional structure; further on, current planning system is introduced by the elaboration of functions of the two layers of urban planning - master plans and detailed plans, the urban development control is described as well. The second main content of this chapter is the examination of local context of Yinchuan city, from the aspects of administrative structure, main development policies, population and economic changes, and progress of urban development. The urban structure of the study area is explicitly explained as well. The basic information of Chinese planning system and the outline of the study area help to deeply understand the special context in which the urban planning and urban policies are operated and the urban development occurs, and also to support more clear interpretation of the urban and planning issues in Yinchuan city.

3.1 Planning system in China

3.1.1 Transformation of the planning system

Modern urban planning work of Chinese cities started after the foundation of socialist China in 1949, the planning system has been going through constant transition since the social-economic context has transformed from the centrally controlled planned economy toward market economy, and the main operation body of urban development projects have shift from public sectors toward private developers. Until now, a comprehensive planning system that comprises of both urban planning and rural planning has been formulated in China.

1. Urban planning under the socialist industrialization (1949-1977)

In the central planned economy, since the socialist state of China was founded, it was central economic plans that dominated the urban development. The role of urban planning was limited due to the dominance of the economic plans, central government control and the decision-making power of state-owned enterprises that subordinated to different economic departments in the actual development. Urban development was organized based on the "work units", which are development projects for promoting industrialization and allocated by the central economic plans, and were developed by the state-owned enterprises or public institutions[76]. Thus, urban planning only served as a spatial tool to accommodate these "work units" projects into urban space, and was lack of power to comprehensively arrange developments in the whole city. In this period, the city plans of Yinchuan was made by the provincial authority to follow the national and provincial development plans.

2. Urban planning in the early stage of post-reform period (1978-1988)

The market economy and administrative decentralization was propelled after the 1978's "reform and opening up" in China. Urban planning of Chinese cities was gradually recovered from the political turbulence of "Culture Revolution" during 1967-1977, since the Central States have issued series of notifications on enhancing the planning work since 1978. In this period, local states gained much more autonomy including independent fiscal management and planning of urban development. Yinchuan city's own planning committee was established in 1978 as a specialized institution for plan-making. In 1985, Yinchuan city's planning and management bureau was established, which is responsible for the plan-making, plan implementation-drawing up detailed plans and development control of single projects.

In this period, "work unit" based urban development was replaced by a new urban development type "comprehensive development". The comprehensive developments are large-scaled development projects that comprehensively planned by the city government and carried out by the developers that subordinated to the city government, under the supervision of the planning committee and bureau of the city.

3. Establishment of a comprehensive urban planning system (1989-)

Due to rapid growth of market economy and urban development especially after the "land reform" in 1988, widespread of unordered urban development was noticed in China. The central government began to realize the importance of development control, and urban planning should function more like a development regulator other than a

subordination of the economic plans. Therefore, China's first City Planning Act was enacted by the National People's Congress at 26 December 1989 and was enacted from 1 April 1990. With the act, a strict top-down plan-making and planning control system was enforced to manage the urban growth towards a more rational pattern. According to the act, the master plans (*Zongtiguihua*) of all the province capital cities and cities with population over one million must be examined and approved by the State Council. Once the master plan is approved, the plan gains legal status, and any adjustment of the plan is basically prohibited. Besides, a second tier of urban planning was introduced, called as Detailed Development Control Plan (*Kongzhixingxiangxiguihua*) that is drawn by the Municipal Planning Bureau based on the master plans to control the land use and development projects in a planning unit. All development projects within the urban planning area should conform to the planning regulation, which is examined and supervised by the Municipal Planning Bureau.

4. Present planning system: coordination of urban and rural planning (2007-)

Due to the long separation development of urban and rural areas in China, development control has always been looser in rural land than urban land in China. In order to support the national strategy of urban-rural integration, on 28 October in 2007, a new planning Act "Urban and Rural Planning Act" was promulgated by the State Council and was enacted from 1 January of 2008, meanwhile, the old 1989's City Planning Act was abolished. The new act emphases the coordination between the urban development and rural development, in which the city plans, town plans and village plans should be coordinated by an overall urban system plan.

In terms of the plan approval and implementation, the hieratical approval of the plans was kept same with the 1989's Planning Act, however, public participation was more stressed. According to the new act, before the master plans and detailed plans are submitted to central or upper government for approval, the plans should be estimated through public hearing and peoples committee of corresponding-level, and also broadcast to all the citizens. The development projects in the urban planning area and town planning area are examined by the city's planning bureau and the county's planning bureau, respectively.

In the act, the flexibility of urban planning was considered as well. Under certain circumstances, such as the master plans of the upper governments are changed, a key project that approved by the State Council requires plan revision or it is estimated and proved the necessity of plan revision. At first, the plan-making institutions should prepare a report listing the reasons of the revision, and submit to the plan approval authority, only

when the authority agrees to change the plan, the plan could be subsequently modified and re-approved under the legal approval proceeding. Similarly, the procedure also applies to the revision of detailed plans. Despite slowly progressed, the urban planning legislation in China is evolving with the social-economic changes, and is heading toward a more strengthened and sound system.

3.1.2 Institution and function of urban planning

This section explicitly explains the present institution and function of urban planning and urban planning management.

3.1.2.1 Hierarchy of the government

Chinese administrative system is vertically divided into two layers- the central government and the local government. In the central government tier, the State Council (*Guowuyuan*) holds the highest administrative and decision-making power in the entire governmental system, under the direct supervision of the State Council, a variety of Ministers are responsible for the specialized national issues of different fields, agriculture, education, urban-rural housing and construction(responsible of urban planning) and so forth. The hierarchy of the local government is: Province (Autonomous Region), Municipality, County, Township and Village. Horizontally, the functional departments in each level are administratively supervised and financed by the corresponding local government. At the same time, each department is functionally supervised by the corresponding department of upper government level (Fig. 3-1). The responsibility of central government and local government is below:

Central government: Legislation, national plan making, policy/plan estimation and approval, supervise subordinated ministers and local governments, etc.

Local government: local ordinance/regulations making, local plan making and estimation, evacuate orders from upper government, report to the upper government, charter functional departments, supervise works of subordinated departments and lower governments, etc.

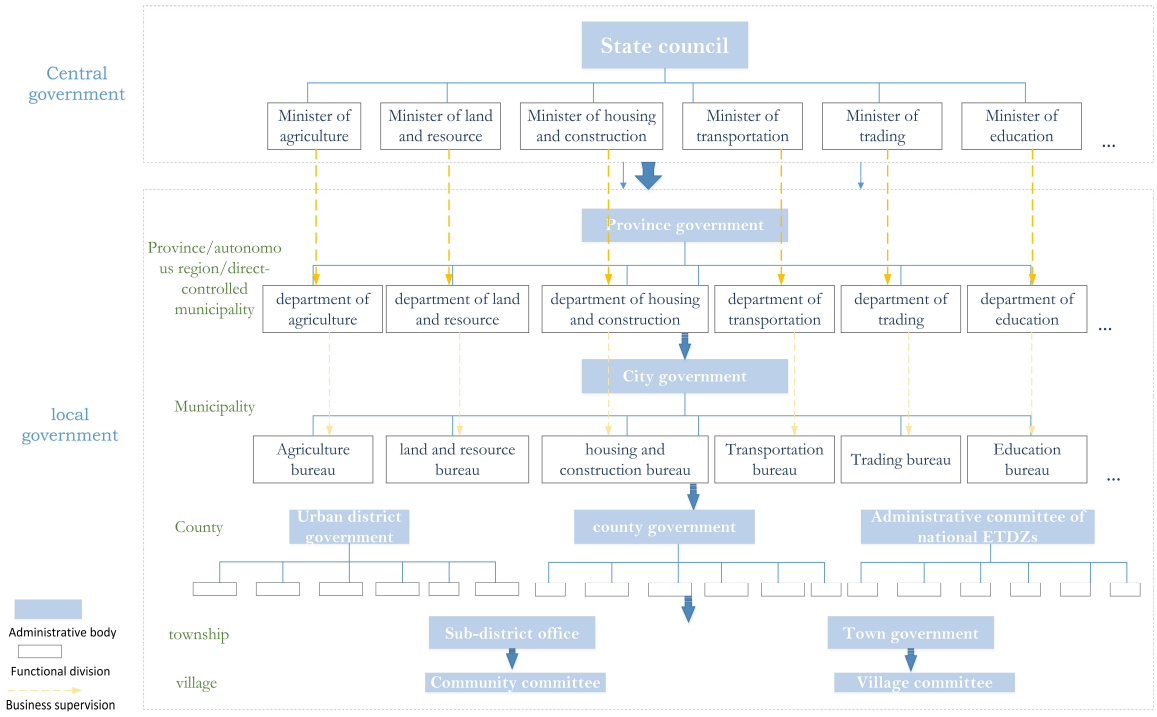


Fig. 3-1 Hierarchy of government in China

3.1.2.2 Two tiers of urban planning

- **Master plans (Comprehensive plan)**

According to the 2007's Urban and Rural Planning Act, Master Plans (M.P.) of cities and towns are official development plans prepared by the municipal government. The master plans should first set up development goals, targeted urban population and targeted size of urban construction usually in a time span of 20 years. In the master plans, spatial development strategy, visions of functional structure and land use layout, arrangement of construction projects (infrastructure, public facilities, etc.), development priority plan (designation of area suitable for construction, construction prohibition area, etc.), plan of green space system, and disaster prevention plan within the planning area should be included. In addition, short-term plan for construction projects (usually 5 year time span) and implementation guidance should be incorporated as well. Thus the master plans mainly function as a guidance for the overall urban growth, and master plans are the foundation of detailed development control plans. In the mega cities, District Plans (*Fenquguihua*) are encouraged to provide further control at urban district level, which may function as a division of master plans.

- **Detailed Plans**

Detailed plans are drawn up and framed by the master plans or district plans, the planning target is the area faces immediate development or specific areas assigned in the master plans. Detailed plans are divided into two types: Detailed Development Control Plan (DDCP) and Detailed Construction Plan (DCP).

DDCP: By designating the boundary of a specific area (planning unit) and providing guidelines for the functional orientation, land use layout, infrastructure structure, regulations of land use (permitted land use type, maximum building density, maximum building height, maximum floor area ratio, minimum open space ratio, etc.) inside the zone lines, Detailed Development Control Plan is prepared for the area that future projects are uncertain. The detailed development control plan is the main reference when the Planning Bureau evaluate the application of a specific development project. And the specific zoning – designation of a specific zone for special development purpose and provided with detailed land use plans, is one kind of DDCP that aimed at controlling or promoting expected urban development into a planned manner at local scale, and thus is the fundamental planning tool in Chinese cities.

DCP: By delineating boundary of a specific project and stipulating building regulations as well as design codes inside the planned project boundary, detailed construction plan is prepared for the immediate construction project on a specific land parcel.

The detailed development control plans are prepared by the corresponding city/county government, and required to be examined by the municipal Planning Committee and approved by the municipal government, after that, the plans need to be submitted to the upper government for recording. The revision of the DDCP requires approval from the original plan-approval institutions and examinations from the corresponding local government after the revision.

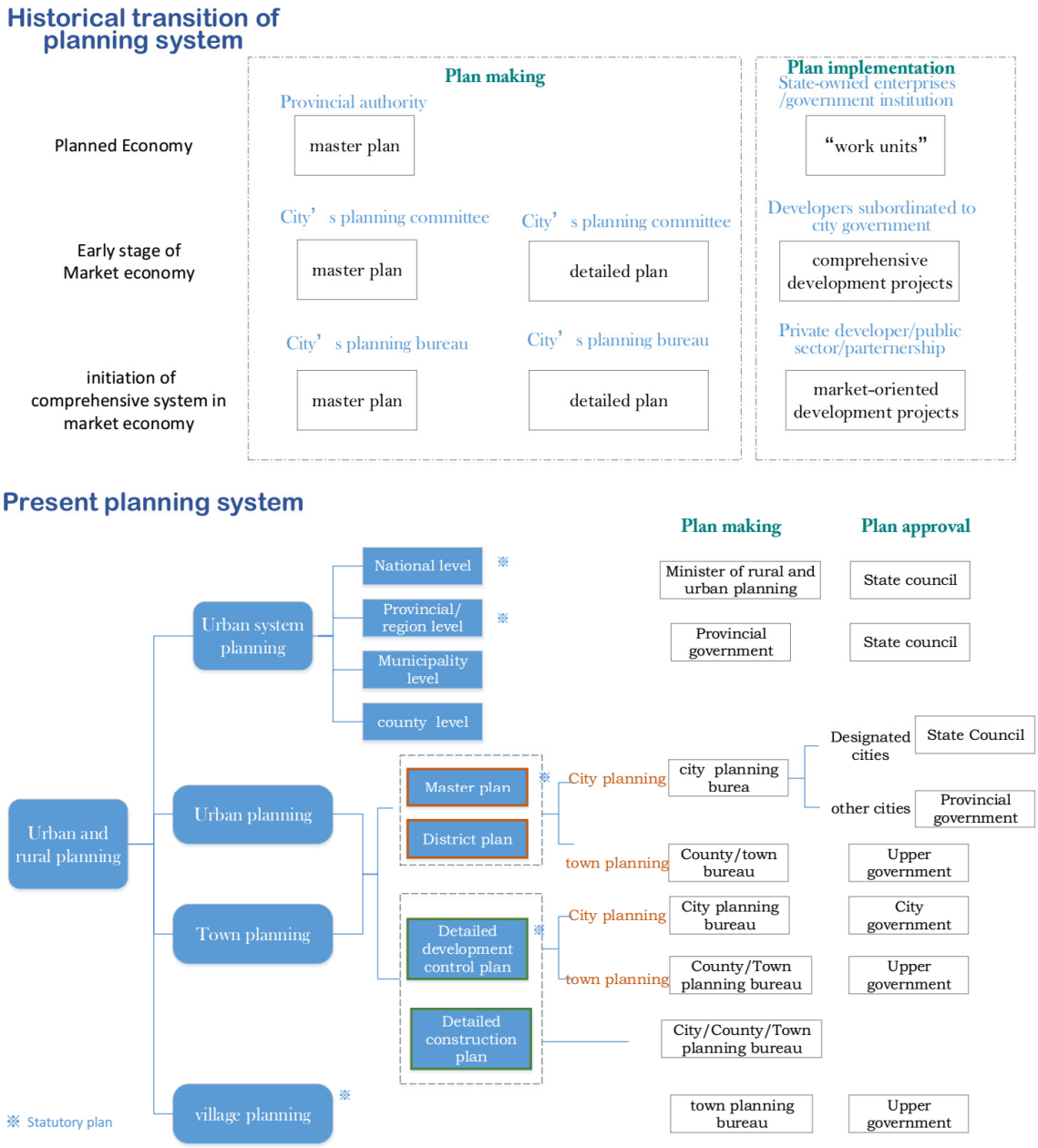


Fig. 3-2 Transition of planning and present planning system of China

3.1.2.3 Development control

- **Land system in China**

In China, all the urban lands are owned by the state and rural lands are collectively owned by the villagers. Before the economic reform of 1978, urban lands were allocated to the developers of "work units"- state owned enterprises with free land use right, same as housing, land was not considered as a commodity. From the 1979's "Sino-Foreign Joint

Venture Enterprise Law", it was stated that the foreign investment enterprises should pay the land use fee, which is the first declaration of paid land use right in China. In 1988, the State Council took a further step in "Land Reform", the PRC Constitution was amended and "Land Management Law" was enacted to legalize the paid transfer of land use right, which provided legal foundation of a land market. Since then, a "Dural track" land system was established, the land use right could be administratively allocated or transferred by the market ways of negotiation, tender and auction. Since the state still retain the urban land ownership and rural collectives are not allowed to trade the land by themselves, only local governments are authorized to expropriate the rural land and convert the rural land into urban land, and subsequently lease the leveled land to the private developers in return of land leasing fee. During the conversion process, local governments are responsible for the compensation and resettlement for the famers who lost their lands, however, the compensation based on a minimum standard set by the municipal governments have been much lower than the land transfer fee in the market, for example, the compensation fee to farmers in one industrial zone of Yinchuan city is 18 yuan/m^2, while the land transfer fee in the zone could reach 1659 yuan/m^2. Under this circumstance, revenues gained from land leasing become a major source of extra-budget for the local governments, and this fiscal revenue is primarily used to develop urban infrastructures.

- **Planning permission**

In 1989, with the enactment of City Planning Act, the power of planning authority to directly control the development projects at the land parcel level was enforced - "The land use and all development projects within the urban planning area should conform to urban planning and be subject to planning administration" (Article 29)." According to the new Urban and Rural Planning Act of China (2007) and Urban and Rural Planning Ordinance of Yinchuan (2010), within the urban planning area, "Note on the Project Location" (*Xuanzhiyijianshu*) or "Planning Condition Note" issued by City's Planning Bureau is indispensable document for obtaining urban land use right from the local government. In principle, the main reference for issuing the Notes is the detailed development control plan, only land parcels that designated with detailed regulation conditions (land use type, FAR, etc.) can be allocated for public projects or leased to the developers. For private projects, holding a "State Land Transfer Contract" attached with "Planning Condition Note" that signed with local government above the county level, developers can apply Land Use Planning Permission that issued by the city's Planning Bureau and then the Building Permission issued by the city's Construction Bureau. Therefore, plan regulation is the main tool employed by local government to control development projects in detail.

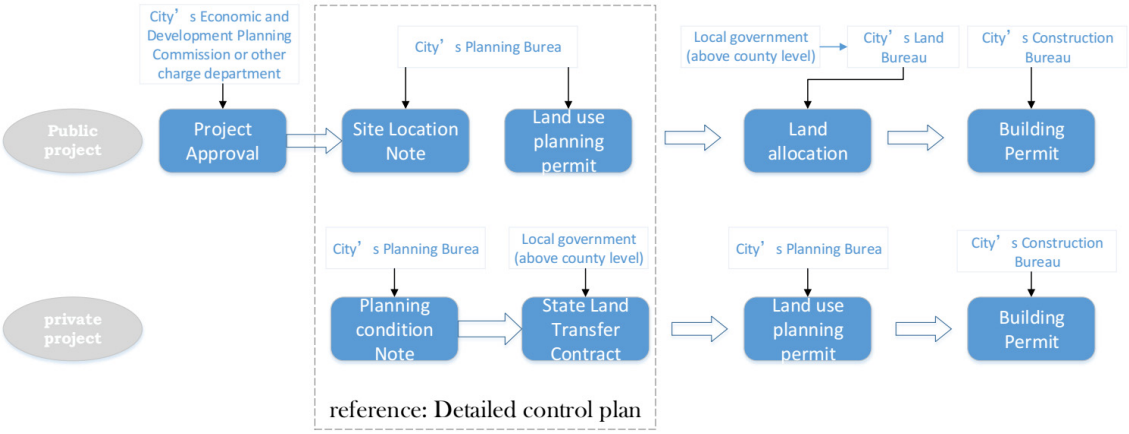


Fig. 3-3 Planning control and development management

In the market-oriented period, the application of Permission Note is essential both for developers and planners that the process usually involves complicated negotiation between developers and local governments. Therefore, developers seek profitable sites based on market conditions while the development site settled in the end might be influenced by ideas from the government. On the other hand, particularly after 2002, targeting inward investment and revenue of land-leasing, Yinchuan's government tend to adjust plans to meet requirement from the developers. For example, in 2012, the city government invited one of the biggest property developers of China - *Wanda* to develop a mega-complex in the city, as a result of the negotiation, the government hall of the Xixia district which was just built in 2005 on the site planned for public facility, was demolished to make room for this new commercial complex.

3.2 Local conditions of the study area

3.2.1 Urban development of Yinchuan city

Yinchuan city, the capital of Ningxia Hui Minority Autonomous Region (province-level), has long been an agricultural center due to its advantage location at the upstream of the Yellow River. Crossed by a north-south national road in the east, the city is also a historical trading center that benefited from the "Silk Road" and a defense center of the local region. The administrative area of the city is 9025.38km^2, with a total population of 2.16 million (2015). The municipality is comprised of 6 administrative units: three urban districts (Xingqing, Jinfeng and Xixia), two rural counties (Helan, Yongning) and one county-level satellite city (Lingwu, which was annexed by Yinchuan in 2002). In 2015, the urban built up area of the city was 169.1 km^2.

Table 3-1 Administrative structure of Yinchuan municipality

municipality	county			township			village	
		Population (10,000)	*Administrative Area (km²)*	*Sub-district*	*Rural town*	*Town*	*Community*	*Village*
City proper	*Xingqing* District	72.52	828.26	11	2	2	67	32
	Jinfeng District	29.92	353.00	5	2		42	19
	Xixia District	34.91	1129.27	6	2		50	16
Rural area	*Yongning* County	23.26	1178.68		5	1	8	69
	Helan County	24.66	1527.20		4	1	8	60
Satellite county	*Lingwu* city	27.63	4008.97	1	6	2	12	67

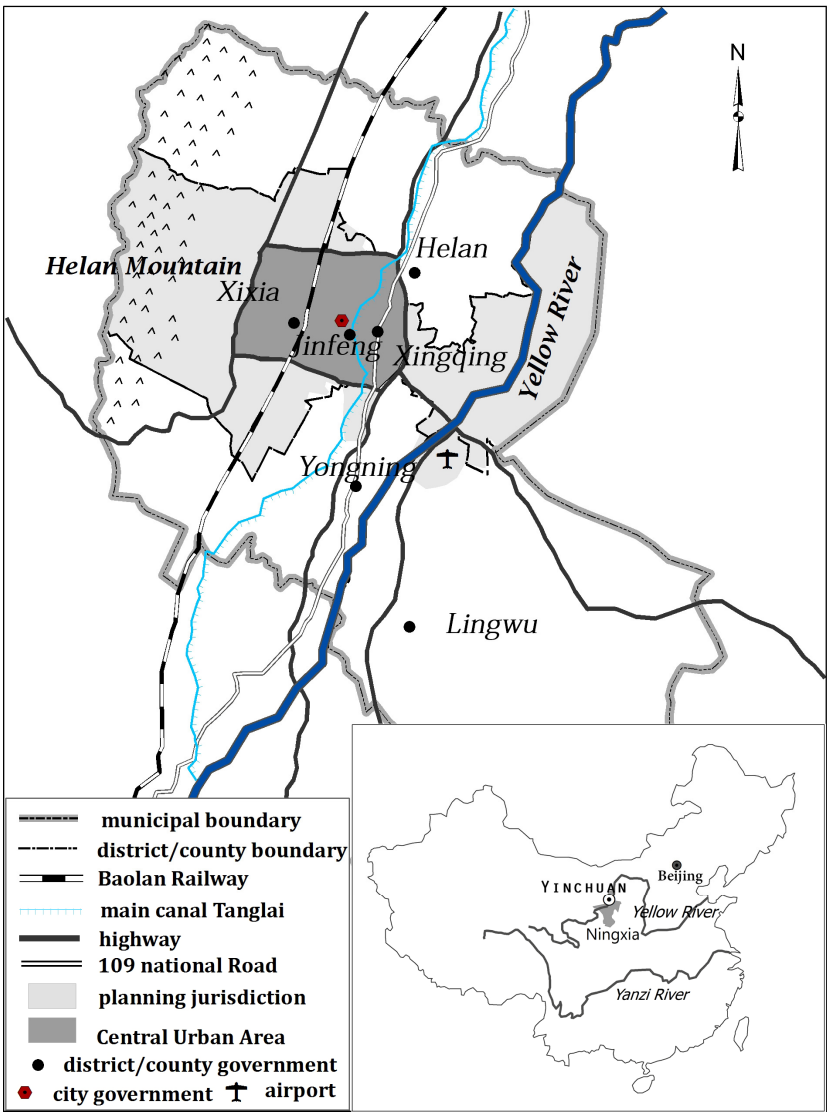


Fig. 3-4 The Central Urban Area of Yinchuan city as the study area

The modern urbanization of Yinchuan started in 1949, when the People's Republic of China was founded. The modern urban development can be divided into 3 phases, distinguished by their founding social- economic policies: 1) 1949's Centrally Planned Economy; 2) 1978's national economic reform; 3) 2002's city policy of "Big Yinchuan".

1. The Socialist Industrialization and the Centrally Planned Economy (1949-1977)

After the socialist state of China was founded in 1949, the urban development was controlled by the central economic plans. The central government played a dominant role in the urban development by allocating development projects, called "work units" (*Danwei*) into the city, for promoting industrialization according to the plans of different economic departments. Each "work unit" is an enclosed compound contained the workplace for a state-owned enterprise or public institution, as well as houses and daily services for the employees.

2. Transition towards Market Economy and remained dominance of public sectors (1978-2001)

The reform towards market economy was propelled by the national Economic Reform from 1978. With the rise of market values, administrative decentralization was also promoted and local governments gained more autonomy to plan the urban development. However, Yinchuan didn't experience rapid growth of its market economy as the cities in the east coast, mainly from two reasons: 1) the constraints of the inland position did not facilitate foreign investments; and 2) the national experimental policies for marketization were mainly implemented in the east coastal cities. Thus, the public sector still played a dominant role in the urban development. According to the data of 1997, 73.90% of annual constructed housing floor areas were still public investment. During 1980-2000, the annual increase of urban built up area in Yinchuan was merely 3.13%.

3. Rapid growth of the Market Economy brought by the change of city policies (2002-)

In the Notice No. 23 of 1998 - "Further facilitating housing commercialization", the State Council announced its decision to terminate the welfare housing system that allocated through the "work unit" system and to create a diversified housing provision system with commodity housing as a main source. The decision greatly facilitated the commercialized housing development in China. In 1998, the annual investment in urban housing in Yinchuan increased 89.5% from 1997, while the share of public investment in 2000 had fallen to 26.63%.

Soon after, in order to help western China's economic development, a Leadership

Group for Western China Development was created by the State Council in January 2000. The aim was to support infrastructures and enticement of investment in under-developed western region by central finance and preferential terms. In 2002, as a response to the central policy "China Western Development", the city developed a new strategy "Big Yinchuan", which aimed to reform the city into an economic center of the wider region. In order to gain space for promoting rapid urbanization, the previous administrative urban area (city proper) that contained two urban district (Chengqu, 15.78m^2 and Xingchengqu, 69.66m^2) and a suburban district (Jiaoqu, 1209.06m^2) was readjusted into three urban districts, and the urban administrative area was enlarged from 1294.50 km^2 to 2067 km^2 in 2002.

Moreover, the central "Tax-sharing Reform" from 1994 greatly facilitated the local governments in promoting urban developments in return for revenue retention from land transfer fees. Similarly, the Yinchuan City's fiscal reform from 2003 that redistributed revenue-sharing between municipal government and urban district/county government, further increased the urban district/county governments' motivation in promoting urban development.

Benefited from the finance support from the central government and targeted in facilitating private investments, the annual increase rate of investment in infrastructure climbed to 62.29% in 2002 and 90.05% in 2003. Concurrently, the urban built-up areas in the city saw an increase rate of 30.41% from 2002 to 2003. Five People's squares and 22 artery roads were constructed between 2002 and 2003, and the increase of road area reached 1.66 million m^2 in 2003. At the same time, the city announced to lease 3.5 km^2 urban lands in 2003, and the released lands in this year have provided 1.02 billion Yuan of leasing revenue for the city government, which is 13 times in comparison to the number of year 2002. Since then, the city entered to a rapid-growing period that based on the market economy.

In the following city's strategy "Dural Cozy City" of 2006, the aim was to promote Yinchuan city as most livable and workable city in northwest region (within 500 km^2 circle). The city further turned to actively promote urban growth by improving investment environment, for example, the natural environment betterment and development of natural parks based on former waterways, as well as improvement of transportation infrastructures. By 2015, the built-up urban area of the city had reached 169.1 km^2, which is the triple size compared to 2000. While the urban population has just doubled during the same time span (Fig.3-5).

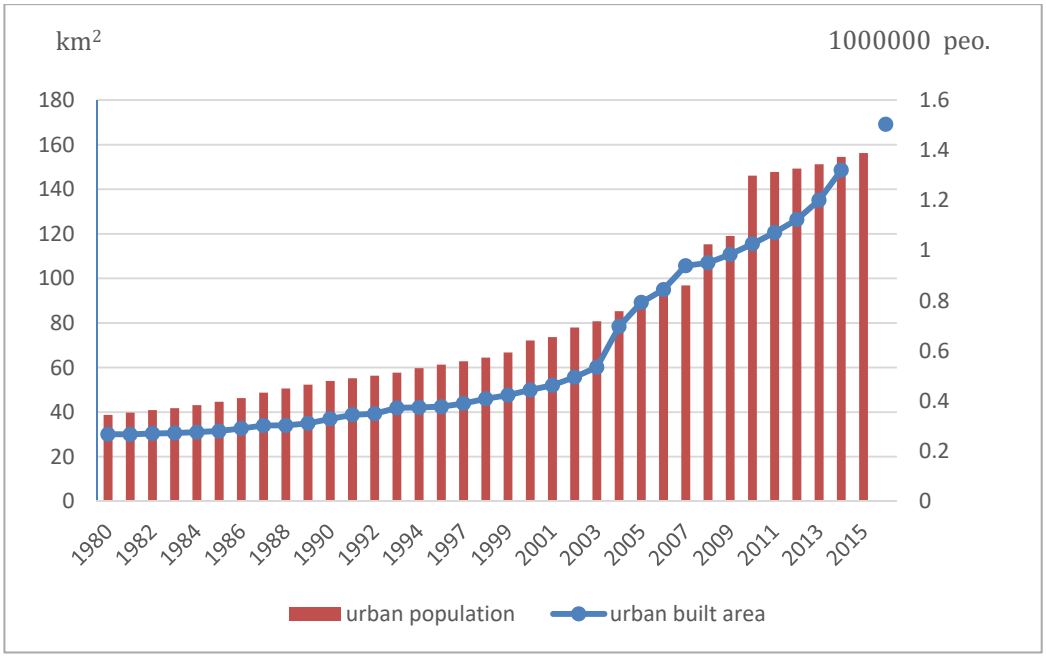


Fig. 3-5 Urban built up area and urban population in Yinchuan city (1980-2015)

(built area data of 2014 was not available)

3.2.2 Definition of the study area

The study area of this research is located within the city's loop highway of approximately 400km² (Fig. 3-4). This area, designated as Central Urban Area (CUA) in the 2007-2020 Yinchuan's Master Plan, has been the focus of urban development and planning control in the long term. In the master plans of Yinchuan, only the CUA has been planned with land use layout, infrastructure arrangement, public facilities distribution, green land system and so forth. Today, more than half of the total population of Yinchuan city and majority urban population lives in the CUA. For these reasons, the Central Urban Area is defined as the study area.

3.2.3 Urban structure of the Central Urban Area

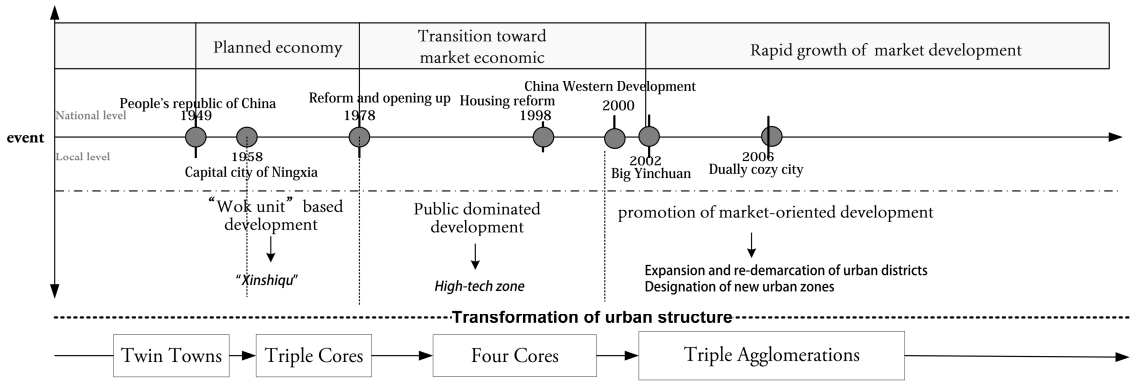
The Central Urban Area is located on the flood plain between Helan Mountain and Yellow River, with an intricate waterway network. The urban area originated from the so-called "Old Town" (O.T.) that was built in 678 A.D. as a walled precinct of approximately 3 km². The main canal Tanlai was also built in this period (A.D.690-750), followed by several irrigation canals that parallel with the Tanlai later on. The Old Town was once the most prosperous capital of the Xixia Empire (907-1227) and has long been the commercial and administrative center of the local region. In 1739, the camp of Manchu's troops was built 7.5km west of the Old Town, which formed another urban area "New Town" (N.T.) of about 1.1km². Connected by one east-west historical primary road, the Old

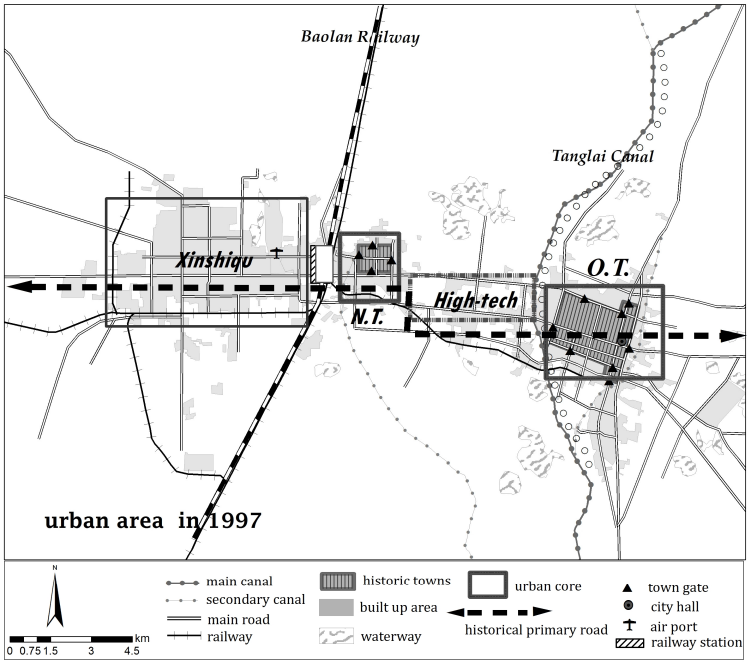
Town and New Town are thus historic urban cores of the Yinchuan's CUA.

In 1958, with the first city's railway Baolan developed west of the historic area, a new urban area "Xinshiqu" was planned west of the railway as an provincial industrial, education and administration core, in order to accommodate the allocated "work units" from the central state. Thus, an urban structure of "Triple Cores" was formed. In 1992, a special high-tech development zone was designated between the Old Town and New Town, together with the southern outskirt of this zone, the area was developed as the "Forth Core" of the CUA. Until 2002, the urban area of the city was administratively and functionally divided into two parts: the West part (*Xinchengqu*) included Xinshiqu and the New Town, while the East part (*Chengqu*) was based on the High-tech Zone and the Old Town. In 2002, the administrative urban area of the city was re-demarcated into three urban districts, and functionally the urban structure was transformed to "Triple Agglomerations" as well: West (Xixia), Central (Jinfeng) and East (Xingqing) that geographically divided by the Baolan railway and Tanglai canal, respectively. A New Urban Zone functions as new civic center was designated in the Central in 2002 to direct new development focus toward Central, which stimulated rapid development of central agglomeration. In present, the West mainly functions as an industrial and education core of the city, the Central focused on functions of administration, culture and business, and the East remained as the commercial core [77)78)](Fig. 3-6).

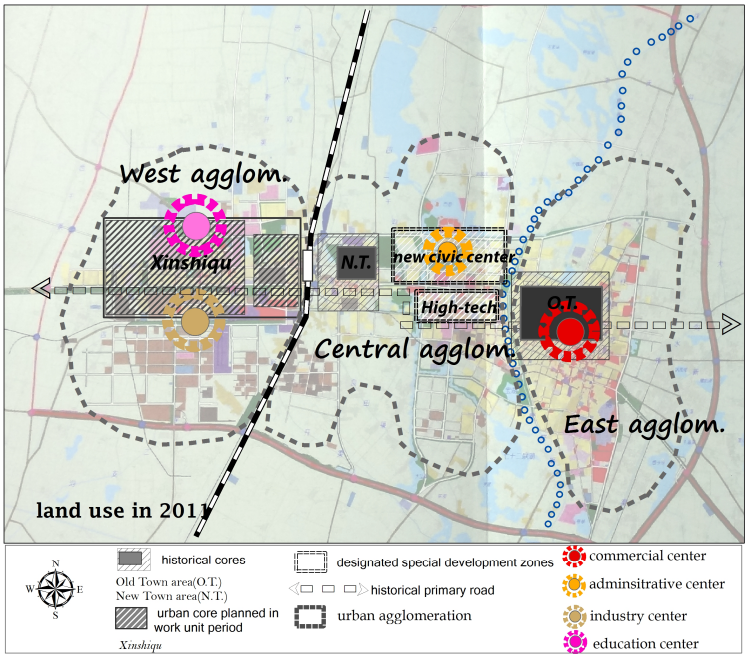
- **Population and economic change of the "Triple Agglomerations"**

Before 2002, the population of the former East part had always been slightly larger than the former West (272783 and 211114 respectively in 2000). Even after the urban district was re-demarcated into three parts, the present East (Xingqing) continued to hold largest population (The population of the East, Central and West is 725200, 299200, 349100 in 2014, respectively). However, it is found that in this decade (2002-2014), the speed of population growth have been almost same in the three agglomerations. In regarding to economic conditions, it could be seen that the West (Xixia) has led the economic development among the three agglomerations in this decade, the GDP per capita of the West, Central and East was 749, 540 and 577 million Yuan in 2014, respectively. While the changing trend of economic development of the three agglomerations was similar, in recent years (2010-), as a new developed urban agglomeration, the Central showed slightly higher speed of GDP growth and likely greater economic potential(Table 3-2, Fig. 3-7).





"Four Cores" before 2002



"Three agglomerations"

Fig. 3-6 Transformation of urban structure in Yinchuan's Central Urban Area

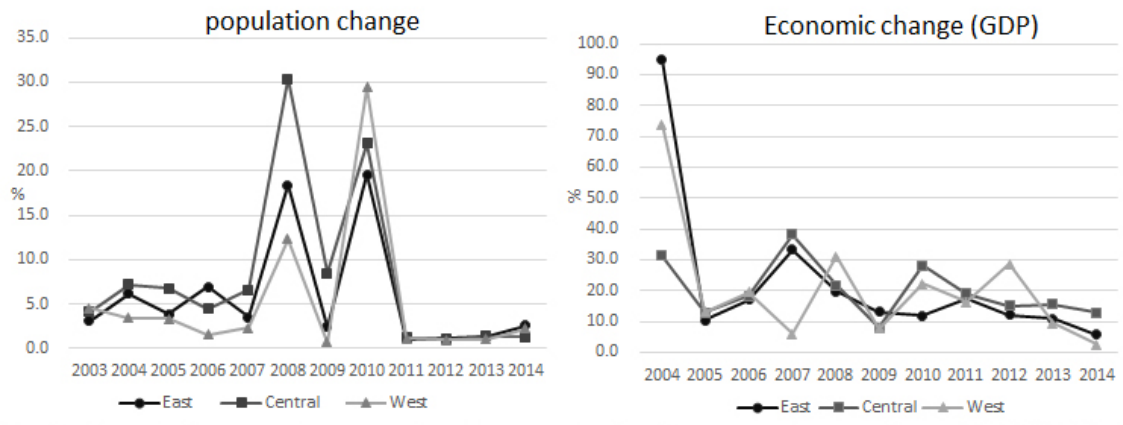


Fig. 3-7 Population and economic change of the three urban districts (2003-2014)

Table 3-2 Urbanization of the three urban districts (2013-2014)

	Urbanp opulation （10,000）		**Rural population** （10,000）		**urbanization level** （%）	
Year	**2014**	**2013**	**2014**	**2013**	**2014**	**2013**
Total	124.76	122.62	12.58	11.77	90.84	91.24
Xingqing(East)	68.01	67.92	4.5	2.80	93.78	96.05
Xixia(West)	31.37	30.32	3.54	3.82	89.88	88.82
Jinfeng(Central)	25.38	24.38	4.54	5.15	84.84	82.55

Source: Yinchuan Statistic Bureau

3.3 Terms

Work Unit *(单位)*: According to the socialist ideology, cities are production rather than consumption centers. "Work units" (*Denwei*) are development projects for promoting socialist industrialization under the planned economy in Chinese cities. The "work units" were allocated to the local city according to the economic plans of different economic departments subordinated to central government. Each "work unit" was developed by a state-owned enterprise or public institution, such as factories, schools or government agencies, with workplace, housings for employment and daily services in an enclosed territory. In the period of planned economy, "work units" functioned as productive unit and basic cell in the urban structure.

Land Reform (*土地改革*): Since 1949 of foundation of socialist China, according Constitution of Chain, urban lands are all state owned while rural lands are collectively owned by villagers. In the planned economy, urban lands were administratively allocated to "work units" for free. Market value of land was gradually recognized after the economic reform of 1978, Chinse governments have made experiments to levy land use fee from the land users since this period. Finally, In March of 1988, Conference of China allowed legal existence of the private sector in the economy and legalized the paid transfer of the use right of state-owned land (land leasing). The reform has generated income for state urban development as well as created investment environment for private investors. Since then, the urban land are transferred in dual ways, 1. Administrative allocation for public projects. 2. Land leasing based on market, by ways of "tendering", "bidding" and "listing".

Fiscal Reform (*分税制*): In 25th, December of 1993, the State Council of China issued "Decision on implementing the tax-sharing fiscal system", enacted from January of 1994. The decision was made to redistribute tax-sharing between the central government and local governments in China. The decision enabled central government gained more tax revenue from local governments, yet leaving local development burden on the local government. Thus, this new fiscal system largely facilitated local government's motivation in grabbing extra-budgetary revenue, mainly relied on the land transfer fee, since only local government is authorized in rural land exploitation and conversion to urban land. In 2003, municipal government of Yinchuan city reformed city's tax-sharing system similarly, and district/county governments can hold land transfer fee as own revenue and keep 70% of property tax. This municipal fiscal reform has fueled district/county government's interest in promoting land-centered urban expansion and housing development.

Housing Reform (*住宅改革*): In the planned economy, urban housings are mainly developed by "work units" and allocated to employees of the state-owned enterprises, called "welfare housing". Commoditization of housing goods, marketization of housing consumption and housing allocation as well as privatization of housing stocks gradually advanced in China since the economic reform in 1978. Commodity housing development was initiated from 1988 due to the "land reform" and experienced a peak in 1992 due to the establishment of Chinese Socialist market economy. In 1998, China's State Council issued "Resolution of further housing system reform and accelerating housing development". The notice externally decided to terminate the old "welfare housing system", and to establish a diverse housing market with commercialized housing as main source. The reform is a major step toward the

establishment of commercialized urban housing market in China and stimulated fast housing growth in cities.

Social housing project (*保障住宅*): social housings are the housings planned and mainly financed by the local government, and then rent or sold with price lower than the market prices. It is the counterpart of commercialized housing in China. Social housing was launched in Yinchuan since 1994, named as "*Anju*" or "*Kangju*" (livable housing) and now is together named as "*Baozhangfang" (affordable housing).* In current, there are two types of social housing. The first type is the housing for low income families, including low-rent housing, economically affordable housing and price caped housing. The second type is resettlement housing for the families whose houses was demolished by city's public projects, usually farmers whose lands were expropriated for public projects.

China Western Development (*西部大開発*): In order to help western China to catch up with the economic booming of the east after the economic reform in 1978, a Leadership Group for Western China Development was created by the State Council in January 2000. The primary aim was supporting development of infrastructures and enticement of investment, increasing efforts on ecological protection, promotion of education and retention of talent flowing to richer provinces. The strategy was mainly based on the central finance and preferential terms toward western region.

Great Leap Forward (*大躍進*): political campaign of China took place during 1958-1961 which aimed to facilitate rapid transformation toward socialist industrialization and collectivization. However, most economic targets in this campaign were boastful and rushed to unrealistic development.

Culture Revolution *(文化大革命)*: sociopolitical movement in China in 1966-1976. During this period, a large number of population was displaced from cities to rural villages, and most urban economic activities were halted.

Urban village (*城中村*): the rural villages that has not been expropriated by the local governments to turn rural ownership to state-owned ownership, but already encircled by the urbanized area due to rapid urban growth in Chinese cities. Usually located on the peripheries of the city, in this type of villages, although the lands are still collectively owned by the farmers, and urban infrastructure is not equipped, it is common that they are rent to the low income migrant labors and illegally built with extremely high density for urban activities. This unique landscape has imposes great challenge on the urban management in China

3.4 Conclusion

This chapter introduced planning system in China, from the aspects of planning authorities and legal functions of the urban planning as well as development control. It was revealed Chinese planning system have undergone constant changes along with the social-economic and political changes. Coping with the market economy, a comprehensive and strict Chinese planning system was established in 1989 to regulate market-based urban development, characterized by centralized plan-making control and decentralized plan-implementation. The legal function of the urban planning are divided by master plans and detailed plans, where the detailed development control plans are basic reference for issuing a planning permission. Despite of the similarity of basic concepts of planning system across the world, the practice and outcomes of urban planning greatly varied within different administration structures and local cities. It is critical to estimate the effects of urban planning within special circumstances of a local city to deeply understand planning conditions and planning practices.

Secondly, this chapter estimated local conditions of the study area in Yinchuan city. The modern urban development of Yinchuan city were divided into three phases according to founding social-economic policies: centrally controlled planned economy; transition to market economy and remained dominance of public sectors; rapid growth of urban development based on market economy since 2002. In parallel with this transitions, the urban area of the city also was largely enlarged and has transformed from the “Triple Cores” toward a “Triple Agglomerations” structure. It could be seen that dramatic changes and urban growth occurred in the period of rapid growth of market economy, thus this research mainly focused on this period, to find out how the local government dealt with these urban changes.

Chapter 4 Effects of urban planning on urban expansion control

In this chapter, targeting the study purpose of estimating the effects of urban planning on urban expansion control, a contextualized framework to analyze the mutual influences between planning concepts, planning tool implemented as well as affected urban expansion, in light of the social-economic transition, was set in place. Firstly, the planning concepts presented in Yinchuan's master plans in relation with the implementation of specific zoning was examined; secondly, the urban expansion, promoted or controlled by the designated specific zones is examined based on the planning concept; finally, the effectiveness of the urban planning on urban expansion control is clarified, and implication of urban planning on critical land use issues were discussed.

4.1 Planning concepts and implementation of specific zoning

City's Master Plans (M.P.) are official development plans that set up the prospect urban structure and the development strategy to achieve this structure. The strategy of the M.P. consists of directing development to the intended urban promotion area and defining areas protected from urban development. Based on the planning concept, Planned Urban Area (PUA) is delineated and the scale of the PUA is estimated as amount of urban land required by the prospect urban population usually for a time span of 20 years. The area outside the PUA is preserved for natural green land, waters and rural land use (villages and rural townships). Specific zoning - designation of a specific zone for special development purpose with detailed land use plans, such as industrial development zones designated by local governments, is perceived as one of the fundamental planning tools aiming to control or promote urban land use in a planned manner.

4.1.1 Urban Planning in the planned economy and zoning for "work units"

In 1958, Yinchuan city was designated as the capital of the newly established Ningxia Region. The Central State assigned "work units" to Yinchuan, in accordance with the planned national development, and the city's first railway *Baolan* was built west of the

historic urban areas. Straight after, the province government designated land for these "work units" in an open area west of the railway, named "Xinshiqu". Finally, the development of this "work units" zone, Xingshiqu, as a provincial center of industry, education and administration, was planned by the province authority in Yinchuan city's plan of 1958-1980 (Row Ⅰ/ planning concept and specific zone designation, Fig. 4-1). Until 1980, the concept of the focus of the city development on Xinshiqu was kept despite the plan was revised 13 times.

4.1.2 Urban planning in the transition toward Market Economy and zoning for public projects

In 1978, Yinchuan city's first independent planning institution, Planning Committee, was established due to the administrative devolution. Later, in the 1980's State Conference of City Planning, "Control the development of big cities, and appropriately promote the development of median cities and actively promote the development of small cities/towns" was declared as a main national development policy. Since Yinchuan was considered a big center for the local region, Yinchuan Planning Committee prepared the Master Plan of 1981-2000 with a focus on controlling the development within the three existing urban cores of the Old Town, New Town and Xinshiqu. A spatial structure of "Triple Cores" was set up, aimed at continuing the development of Xinshiqu and restoring the economic function of Old Town (Row Ⅱ/planning concept, Fig. 4-1).

The plan was approved by the State Council in 1983. Subsequently, "work units" developed by state owned enterprises that planned by the provincial and city government, continued to be allocated in Xinshiqu as well as in the New Town area. On the other hand, under the supervision of city's Planning Bureau (established in 1985), large-scaled redevelopment projects that comprehensively organized by the developers subordinated to city government were carried out in the Old Town. However, in 1992, the Central State reaffirmed its orientation on "establishing a socialist market economy in China" that pushed forward further marketization. The annual increase rate of real estate investment in the city suddenly rose to 52.39% in 1992 and 64.97% in 1993, and several large housing projects have been proposed in the northern outskirts of the Old Town by the city. Moreover, in order to promote investments in technology, a High-tech industry zone (5.2km^2) was designated by the provincial government and planned by the city between the Old Town and New Town in 1992 (specific zone designation, Fig. 4-1).

Under the pressure to regulate these new developments beyond the "Triple Cores", the Planning Committee began to revise the 1981 M.P. in 1992. The new revised 1994 plan proposed a "Cohesive Four Cores" structure comprised of the three old cores and the

new High-Tech zone. The focus of the plan was to develop: 1) the High-tech zone and its south outskirts as a fourth core that connects Old Town and New Town and 2) the area north of Old Town (Row Ⅱ-1 /planning concept and zone designation, Figure 2).

However, in 1990s, a widespread urban sprawl was noticed in China's "Development Zone Fever" and "inordinate enlargement of the planning area", that the special development zones promoted by local governments incorporated massive lands but much of the area remained undeveloped. This compelled the State Council enforced a policy of "Strictly control the city size" in 1996 (Notice No.18)[79]. Thus, before the 1994 revised plan of Yinchuan city could be submitted for approval, city government made a new Master Plan for 1996-2010 that intended to strictly control the urban expansion. Based on the distribution of urban developments that steadily progressed in the "Four Cores", the planning concept of the 1996 plan was conceived as "Two urban agglomerations separated by a Central Green belt". The East Agglomeration was comprised by Old Town, Old Town's immediate surroundings, the east part of High-tech Zone and its southern outskirts; the West Agglomeration contained Xinshiqu, New Town and the adjacent areas of New Town. A Central Green Belt was set up to control the expansion of the East Agglomeration, and to prevent excessive farmland occupation from the developments of the High-tech Zone (row Ⅲ/planning concept, Fig. 4-1).

4.1.3 Special zones in the Rapid Growth of Market Economy and the transformation of urban planning

The 1996 M.P. was approved by the State Council in 2000. Soon after, facilitated by the "China Western Development"(2000), "Big Yinchuan" strategy (2002) and the growing interest of the local governments in competing for private investments propelled by new policy changes, various special development zones were initiated by different levels of Yinchuan's local governments, such as the City Government, Urban District or County Government, Administrative Committee of national Economic and Technology Development Zones (ETDZs) - a streamlined agency of the city government (Table 1). Thus, in the period of Rapid Growth of the Market Economy, the designation of special development zones become a prevalent planning tool to promote and control the urban development. Usually, a Management Committee will be chartered by the local governments to behave as a developer corporation entitled to independently plan and manage the projects in a special zone. However, an approval of the plans from the city government is required. Generally, the Management Committee functions as a branch of the local government and the zone development is largely funded by the governments relying on land leasing. In Row Ⅲ/specific zone designation of Fig. 4-1, it could be seen

that most of these designated special zones incorporated vast lands outside the PUA of the 1996 M.P. Yet, these zones were approved and supported by the city with subsidies, tax reduction and priority in land allocation for investment projects. In particular, in order to secure space for the expected rapid growth brought by the "Big Yinchuan", the city began to seek new urban growth space and finally decided to develop the central open area between the "Two Agglomerations" as the new development focus. In 2002, a New Urban Zone (NUZ, Zone C) was planned north of the High-tech Zone by the city government, as a new civic center for 90000 residents. This demonstrated the disruption of the planning concept in 1996 plan.

It was obvious that the unprecedented urban development in the beginning of 2000's has rendered the Master Plan of 1996-2010 inadequate to cope with the new development. Thus, the city government began to draft a new master plan in seeking of new urban growth direction in 2004. Complying with the city's strategy and policies to actively promote urbanization, the already developed special zones were consequently incorporated into the new Master Plan, drafted in 2005 and completed in 2007. Along the axis lines of these existing zones, planning concept of the 2007-2020 M.P was proposed as "Four development axes and multi-centers intersected by two greenbelts". Thus, the urban promotion area was significantly enlarged compared to the 1996 plan. However, the intention of planning control was not abandoned in this new plan, which could be seen in the development strategy of "Prioritizing the west, controlling the east, expanding towards north and south", as well as in the preservation of the two green belts (row Ⅳ /planning concept, Fig. 4-1).

While this new plan was awaiting approval, several new special zones were continued to be designated, such as the Vocational Training Zone. Particularly following the Ningxia Inland Opening-up policy in 2009, a new CBD was designated jumping over the existing urban areas to promote headquarter business of Yinchuan as well as to hold the China-Arab Forum from 2010. Further, in 2011, the city enlarged the commercial zone E into E' to promote Muslin trading and intensive commercial developments, which violated the planning intention to "control the east". These zones all included areas outside the PUA of the M.P. of 2007-2020. Hence, the 2007 M.P. was constantly modified in a 2010-2020 M.P. and eventually completed as a 2011-2020 M.P. in 2015, incorporating the overgrown zone areas (row Ⅳ/specific zone designation and urbanization, Fig. 4-1).

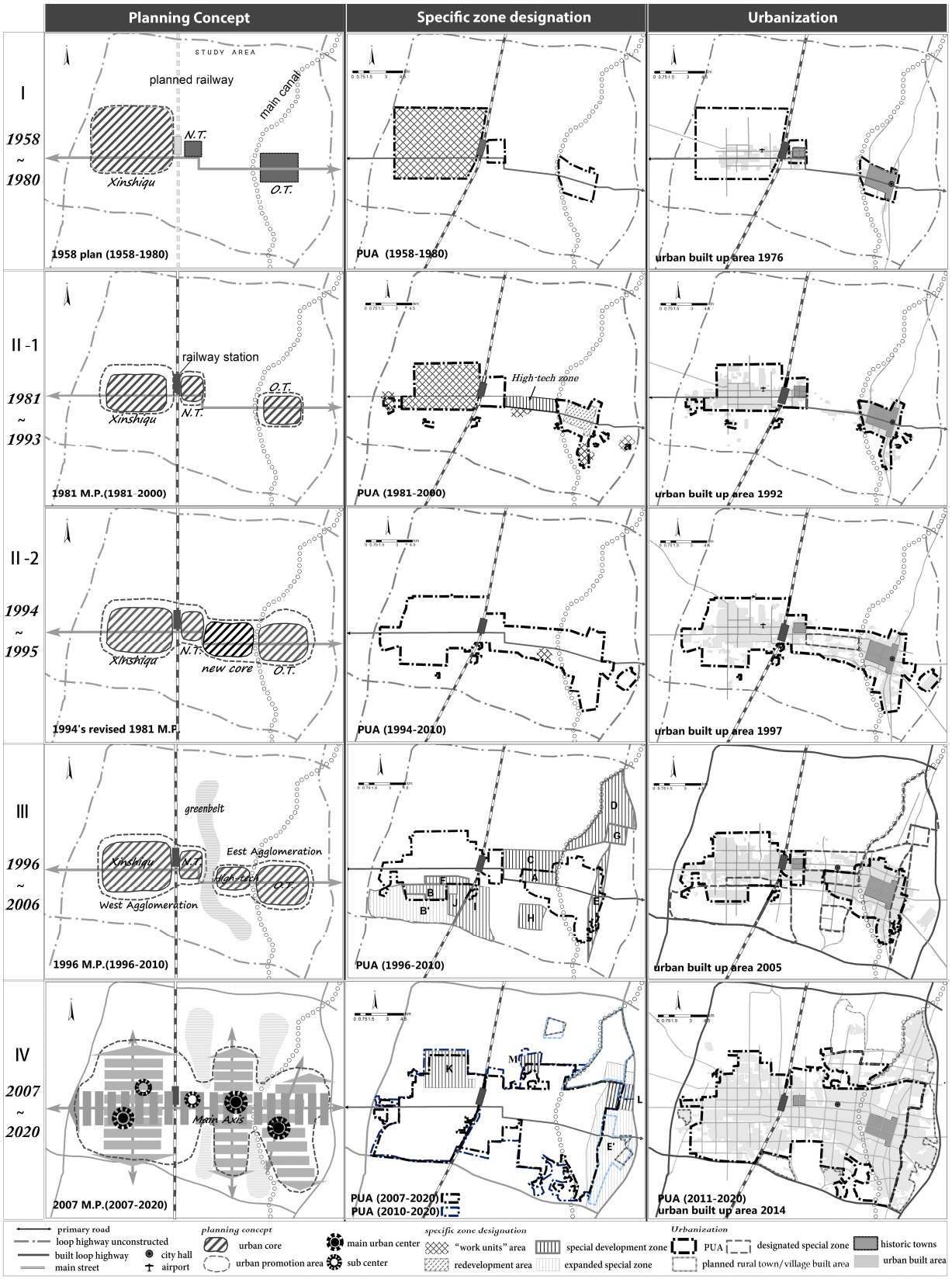


Fig. 4-1 Planning concepts, specific zone designation and urbanization of the CUA of Yinchuan (1958-2014)

(Source: adapted from Yinchuan Planning Chronicle (2005), documents from the 1958 plan, 1981 M.P., 1994 plan, 1996 M.P., 2007 M.P., 2011 modified M.P.; detailed land use plans of special development zones; urban built up map in 1976, 1992, 1997, 2005 and 2014.)

Table 4-1 Designation and development process of special development zones (2001-2014)

	Designation of special zone						Development progress in the zone					
							III(2001-2006)			IV(2007-2014)		
	No	Name of zone	year	area (km^2)	main land use	Founder [a]	Infra[b]	ld.[c]	Completed major projects	Infra	ld.	completed major projects
III	A	National ETDZ 1	2001	2.26	high-tech industry, finance, business	P, C	●	■	1865 enterprises workplaces, 29 foreign enterprises,29 high-tech enterprise (2006)	●	■	2810 enterprises workplaces with 50000 employees(2011)
	B	National ETDZ 2	2002	5.24	Manufacture, logistic heavy industry	P, C	●	□				
	B'	expand	2006	30.68		E	○	□		●	□	
	C	New Urban Zone (city's Civic Center)	2002	10.5	administration, service, residence	C	●	□	New city hall(2006)	●	■	Exhibition & Convention Center, Provincial library, science hall and Museum, Art center(2008); 2 commercial complex (2012, 2013)
	D	*Helan* county Industrial Zone	2002	16.32	food processing, manufactures, trading	D	○	□	323 enterprises workplaces with 5200 employees(2006)	●	□	477 enterprises workplaces with 16859 employees (2012)
	E	*Xingqing* Commercial Strip	2003	7.2	wholesale marketing, distribution	D, C	●	□	Agriculture material mall, automobile mall (2006), 6 Furniture malls(2005)	●	■	Agriculture Hardware mall (2007), 7 Furniture malls (2005, 2008, 2012), commercial complex(partly open)
	F	*Xixia* center of Distribution	2003	2.11	distribution	D, C	●	□	Building-Material complex(2005)	●	■	
	G	*Xingqing* district Technology Park	2003	3.23	Technological industry, distribution	D	●	□	19 enterprises workplaces (2007)	●	□	workplaces for 2343 employees (2012)
	H	National ETDZ 3	2003	5.24	high-new technology	E	●	□		●	■	IBI(2013)- 308 enterprises of 4000 employees (2014)
	I	*Jinfeng* district Industrial zone	2004	11.56	machinery, electronic, 4S, material, industry	D	○	□	40 enterprises workplaces with 520 employees(2006)	●	□	135 enterprises workplaces with 7200 employees(2012)
	J	*Xixia* district Industrial zone[1]	2004	4.2	agriculture product processing, machinery, electronic, material industry	D	○	□	39 enterprise workplaces, 6 operated factories(2006)			
IV	K	Vocational training Base	2008	8.8	education	P				●	□	12 collages(2012)
	L	City Distribution & Trading Center[2]	2008	6.23	wholesale, distribution	C, D				●	□	Muslin Trading Town (2012), cold-chain logistic center-1 (2012), Service outsourcing industrial park (2017)
	M	City CBD	2010	2.22	business, finance	C, D				●	□	
	E'	City Distribution and Trade Strip	2011	32.08	wholesale, distribution	C, D				○	□	2 Furniture malls(2012)

Data source: compiled from approval documents of establishing special zones issued by city government, materials from Management Committee of ETDZs and Yinchuan Economic Cooperation Bureau, official websites of each zone, Annual Statistic book of Yinchuan(2000-2014), Yearbook of Yinchuan (2000-2014), Chronicle of Xixia district(2009), Yearbook of Xingqing district(2013), Comprehensive Chronicle of Jinfeng district (2007-2012), budget report and note of government meetings, Report of land use situation in ETDZs issued by Yinchuan Land Resource Bureau in 2010, and our site survey in July 2014 and August 2016.

a. P (province government), C (city government), E (Administrative Committee of ETDZ), D (district/county government); **b.** Infrastructure: ● - completed; ○ - partially completed; **c.** Land development: ■-almost all the available lands were leased out; □-Only parts of available lands were leased out. **1.** Zone J was combined into ETDZ-2 in 2005 and ETDZ-2 made expansion plan in 2006(B'); **2.** Zone E was enlarged in 2011 to combine Zone L and Zone G, and renamed as E'

4.2 The process of urban expansion

4.2.1 Development of the "work unit" zone -*Xinshiqu*

During the 1958 plan (1958-1980), urban development was primarily promoted by "work units" of diverse functions, such as factories, universities, government institutes, etc. These "work units" were mainly concentrated in the *Xinshiqu* zone. However, due to China's political turbulences of the "Great Leap Forward" during 1958-1961, the planned urban area in the 1958 plan was unrealistically oversized, and influenced by the "Culture Revolution" of 1966-1976, scattered urban development progressed very slowly in this oversized planning area. Until 1978, the original development target for the *Xinshiqu* area (90 km^2 for 1 million population) was far from accomplished, large part of the 1958's PUA was undeveloped (Row Ⅰ/urbanization, Fig.4-1).

4.2.2 Development of the "Triple Cores" and the High-tech Zone

Within the first decade of the enacting of the 1981 Master Plan, the urban development based on the "work units" system continued to progress in *Xinshiqu* and the New Town area. By 1985, there were 203 "work units" of state-owned factories have been developed in this area. Meanwhile, the economic function of the Old Town was reevaluated since more attractive facilities are concentrating in this area. Especially after the "land reform" of 1988, a relatively rapid development of the Old Town area was observed. In 1992, developments around Old Town approached the limit of the PUA, while large planned areas in *Xinshiqu* and New Town were still undeveloped (Row Ⅱ /urbanization, Fig. 4-1).

During 1992-1995, the development of the High-tech Zone had commenced from its eastern part. By 1996, built-up area of the zone was 1.6 km^2. Also, "work units", mainly took the form as research institutes and colleges, were developed in the southern outskirt of the zone. In general, these developments were later regulated by the PUA of the 1994 plan (Row Ⅲ /urbanization, Fig. 4-1).

4.2.3 Development promoted by the special development zones

In the planning period of the 1996 Master Plan (1996-2006), urban developments have been rapidly carried out in some of the designated special development zones (development progress Ⅲ in Table 1). For example, during 2001-2006, the annual increase of fiscal revenue was kept at 42.1% (data from 2002 is lacking) in the ETDZ-1(Zone A) and ETDZ-2 (Zone B). By 2006, these two zones have attracted 1865 enterprises

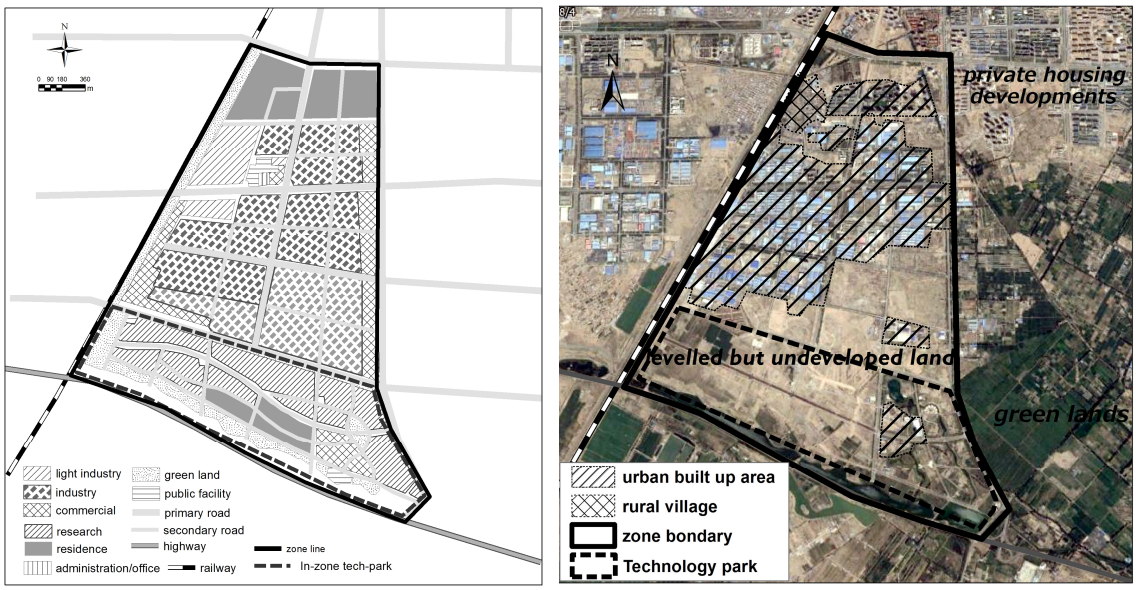
and 58% of all the high-tech enterprises in the province. The ETDZ-1(previous High-tech Zone, approved as national ETDZ in 2001) was especially well developed after its development strategy was readjusted as "a comprehensive urban zone with multi-functions of high-tech industry, residence and finance". Stimulated by the relocation of the City Hall and other government institutions to the New Urban Zone (NUZ) in 2006, public cultural facilities, and high-rise offices as well as housing projects were promptly developed in NUZ. At present, the Old Town is still the city's main commercial center, while the NUZ has taken the position of administrative center. Also, with a diversity of large wholesale complexes opened, the Commercial Strip (Zone E) has become a vibrant trading area of the city.

On the other hand, the development of other designated zones was relatively slow. A variety of technical industry zones that initiated by the county and district governments have repetitive function with the ETDZs, however, the gross industrial output (GIO) per area in these zones have been much lower compared with the ETDZs (Table 3) - For example, in Jinfeng industrial zone (Zone I) half of the land designated for industrial use was underutilized 11 years after its establishment, although all the ex-farmlands in its designated area have been expropriated and levelled. Even though the southern part of the designated zone area was not included in the 2007's PUA, in 2010 the city government still promoted this south area as an In-Zone Technology Park (Fig.4-2). In the field survey of August 2016, it was observed that several high buildings as technology incubations has been constructed in this in-zone park, while vast land remains idle in the northern parts of the zone (Fig. 4-3, a). Moreover, through our survey we found out that large underutilized areas enclosed by one factory are common in these industrial zones. For instance, in 2012 problems with "increasing numbers of suspended factories" and "no productions in the lands circled by enterprises" were reported for *Xingqing* Technology Park (Zone G, Fig. 4-3, b, c).

Table 4-2 GIO of industrial zones with similar functions (million yuan/ha)

GIO/area	ETDZ1,2	Zone D	Zone G	Zone I	Zone J
2006	5.58	0.77		0.09	0.09
2009	13.10	2.21	1.61	0.69	
2012	5.82	5.73	0.65	2.04	

Data source: same as Table 1.GIO of ETDZs in 2006 and 2009 is calculated based on designated area of Zone A and Zone B, GIO in 2012 is calculated based on designated area of Zone A and Zone B'



(**a**) Land use plan (**b**) Present land use conditions

Fig. 4-2 Development of the Jinfeng Industrial Zone

(a) Predominant zone area were planned for industrial (technological) use in the land use plan (b) land use condition inside the zone, adapted from Google map, photo date April, 8, 2015

(**a**) (**b**)

(**c**) (**d**)

Fig 4-3. Unutilized land in the special development zones in Yinchuan's CUA

(Source: photographed by author in August, 2016)

(a) Undeveloped land in the northern part of the Jinfeng Industrial Zone, the tall building is a key project of the new promoted In-zone Technology Park, located in the south of the zone; (b) underutilized land in the territory of one factory in the Xingqing Technology Zone; (c) Absolute buildings of one suspend factory in the Xingqing Technology zone; (d) Front gate of a colleague in the Vocational Training Education Base which occupied large areas but low density built.

4.2.4 Development sprawled outside the designated zones

Concurrently with the development progressed in the designated zones, the infrastructure of the whole city was upgraded. The construction of a grid road network that linked the new designated zones with other part of the city, has driven rapid urban development in the zones' surroundings. We observed that urban development into the Old Town's surroundings, mainly comprised of housing projects, was significant compare to the development of slow developed zones. They even encroached the adjacent rural towns. Developments also encroached the Green Belts and occupied parts of the planned urban green sites, such as some of the housing projects were developed under the name of green park development. During the last decade, it was observed that developments were constantly overflowing the PUA. These developments were later incorporated into the revised planning area in the Master Plans. However, on the other hand, available land in the designated zones particularly in the west was left underdeveloped (Row Ⅲ, Row Ⅳ/urbanization, Fig. 4-1). Thus, the planning intention to control the eastern urban expansion and develop the west was not achieved.

Taking the development process of ETDZ -3 (Zone H, designated in 2003) and development progressed in its surroundings as an example. The zone was designated as technological industry zone by the administrative committee of ETDZs in an area planned as open space in the M.P. of 1996. Until 2008, the industrial development in this zone was slow since only a few scattered industrial projects were built. Meanwhile, private housing developments were burgeoning in the area outside the zone. In 2005, the city decided to promote city's residential function here, and big public housing projects were initiated in this zone, in the 2007 plan, the land use layout insides the zone was already adjusted to convert the majority of the land into residential use. Private housing developments began to gradually fill the zone and the existing factories were demolished. Yet, in 2010 a housing project with 20,000 units was invited adjacent to the South Lake, even though this area was envisioned as eastern Green belt in the 2007-2020 Master Plan. Meanwhile, all the sites around the lake were rezoned for residential use in the modified 2010-2020 Master Plan and were promoted by the city government as a "high-end ecological residential area" in 2012. This example clearly illustrates inability of the designated specific zones in promoting the phased and ordered urban development at the city scale. The situation on

the ground suggests that the urban development pattern is shaped by the profit-seeking activities and the profit is together shared by the governments. Under this circumstances, the planning can only conform to the urban expansion where market values, instead of planning control goals, dictate the outcome.

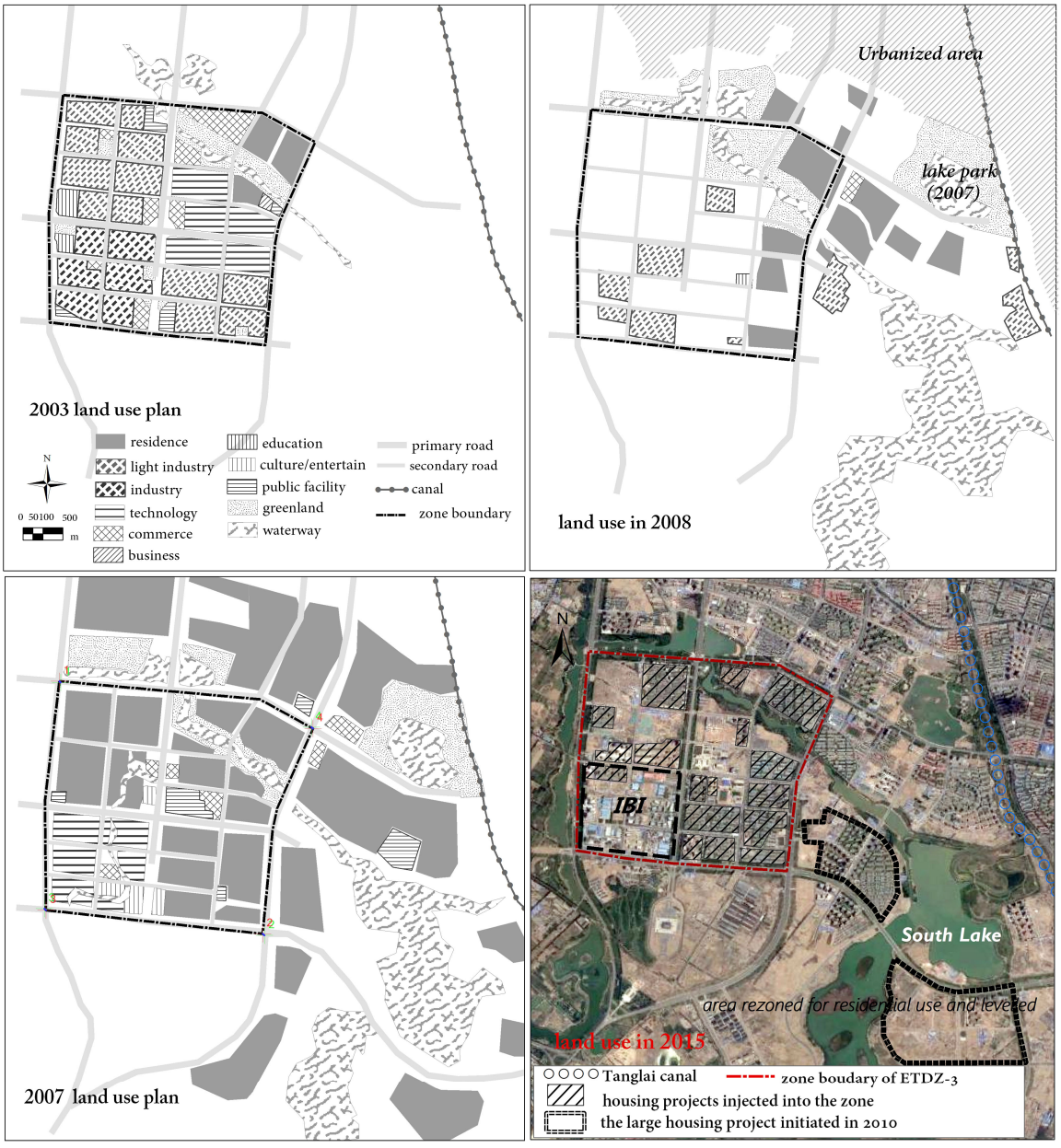


Fig. 4-4 Land use planning and development in the special zone ETDZ-3 and its surroundings

(Source: Adapted from land use plan of ETDZ-3 in 2003, land use map of Yinchuan's CUA in 2008, DDCP of southern part of Jinfeng District in 2007, photo from Google map on 18th, July, 2015; IBI-Incubation park of information technology, bio - technology and intellectual)

4.3 Effects of the urban planning in the urban expansion control

Based on the examination of planning concepts, implemented specific zoning and urban expansion in Yinchuan's Central Urban Area, in this section the effects of planning concepts in the urban expansion control was clarified. And then, the implication of urban planning on the critical urban expansion issues, in order to provide insights in promoting performance of urban planning in achieving compact city for Yinchuan city.

4.3.1 Mutual influence of the planning concept, specific zoning and urban expansion

In the centrally planned economy, the zoning for accommodating the allocated "work units" brought about the planning concept of a new urban core "Xinshiqu" in the 1958 plan. Thus, at that time, urban planning just served as an instrument to spatially substantiate economic plans of the central government.

In the transition toward market economy in 1980s, the city government gained more autonomy in arranging the urban development. The primary goal of the 1981 Master Plan was to constrain the urban development in line with the central policy of "control the growth of big cities" from 1980. In the beginning, the plan succeeded in leading the zoning for redevelopment and "work units". However, the development of the 1992 High-tech zone outside the old three cores, brought by the progress of market economy, resulted in the revision of the 1981 plan in 1994. This revision was the initial indication of failed plan-led development in the city, since the plan was adapted to incorporate the new special zone that targeted inward investment and economic growth of local governments. Although the master plans didn't function in plan-leading, the planning control was generally effective in confining the urban expansion in the designated specific zones in these periods. Even though an imbalance between the development of the east and west areas already appeared, due to the slow progress of market economy, the urban expansion control was not critical.

The 1996 Master Plan was prepared while the pressure for urban development was not yet urgent. The main intention of the plan was to control the urban expansion (especially in the eastern parts) in order to meet the requirements of the central state's policies. However, this plan didn't anticipate the subsequent policy changes (the housing reform, China Western Development, Big Yinchuan, etc.) that facilitated local governments in actively seeking urban growth based on market economy. In order to promote the expected rapid urbanization, local governments started to develop special

development zones beyond the 1996 plan, and the plan lost its guiding forces in the plan-implementation.

Consequently, the 2007 Master Plan incorporated the urbanized area in the zones started in the previous planning period into its planning control. The plan also formulated a more aggressive planning concept to positively promote the urban development with utilization of private investments. In the same time, the intention of planning control was not discarded but, the constant modification of the plan seems inevitable since the rapid urban development is actively pursued by the city government. Thus, the 2007 Master Plan was a significant turning point in the tandem of "China Western Development" when the planning aim was changed from constraining to promoting urban development, as an

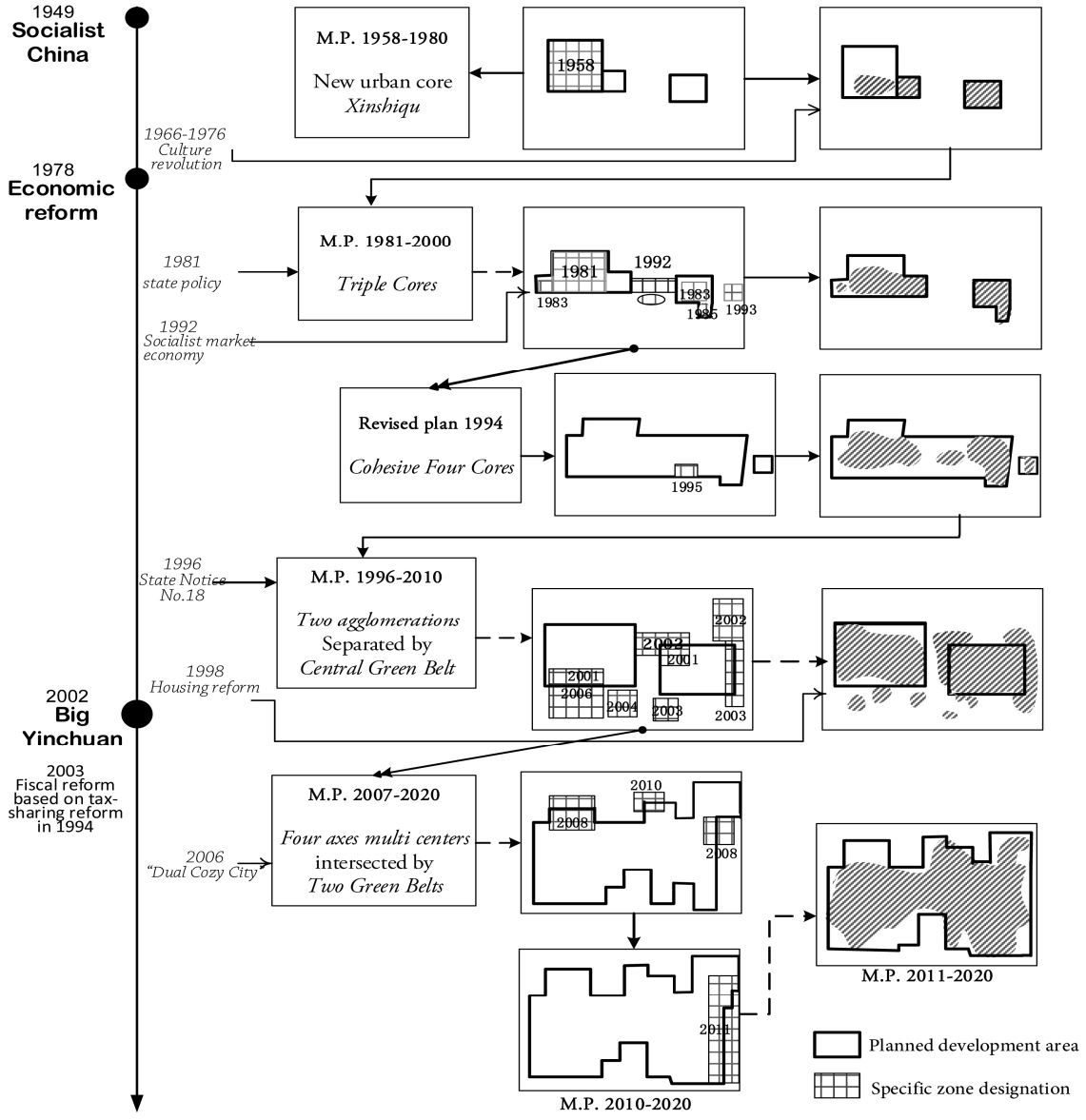


Fig. 4-5 Mutual effects between the planning concept, specific zoning and urban expansion

effort to keep up the intentions of the city government. Nevertheless, the plan still didn't function in plan-leading since the special development zones promoted by the governments still continued to develop beyond the plan. An overall coordination in function specialty and land use arrangement between these zones was absent, thus resulting excessive zoning and low land use efficiency. Moreover, uncontrolled urban expansion in the areas outside the special zones have been observed, while the development of some designated zones were not fully promoted. Therefore, the specific zoning implemented by the local governments, are not effective in controlling the urban development based on the market. (Fig. 4-5)

4.3.2 Implication of urban planning on present critical urban expansion issues

Under the administrative devolution and the active attitude of the city government in regards to urban development, the plans could impose little control on the zoning exceeded the plans. A reform of the planning towards a more inclusive strategy by coordination of different interests in the new zone development with consideration towards the old industrial areas is urgently needed. Moreover, this study suggests that a periodical evaluation and adjustment of special zone's plans in response to the development status might improve the performance of the special zones. For instance, the ETDZ-1 and ETDZ-3 have gained more prosperity after the development plans of the zone have changed from focusing on single-functioned specialized zone toward a more mix-used new urban area. It is necessary to re-examine the present conditions of the other special zones, and to carefully evaluate the plans of these zones based on the overall city needs.

Meanwhile, faced with the recent housing boom after 2008 in the city, residential developments are proliferating towards the peripheries. Capitalizing from vast farmlands, these developments have generated considerable profits for both developers and local governments. It appears that the market attractive areas were the Green Belts and areas around the Old Town, even though these areas were not serviced well with infrastructure, leaving the lands insides the well-equipped special zones underdeveloped.

Since the expropriated farmlands in the designated industrial zones are not easily recovered and uncontrolled housing continues to consume more green lands. The loss of green land could have future negative effect. Effectiveness of planning control need to be promoted, but physical regulation seems to be only concerned with conforming to the development pressure by modifying planning boundary. Therefore, further studies are needed to seek effective measurements to guide private investments into intended promotion area.

4.4 Conclusion

Urban planning should play an important role in guiding and regulating urban developments from the perspective of overall spatial organization and ordered development pattern. This chapter, based on the integrated analysis of the mutual effects between the master plans, specific zoning as a planning tool and urbanization, clarifies that in the case of Yinchuan, a median city in Western China, the planning effects on the urban expansion control are contested. In the transition from centrally planned economy towards a decentralized market economy since 2002, according to the new master plan of 2007-2020, the urban planning of Yinchuan city has concordantly transformed from constraining urban expansion to promoting urban growth, in an effort to concert the intentions of the city government in actively pursuing rapid urban development and also keep the control over the urban development. Despite this, the centralized planning still failed in leading the state-promoted urban development, it is evidenced by the designation of special development zones by the local governments still breach the planning intentions and these zones were developed beyond the plans, thus the constant modifications of the plans were decided to incorporate these designated specific zones. As a result, excessive zoning occurred. Moreover, the specific zoning implemented to control urban development is unable to control developments in a market-oriented context as well. Specifically, uncontrolled housing developments prevailing around market attractive places, whilst developments were not well promoted inside some special zones.

Chapter 5 Effects of public programs on housing developments

As revealed by Chapter 4, excessive urban expansion in Yinchuan city is mostly housing development that out of the planning control under the market economy, which calls for effective measurements to lead and manage these housing developments. This chapter aims to offer an approach in understanding the urban housing expansion from the perspective of city management. At first, critical housing issues in Yinchuan city is revealed by analyzing the housing supply in relation to the population change; secondly, we examine the impacts of public promoted programs on the expansion of housing development; thirdly, the effectiveness of these programs in achieving the intended housing development pattern is evaluated. Finally, the implications of managing market-based housing development are discussed, by which the possible strategies to promote housing development toward more a sustainable way are approached.

5.1 Housing supply in Yinchuan city

5.1.1 Marketization of housing development in Yinchuan city

Modern housing development in the city started after the establishment of the socialist state of China in 1949. At first, urban housing was primarily developed based on the "work unit" system (WUD). In this system, workplaces and houses for the employees were together developed in a compound, by the state owned enterprises or public institutions on the allocated free land. Thus, the housing in this period was called as "welfare" that allocated by the public without ownership. The marketization, privatization and commercialization of housing in China was gradually fueled after the economic reform of 1978. According to the housing policies, the alteration of development types and project volume (Table 5-1), the marketization of housing in Yinchuan can be divided into three phases (Fig. 5-1):

1. Public domination in transition to marketization (1980-1999)

With the promotion of market economy and administration decentralization from 1978,

local governments have gained more autonomy to organize the urban development. As a result, a transitional housing development mode - "unified development" (UD) was introduced in 1980, by which housing development was planned by the city government and was carried out by the government owned developers. The completed houses were usually sold to state-owned enterprises or institutions who funded housings in advance, and then sold to employers with discount[80]. In 1988, the "paid transfer of lands" allowing private developers to invest in housing development and sell housings as commodities based on market mechanisms, thus initiated the "commercialized housing development" (CD) in China. However, in Yinchuan, according to the data of 1997, 73.90% of annual constructed housing floor area was still public investment, WUD and UD were dominant before 2000s (Fig. 5-2 - 1980-1999).

2. Rapid growth of market-based housing development (2000-2007)

In the Notice No. 23 of 1998 - "Further facilitating housing commercialization", the State Council announced its decision to terminate the welfare housing until 1999 and to create a diversified provision system with commodity housing as a main source. The decision marked a major turning point towards market-oriented housing development in China and greatly facilitated the commercialized housing development. In 1998, the investment in urban housing in Yinchuan increased 89.5% from 1997, while the share of public investment had fallen to 26.63% in 2000. Thus, from this time, less than a quarter of housing development came from the public sector in the form of social housing [(3)] (SD, Fig. 5-2). Further, facilitated by the massive investments in infrastructure, which was brought by the city's strategy "Big Yinchuan" in 2002, rapid housing development was launched in the city and the annual growth of investment in housing was up to 67.81% in 2002 and 69.83% in 2003.

3. Booming of housing development (2008 -)

In 2006, the "*Liang Yi*" City strategy was proposed by the Yinchuan government. A primary target of this so called "Dually Cozy City" development strategy was to make Yinchuan the most livable city in the north-west China. As a result of city's efforts to improve the investment environment by infrastructure constructions and preferential terms, housing development boomed. The annual increase of housing investment was kept at 20% since 2008, thus in 2014 the annual housing construction area reached 17.86 million m^2 – triple compared to 2007 and nearly 12 times of 1999. Moreover, the volume of the housing projects was significantly enlarged (Table 5-1) – more than 10% of the housing projects have over 2,000 units. This was accompanied by the abrupt increase of housing price as well - 18.22% in 2008 and 23.61% in 2009. The mushrooming of large-scaled gated communities is prevalent on the city's peripheries.

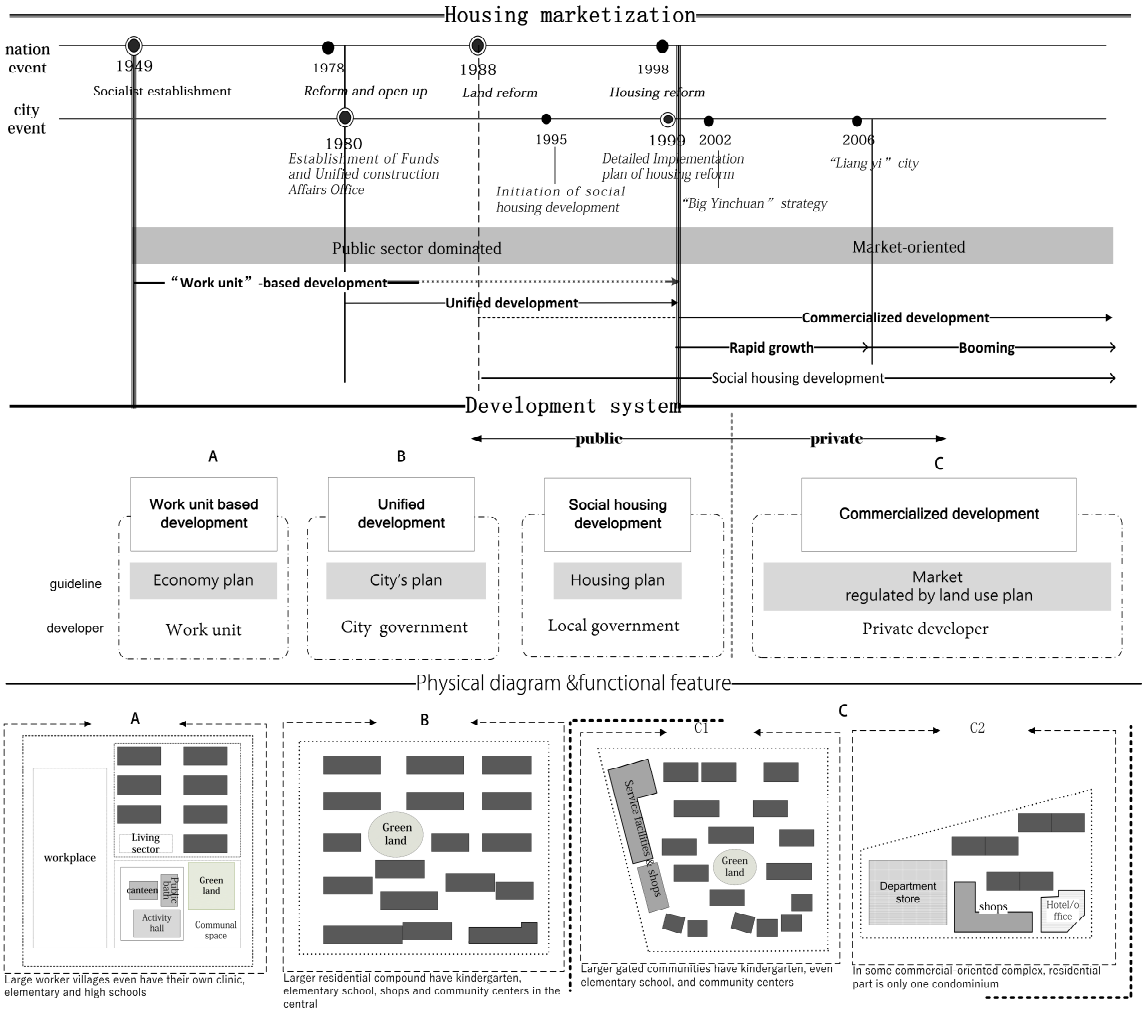


Fig. 5-1 The process of housing marketization and transformation of development type

Source: adapted by author from the Yinchuan Housing Development Chronicle Ⅰ(1990), Ⅱ(2000)

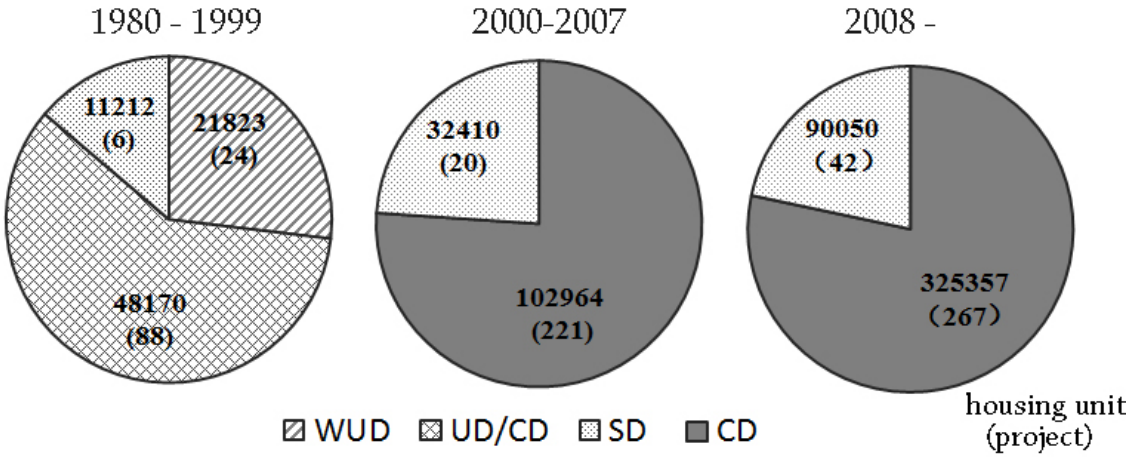


Fig. 5-2 Distribution of different types of housing development (1980-)

(Precise data to distinguish development type of UD with CD in 1990-1999 was not available, but from the statistic of investment source we could assume that majority of the projects were carried out by the governments thus most projects were UD; After 2000, still a few projects of WUD and UD were developed, which were account as projects of SD.)

Table 5-1 Volume of housing projects in each period (housing unit)

	WUD				SD				CD/UD			
	obs.	mdn.	max.	min.	obs.	mdn.	max.	min	obs.	mdn.	max	min
1980-1999	24	610	3580	60	6	1,765	3,946	410	88	420.5	3,371	36
2000-2007					20	1,311	5,900	1,200	221	300	3,632	36
2008-					42	1,449	10,155	240	267	790	20,000	50

Obs.: observed number; mdn.: median number; max.: maximum; min.: minimum. Data source: calculated by author.

5.1.2 Housing supply and population growth in the city

During 1981-2014, the stable increase of urban population was generally accompanied by a growth of urban housing construction (Fig. 5-3). However, since 2002, the housing development projects an abrupt increase and much more rapid growth than the population, probably due to the promotion of development by financial and housing policies, as well as the improvement of individual living space. The data shows that particularly after 2010, the population increase rate has been lowered while the housing construction shows fast and uptrend growing. Moreover, the changing of housing development has been consistent with the trend of economic growth (GDP). Yet, it could be seen that the growth of GDP is slowing down in recent years while the housing growth rate is still increasing. Thus, it seems that development of housing have been excessive that already exceed the residential demand (Table 5-2) and economic level, nevertheless more houses are under construction. Currently, the guidance and control of housing seems to be an urgent issue for the city. Thus, this study on the effects of public sectors in housing promotion is aimed as a base for improving the housing policies for Yinchuan city.

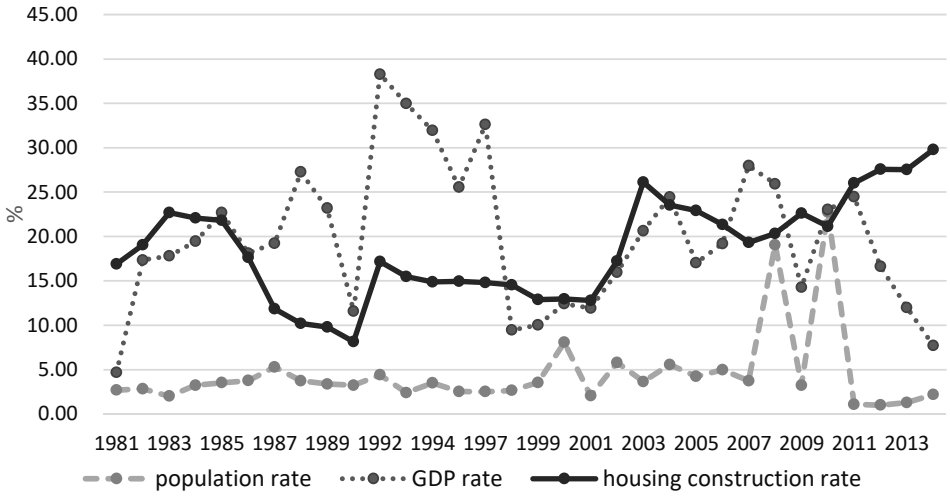


Fig. 5-3 Urban housing construction, population and GDP growth in Yinchuan city (1981-2014)

(Data source: statistics of Yinchuan urban districts; 1991 and 1996 data was not available.)

Table 5-2 Developed new housings and urban resident growth

	1980-1999	*2000-2007*	*2008-2014*
new dwellings (10,000)	81,205	126,560	259,801
urban household growth(10,000)	96,111	114,256	210,312

*new dwellings was calculated by developed housings minus redeveloped units.

5.2 Housing promotion area in the city plans

(Ⅰ) Master Plan of 1981-2000 and the revised plan of 1994

In the Master Plan of 1981-2000, the housing planning idea was to distribute new housing in the northern parts of Xinshiqu and in the surroundings of the Old Town and New Town. Meanwhile, redevelopment of the historic town areas was encouraged. When the plan was revised in 1994, new housing was planned east of the new forth core - High-tech Zone and its southern outskirt (Fig.5-4 - Ⅰ).

(Ⅱ) Master Plan of 1996-2010 and new designated housing-promotion zones

In the master plan of 1996-2010, the intention of balancing housing development in the East and West agglomerations is clear: in the east, renovation of old housings and four clusters of new housing developments in the outskirts of the Old Town were planned; in the west, planned new housing projects were concentrated north of *Xinshiqu* and the New Town area. According to the plan by 2010, the East and West Agglomerations accommodated 380,000 and 350,000 residents respectively, which was almost equal amount of housings. During this planning period, the New Urban Zone (NUZ) functions as a civic center with multiply function for 90,000 residents in 2002, and an Economic & Technology Development Zone (ETDZ-3) that designated in 2003 primarily as an industry zone and turned to promote both high-tech industry and residential development since 2005, were designated to the Central Agglomerations as city's new housing development focus (Fig.5-4- Ⅱ).

(Ⅲ) Master Plan of 2007-2010 and the modified plan of 2010, 2011

According to the 2007-2020 Master Plan, subsequent housing plans (2006-2010), (2008-2012) and revised master plan of 2010-2020 and 2011- 2020, the city planned the housing based on the new "Triple Agglomerations" structure (Fig.5-4- Ⅲ). The main strategy was to: 1) focus on the Central Agglomeration by promoting expansion in north-south direction; 2) prioritize the West by improving old housing in Xinshiqu and develop new housing north of the west agglomeration; 3) control the East by constraining urban

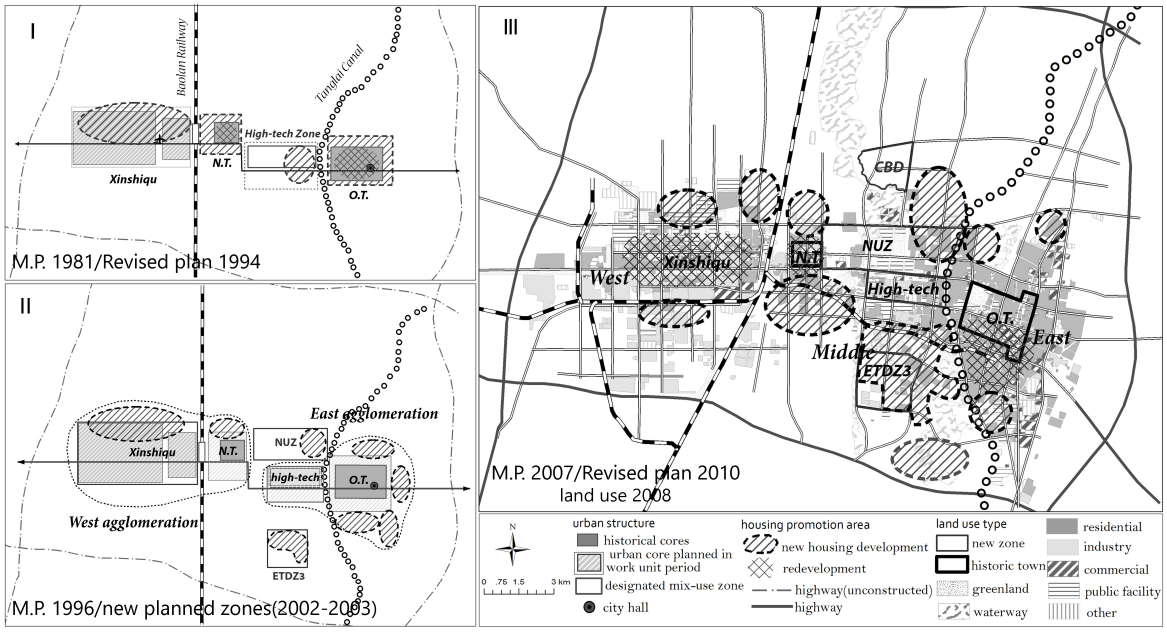


Fig. 5-4 Housing promotion areas in the city's master plans

and evacuating developments from the Old Town, promoting redevelopment of the shanty houses of the south of the Old Town and expand only in the north of the East Agglomeration. Therefore, from 1981, the city plans have continuously targeted in spatial balance of housing between the west and east part of the city.

5.3 Effects of public programs on promoting housing development

Attributed to the dominant housing projects were organized by the public sector, urban planning was able to easily control the housing developments. However, the direct intervention of public sector in housing faded significantly after 2000. In this section, the effects of the public programs that were promoted by the local governments on the housing expansion is estimated, in the new context of market-oriented development.

5.3.1 The role of public housing projects in housing promotion

After 2000, the local (city and district) governments are mainly involved in two types of housing projects: a) social housing planned and mostly financed by the local government with priority of land allocation (usually large scale, Table 5-1); b) major investment-invited projects proposed by local governments and partly financed by private developers. The second type is usually a large mix-used complex supported by preferential terms of tax-reduction, priority for land allocation or subsidies.

5.3.1.1 The effects in the case of new housing promotion zones

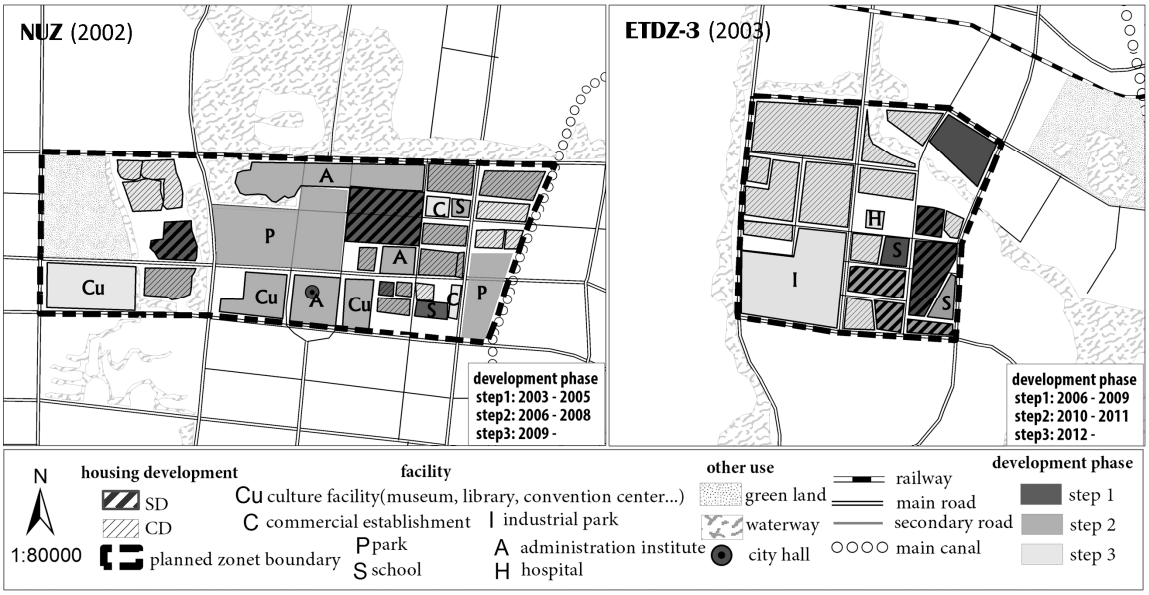


Fig. 5-5 Development sequence in the targeted development zone

From the cases of the NUZ and ETDZ-3, it was found that after the planning of these new housing promotion zones, large social housing projects were the first to be developed by the city. When the social housing was developed or initiated, other facilities like schools, commercial service and public transit, as well as private housings, followed (Fig. 5-5). This indicates the city government's intention of using social housing projects to lead housing development into the targeted areas. The insertion of social housing signaled to developers that infrastructure and facilities will soon be provided nearby, thereby private housing investment was promoted.

5.3.1.2 Public promoted housing projects and housing expansion

After 2000, a notable proportion of large social housing projects were located in the Central Agglomeration, according to the planning intentions. Considerable proportion was developed in the East Agglomeration as well, while the West Agglomeration had much less developments (Table 5-3). As social housing projects progressed in the designated zones and peripheries of the Central Agglomerations, they were followed by private projects in the surroundings. In the east, social projects were mainly located at the frontier. Some of these projects were even developed as a leapfrog, which allowed private projects to be developed as an infill urban area. Most of the social projects in the east were distributed as residential clusters with around 5,000 units each. Given the role large social projects played in leading the housing development, these clusters will probably promote further housing expansion to the east. Similarly, major investment-

Fig. 5-6 Public promoted housing projects and housing expansion

Table 5-3 Distribution of public housing projects in the market-oriented period

		West ag.	New zones	East ag.
2000-2007	Number of project	4	4	12
	Total house unit	3,840	12,043	16,527
	Mean volume	960	3,010	1,377
		West ag.	**Central ag.**	**East ag.**
2008-2016	Number of project	8	22	22
	Total house unit	13,415	63,635	37,867
	Mean volume	1,677	2,893	1,721

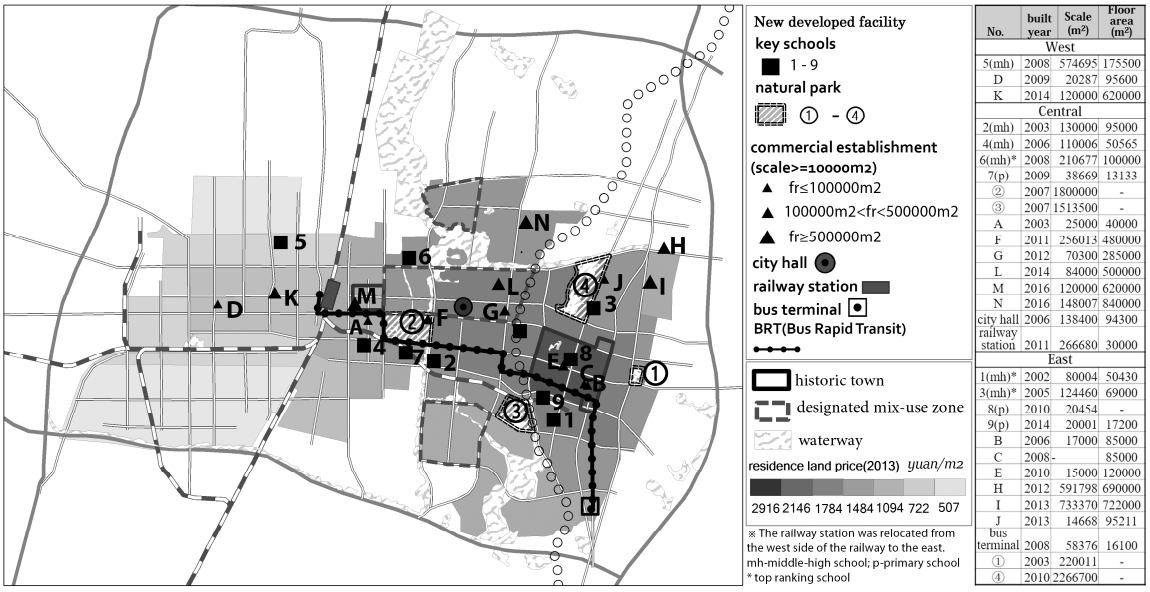
invited projects may have same impacts on housing promoting, as some of these projects were planned together with facilities. For example, one project with 10,000 housing units located in the east, contains one key primary school, one park and several commercial complexes with offices (Fig.5-6 -down). The project is expected to become a new urban node and may attract more housing investment into this area in the near future. However, in the west, both public and private projects were relatively fragmented (Fig. 5-6).

5.3.2 Public facilities as triggers of housing development

Along with the rapid growth of market-oriented housing development and improvement of housing conditions, values of amenities are increasingly recognized, especially, due to the rules of "School District" in China, high-ranking public schools are highly valued. Also, living in the high dense city, natural environment are pursued by the local people, great importance are put on the proximity to waterways and green lands.

In 2002, a key high school was relocated from the Old Town to the farmlands on the southern outskirt of the town (No.1 in Fig.5-8). This triggered a massive expensive housing development in its vicinity, called "School District Housing" (Fig.5-7-left). The trend continued with another two key schools from the Old Town being relocated to the periphery of the city in 2005 (No.3 in Fig. 5-8) and 2008 (No.6 in Fig. 5-8), while one school from New Town was relocated into its southern outskirt in 2006 (No.4 in Fig. 5-8). The relocation of these high schools was also observed as a trigger of housing development around the new sites. Moreover, since 2002, former waterways in the city were restored and several large lake parks were developed around the channels. This spurred development of high-class gated-communities around the new parks, in the name such as "No.1 site of lake viewing", "Families intimate with water", "Garden on the precious lake shore", etc. (Fig.5-7-right). It seems that development of attractive public amenities was conceived by the governments as an effective tool in inviting private housing development.

Fig. 5-7 Housing development sequence around two public amenities



No.	built year	Scale (m²)	Floor area (m²)
West			
5(mh)	2008	574695	175500
D	2009	20287	95600
K	2014	120000	620000
Central			
2(mh)	2003	130000	95000
4(mh)	2006	110006	50565
6(mh)*	2008	210677	100000
7(p)	2009	38669	13133
②	2007	1800000	-
③	2007	1513500	-
A	2003	25000	40000
F	2011	256013	480000
G	2012	70300	285000
L	2014	84000	500000
M	2016	120000	620000
N	2016	148007	840000
city hall	2006	138400	94300
railway station	2011	266680	30000
East			
1(mh)*	2002	80004	50430
3(mh)*	2005	124460	69000
8(p)	2010	20454	-
9(p)	2014	20001	17200
B	2006	17000	85000
C	2008	-	85000
E	2010	15000	120000
H	2012	591798	690000
I	2013	733370	722000
J	2013	14668	95211
bus terminal	2008	58376	16100
①	2003	220011	-
④	2010	2266700	-

Fig. 5-8 Distribution and volume of new developed key facilities (2000-2016)

Majority of the key facilities, including public schools and parks, or major investment promotion commercial projects developed after 2000 were located in the east and central areas, while most high ranking schools and major public promoted commercial establishments (floor area more than 40,000 m²) remained in the east (Fig. 5-8). In parallel, the imbalance of housing market between east and west has been intensified after 2000, which is evident in the enlarging gap of residential land price. Comparison of residential basic land price between 2001 and 2013 revealed that Old Town, areas around the Lake Park ④, NUZ and east of the Park ②, had outstanding increase in land price (more than 1800 yuan/m²). Other central areas and areas around Old Town also experienced substantial rise (more than 1000 yuan/m²), while the west area generally saw relatively small increase (less than 800 yuan/m² in Xinshiqu). In 2013, the residential

land price gap between Old Town and *Xinshiqu* was 3: 1 while in 2001 it was only doubled. It is seemingly that the imbalanced distribution of the public promoted amenities is one major reason of this exacerbating gap of market prospect between the east and west parts of the city.

5.4 Housing development and urbanization

The housing expansion in relation to the urbanization and urban planning is analyzed in this section, and thus the effectiveness of public programs is estimated (Table 5-4).

5.4.1 Housing expansion and urban growth control

During 1980-1999, all housing projects were confined in the planned urban growth boundary in the master plan of 1981-2000 and revised plan of 1994(Fig.5-9-Ⅰ). In 2000-2007, over 10% of total housing projects were developed outside the planned growth boundary and these outgrown projects predominantly concentrated in the East Agglomeration (Fig.5-9-Ⅱ). After 2007, only 5.50% of all the projects were developed beyond the planned growth boundary of 2010-2020 master plan. However, it was revealed that in the 2010-2020 plan, the eastern planning boundary of the 2007 plan was significantly expanded as township built area, to include housing developments carried out before the revision. Thus, it is housing development that out of the control of the plan and constantly pushing the growth boundary (Fig.5-9-Ⅲ).

5.4.2 Housing development and planned residential areas

During 1980-1999, in line with the planning intention, redevelopments were carried out in the historic towns and new housing developments progressed in *Xinshiqu*, the High-tech zone and its southern outskirt, and around the historic towns. Housing projects were dominantly developed on the planned residential land (Fig.5-9-Ⅰ). However, during 2000-2007, only 59.92% of all the projects were developed on the designated residential land with another 6.20% located in new housing promotion development zones, while up to 33.88% of projects were on the land planned as other use (mostly industrial use) and open areas. Housing projects grew fast in the areas around Old Town, while lands planned for residences in the west agglomeration were not fully developed (Fig.5-9-Ⅱ). Thus, the intended housing balance between the east and west agglomerations was hardly achieved.

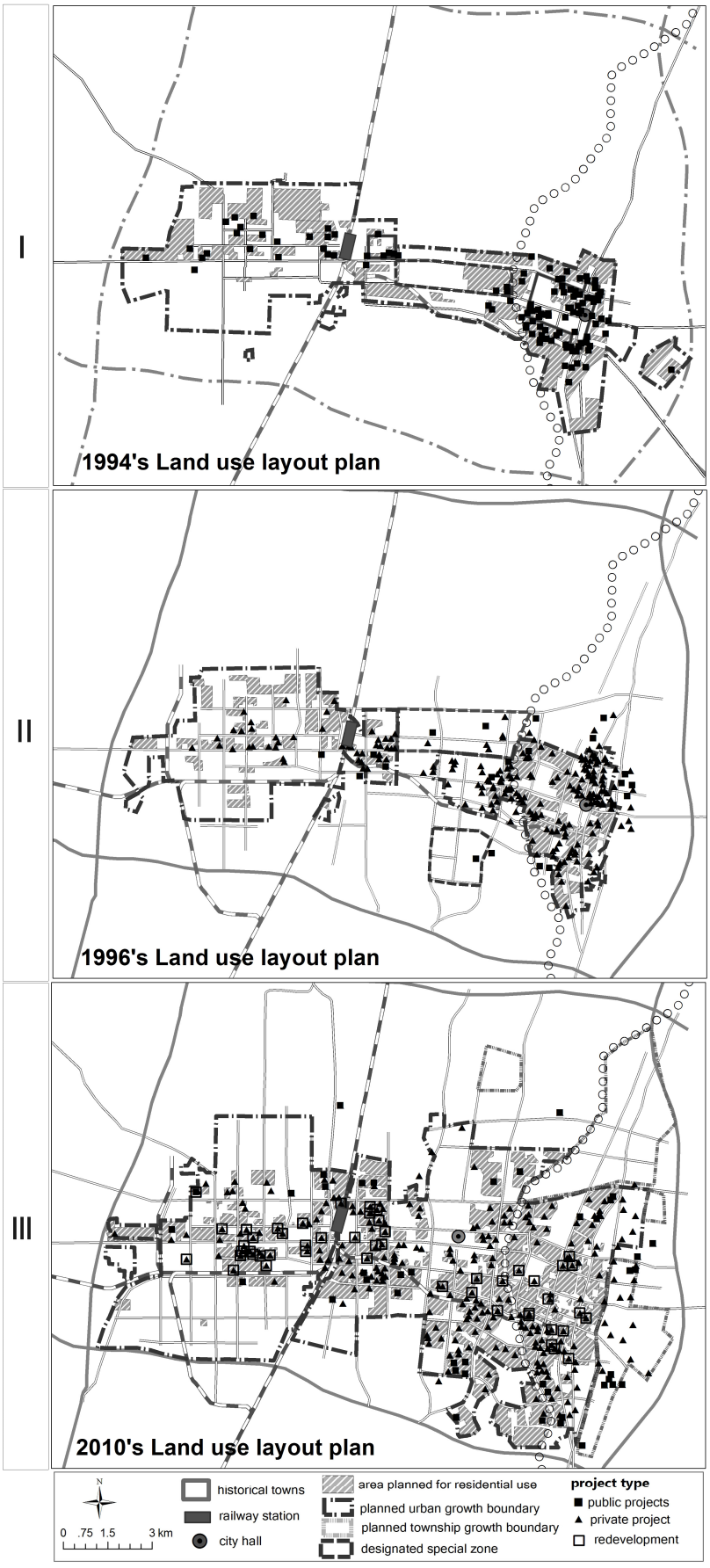


Fig. 5-9 Housing development and planning in each period

From 2008, more than 80% of all the projects were developed on designated residential lands of 2010 plan that significantly enlarged planned residential area compared to the 2007 plan, especially in the east and the planned green belts. Facilitated by the central government's policy of "Dilapidated housing redevelopment" (2008) and the city's "urban renewal" program (2013), redevelopment projects have been vigorously carried out in Xinshiqu and in the "urban villages" south of the Old Town (Fig.5-9-Ⅲ). The focus of housing supply was successfully oriented to the Central Agglomeration, where a number of new housing projects are burgeoning. Yet, the idea of controlling the east expansion is basically defeated because housing development is continuously encroaching the east.

Table 5-4 Housing development and urban planning (project)

	zoned as residential use	within planned growth boundary	unregulated	total
Ⅰ	93	118	0	118
Ⅱ	145	216	26	242
Ⅲ	253	292	17	309

* Planned growth boundary includes areas of new development zones.

5.5 significance of public programs in managing housing development of Yinchuan city

To tackle the problem of excessive housing supply, in Nov. 2015 the Construction Department of Ningxia province issued a notice for the cities to urge consumption of housing stock. The measures mainly contained land supply control and purchase of commodity housing to be used as social housing. In 2015, the Housing Bureau of Yinchuan also announced that housing supply is currently sufficient and halted the development of social housing for low income families.

By looking into the inner spatial distribution of the housing developments, our findings suggest that more critical issues for the city seems to be restraining the further eastern housing expansion by channeling attractiveness to the central and west area. The local context was similar in the East, Central and West agglomerations in terms of trend of population growth, economic changes and geographical conditions (all on flat plains), while the planning condition is more favorable for the central and west areas. For instance, in the field survey of 2015 it was observed that some leapfrogged new-built social housing projects in the east can only be accessed by unpaved roads. However, the east still concentrate large amount of housing projects and population. While high vacancy in the new projects in the Central agglomeration was observed, the population density of Old Town has been around ten times of that in the new developed central areas. In a new *Shequ* (community) comprised of 13 new housing projects around park ②, low occupancy

rate was reported. For example, in one project of 808 housings completed in 2011, only 146 have been occupied in 2014. In the literature of advanced market economy, factors frequently criticized for stimulating sprawled development are transportation infrastructure, housing mortgage policies, economic growth as well as planning and zoning control, as these variables in the three agglomerations were almost identical, it is considered that distribution of large-scale public housing and key facilities have contributed to the difference of market prospect and attraction of living environment, and thus housing development and population distribution is imbalanced.

The imbalanced housing development in the city have caused unmatched employment and housing supply. While considerable proportion of city's workplaces are concentrating in the west and central area, housing supply and residents are less in these areas. According to the hearing from a professor of planning department in Ningxia University, in the university which locates in *Xinshiqu*, about half of the faculty are living in the east area and daily commuting to the university; also, the document of a key high school in the central area (No. 4 in Fig. 5-8) reported that more than half of the teachers of the school are living in the east area and average commute time is one hour for the teachers. Due to fast increment of automobile ownerships in recent years, sever congestion has been observed in the rush hour in the city, whereby one way traffic was enforced in most of the streets in the Old Town. Referencing to the principles of compact city, proximity of job and housing would prevent long distance commute and reliance on automobile, the situation of housing development in Yinchuan city suggest that it is necessary to re-organize housing development to assort with employment in the city, that is to promote housing development toward west.

In the market oriented periods, city government uses development control of issuing land use planning permission to regulate private development projects. Principally, the development site settled in the end should be subordinated to planning control and influenced by government's intentions. However, in the practice, the application for a planning condition note or permission involves complicated bargaining between developers and governments. Especially after 2002, targeting inward investment and revenue of land-leasing, the government turned towards adjusting plans to meet requirements from developers. Thus, sole physical regulation is seemingly incompetent in directing market-oriented development into intended promotion area and away from conservation area. Comparatively, it is evident that developing of public amenities and large public housing affected private housing development decision more strongly through changing housing investment environment. Therefore, it seems that to carefully distribute more market-attractive public promoted programs into the west areas is a more

efficient measurement to guide and control the private housing development. Developing a public program location strategy, by cooperation between public sections in charge of decision-making of the significant public programs, may help to achieve the desired and more sustainable housing development spatial pattern within the whole city.

5.6 Conclusion

In this chapter, the impacts of the public promoted programs on the market-based housing development in Yinchuan city was examined. Moreover, the effectiveness of these programs in achieving the intended housing development pattern was evaluated.

The main findings are：1) In the market-oriented periods, local governments still hold power to lead the housing development by promoting housing investment environment based on the developing of large-scale public housing projects and attractive facilities as local amenities. 2) However, the distribution of these public promoted projects and amenities was not consistent with the spatial intentions for housing development, presented in the housing promotion strategies in the city's master plans. This fact might have contributed to the undesired housing development pattern seen in the imbalanced expansion between east and west areas. 3) It is suggested that in order to efficiently manage the housing supply of the city and achieve a sustainable housing development pattern, function and potential of public investment programs in influencing investment environment should be identified and evaluated. Careful consideration is needed to reasonably distribute public promoted housing projects and amenities based on the coordination with city's housing promotion strategy in the master plans.

Chapter 6 Effects of specific zoning on land use pattern

This chapter aims to estimate the effects of specific zoning on land use pattern. Specific zoning, is a widely utilized planning tool in Chinese city under the market economy, which designates a specific zone for special development purpose and provides detailed land use regulations in the zone area. Usually, designated specific zones benefited from the priorities of well-equipped infrastructures, attractive investment environment and preferential financial terms[81)]. A variety of specific zones are already designated in Yinchuan city since 2000 under the name of "Industry and Technology park", "New Urban Zone", "New CBD", "University Tow ns", etc., which occupied considerable proportion in the urbanized area of the city. The importance of specific zoning not only lies on the leading role in the economic growth and facilitating inward investment, but also on the planning practice in promoting and controlling the expected urban development into a planned manner in face of rapid urbanization and market growth.

According to Carruthers (2002), the land use outcome affected by the policy design and institutional structure of the policy implementation, in combination with the land market demands. Therefore, in order to examine the effects of specific zoning on the land use and reveal problems of the specific zoning in promoting efficient and ordered land use in Yinchuan city, analysis of this chapter is based on the close investigation on the rationale behind the implementation of specific zoning. At first, the institutional organization of the specific zoning is interpreted; within this institution setting, the implementation of the specific zoning is interpreted from the aspects of financing, zone designation and detailed land use plans; subsequently, the impacts of the implementation of the specific zones in shaping the land use pattern of the zone area are estimated by comparison studies of the explicit examples. Finally, the implication of specific zoning in promoting ordered and efficient land use is discussed.

6.1 Specific zoning in the market economy

6.1.1 Institutional structure of specific zone development

Yinchuan's High-tech development zone (1992) was city's first special development zone that designated to promote investment on technological industry and market

economy. In the beginning, the zone development was primarily subordinated to the direct supervision of provincial government. In 2001, the zone was approved as National ETDZ and the organization of zone development concurrently turned to more market-oriented. An Administrative Management Committee of ETDZs was established to take over the operation of the zone development, which is an agency directly subordinated to the city government. The responsibility of the committee is zone planning and administrative approval, and later in 2004, the committee was also endowed with autonomy of financial management and land management. Under the supervisor of the committee, a special ETDZ Co., Ltd. is in charge of zone development, including investment invitation, land expropriation and land leasing, infrastructures, key project investment and construction. Institutional organization of most of the specific zones designated afterwards basically followed the model of the ETDZ (Table 6-1). The management committees of the specific zones, chartered by the main funder of the specific zones- district/city/provincial governments, functioning as development cooperation that fully take charge of zone implementation but on behalf of the local government, and the zone plans still subject to the approval of city government.

Table 6-1 Institutional organization and financing of specific zoning– an example of the CBD

Assignment of responsibility	
Management Committee of the CBD	• Draw up master plan(land use layout, detailed land use regualtion), economic plans and work scheme of the zone • Raise funds • Land expropriation, settle relocated farmers, land levelling • Infrastructure development • Investment invitation and investment project management • Coordination with city's government institutions of land, planning and tax, help enterprises to handle administrative procedures.
Jinfeng District government	• Main organizer, charter the committee
City government	• Policy support: incentives, tax-reduction, subsidies for enterprises • Master plan approval • Administrative approval of single project: land use right grant, planning permission, construction permission, etc.
Finance mangement	
Funds	Mainly leasing fee of lands in the zone that refunded by the city government
Operation	Self-balance
Tax-revenue share	district government: 50%, city government:50%

Source: "Notice on the development proposal of Yuehai CBD" issued by Yinchuan city government, 2010, No.44.

6.1.2 Implementation of the specific zoning

6.1.2.1 Financing of specific zone development

There are three types of zone financing alongside the main body of zone development: 1) Fiscal budget. The New Urban Zone (NUZ) is directly planned and developed by the city government, and thus the land exploration and infrastructure development are fully financed by the budgets from city government, and also the Vocational Training Base is mainly funded by the budget from the provincial authority. 2) Land leasing fee. For most other specific zones, their management committee are responsible for their own profit and loss. The primary financial source of these zone development is usually land revenue obtained from leasing expropriated rural land inside the designated zone, while grants from upper government, bank loan and cooperation with private investors are also alternative sources. For example, among the initial funds of Xixia Industry Zone, 10 million Yuan was obtained from land leasing fee, while 8 million was from fiscal grants and another 9.3 million was self-raised by the management committee. 3) Private investment. A special case is the Trading and Distribution Center that planned by the city and Xingqing district government, but a private developer was invited to invest and takeover most of the zone development.

It is found that development procedure of the specific zones that heavily relies on the land leasing is a circulative course with land expropriation advanced before the project building, especially for the zones of large scale. After the zone plan is approved by the city government and work scheme is settled, part of collectively owned rural lands enclosed in the zone are expropriated and converted into state-owned urban land; after that, the converted lands are leveled and infrastructures are equipped. Investment invitation and marketing are carried out in the same time, which mainly involve negotiation with invited developers. All of these early stage works are run by the management committee. As a result, based on the expectations from the potential investors, the management committee reports land release plan to City's Land Resource Department for estimation, once the release plan is approved, the land parcels designated with detailed planning condition (land use type, maximum or minimum FAR, etc.) that prescribed in the zone land use plans will be leased by either way of "auction", "bid" or "public listing". Using the land leasing fee paid by the developers, more lands in the zone area could be expropriated and infrastructure development continue to proceed. By this way, while the land expropriation and infrastructure development are framed by the zone plans, the land development and building activities in effect take places plot by plot, which generally depends on the market preference. Therefore, the development pattern and land use of the special zones

are reconciled consequence of zone plan and market forces.

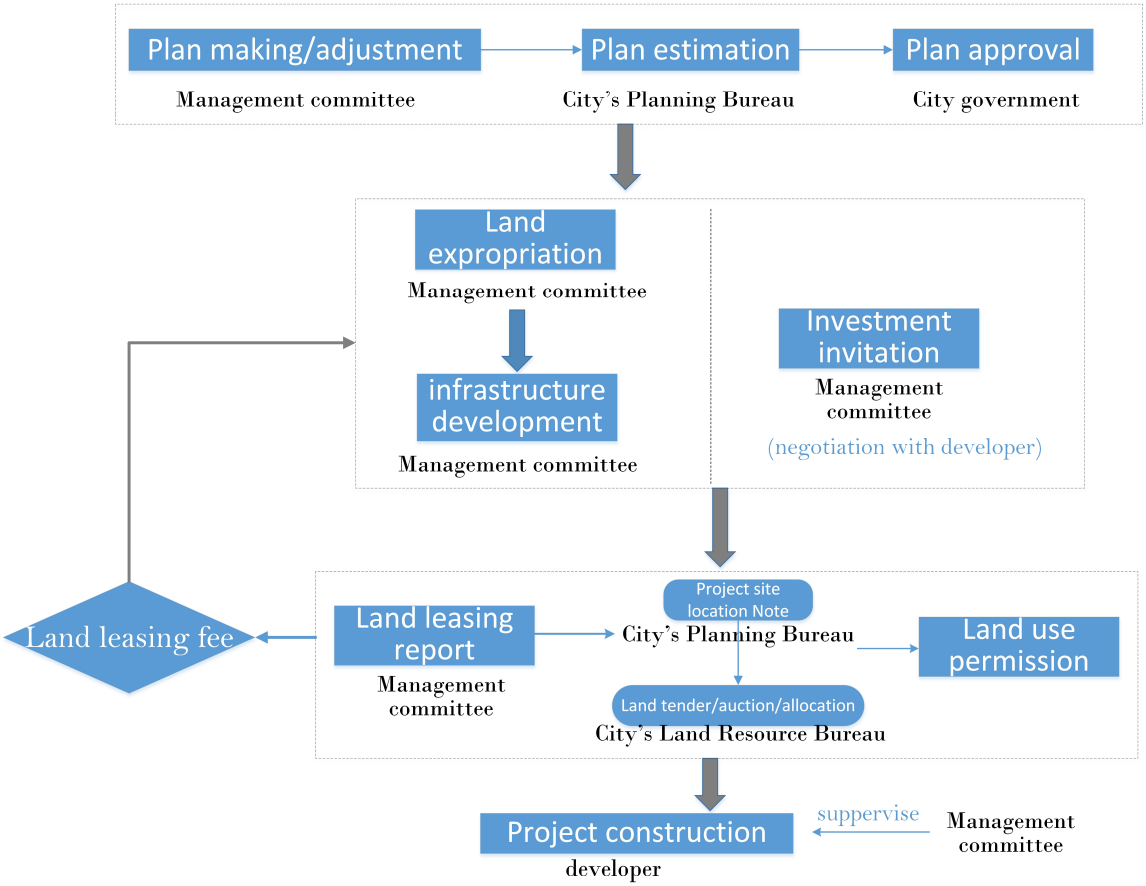


Fig. 6-1 Development procedure of the specific zone relies on land leasing

6.1.2.2 Designation and planning of specific zones – spatial considerations, detailed land use plan and local context

In this section, firstly, by analyzing the official approval documents of establishing special development zones, the political objectives and spatial consideration of designation of the specific zones are reviewed; secondly, planning characters of the specific zones are clarified and categorized, based on the analyzing of detailed land use plans in relation with city's overall land use layout plans.

Based on the estimation of reasonable composition and balanced arrangement of different land use at the city scale, city's land use layout plans presented in the master plans, aiming to lead coordinated urban functions and organized land use layout for the entire city, thereby the maximum of economic performance and sustained land use efficiency of the whole city could be reached. For example, according to the National Standard of Urban Land Use Categories and Planning of Urban Construction Area

enacted in 2012, appropriate composition of urban development land should be: residential, 25.0%-40.0%; service (business, commerce, administration, etc.), 5.0%-8.0%; industrial, 15.0%-30.0%; transportation, 10.0%-30.0%; open space, 10.0%-15.0%; the ratio could be properly adjusted to suit the characters of the city and in this way, a workable and livable city shall be structured. Thus the specific zones that designated larger amount of land for specialized use compare to city's land use plan may demonstrate the excessive zoning of the special land use from the view of city's overall needs.

Isolated zones excessively planned of mono specialized use

Specific zones that promoted by the district governments for promoting industrial investment were mostly designated in the open space isolating from the existing urban area(Zone Ⅶ and Zone Ⅸ in Fig. 6-2). The land in these zones were predominately zoned as industrial or technology use, and even exceeded allocated amount of industrial land in the city land use plans. For instance, the Jinfeng Industrial zone (2004, Zone Ⅸ) was designated when the master plan of 1996-2010 was considered incapable to lead urban development in the tandem of the "Big Yinchuan", this zone was located on the planned open area in the 1996 master plan. Even the new master plan of 2007-2010 was made later and again modified into the new master plan of 2011-2020 to broaden the planned area of industrial use for the city, half of the industrial area in this zone still could hardly be included into the master plans' land use layout plan, which indicates excessive supply of industrial us (Fig. 6-3, c). Moreover, the function orientation of some of these specific zones seemingly deviated from the city's spatial intentions, for example, in the master plan of 1996-2010 and new master plan 2007-2020, the East Agglomeration was consecutively positioned as commercial and trading core of the city, however, the Xingqing Technology Park (Zone Ⅶ) that planned for medicine production, food-proceeding and material manufactures, was designated in 2003 in the north frontier of the east, for the industrial promotion of Xingqing district. In 2011, due to sluggish development, the zone was combined into the expanded Commercial Strip Ⅴ, and thus was re-designed as a trading and distribution zone.

It seems that little consideration was given to the function of these zones in accommodating city's overall urban growth or to integrate the development of specific zones into city's whole spatial organization, instead, competition for investment and purchase of economic revenue overweighed in the planning ideas of these zones. Thus, more exclusionary land use plans that inordinately zoned for a specialized land use are adopted.

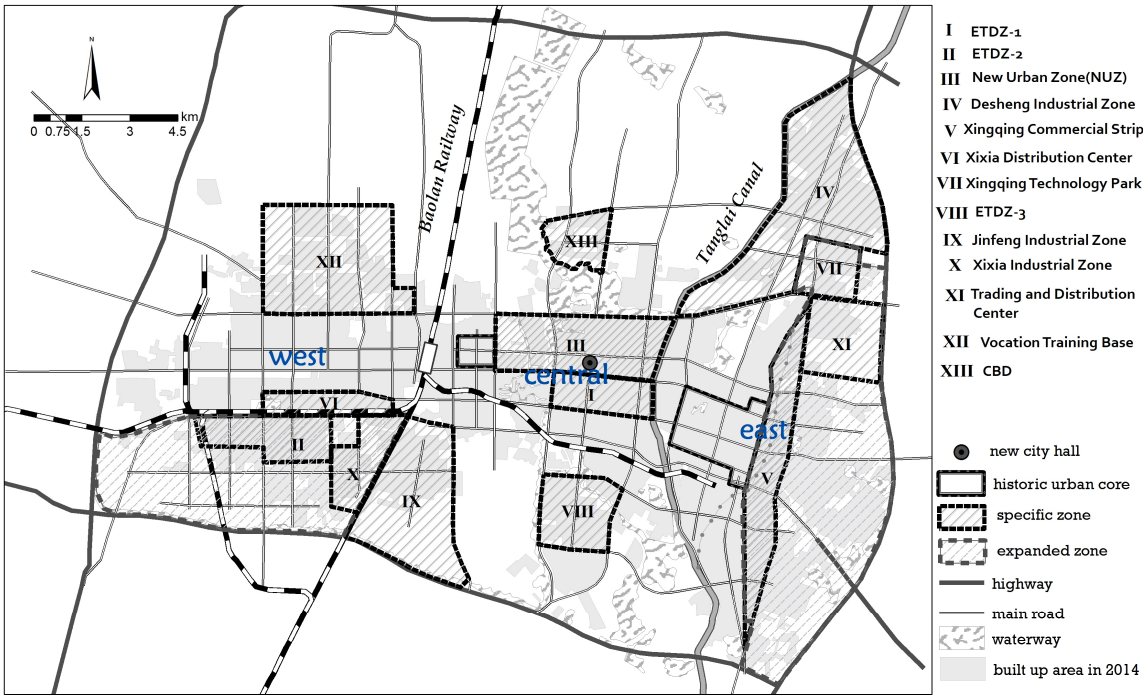


Fig. 6-2 Spatial locations of designated specific zones in the CUA of Yinchuan city

Zones designated on the urban periphery with excessive supply of specialized land use

Most of other specific zones that designated for specialized investment promotion and political achievement (For example, Zone Ⅻ, Table 6-1) are designated in the periphery of the city. The connection of these zones with existing urban area are stronger, usually, these zones are extension of the existing urban functions, for example, the Commercial Strip (Zone Ⅴ) and Trading & Distribution Center(Zone Ⅺ) were designated as an expansion area of the already well-developed wholesales and commerce in the east of the Old Town or the existing commercial strip, in order to further attract more investment through economic agglomeration. In these zones, predominant lands were zoned for the specialized use as well. However, these zone are also inclined to be designated with excessive supply of the specialized land use from the viewpoint of city's overall land use plan (Fig. 6-3, a, b, d), which may intensify competition for specialized investment in the local surroundings.

Specific zones with strategic spatial meaning in the whole city development

The third type of specific zones were designated to serve the strategic arrangement of city development by the city government, and their zone plans are coordinating with the overall spatial intentions. For example, In 2002, in seeking for new urban growth direction for securing expected rapid urbanization brought by the "Big Yinchuan", the New Urban Zone (NUZ, Zone Ⅲ) were designated by city government as a new civic

center to direct future development focus toward the city's central area. As a leading project in this city spatial strategy, the zone was comprehensively planned with multi-functions of administration, culture, business and residence. In the beginning, in 2003, the ETDZ-3 (Zone Ⅷ) was designated in the open space south of the central area as a pioneer project for promoting High-tech development, thus, overwhelming part of the zone land was designated for industrial use. In 2005, city government decided to readjust urban structure and promote this southern-central area as the focus of city's housing

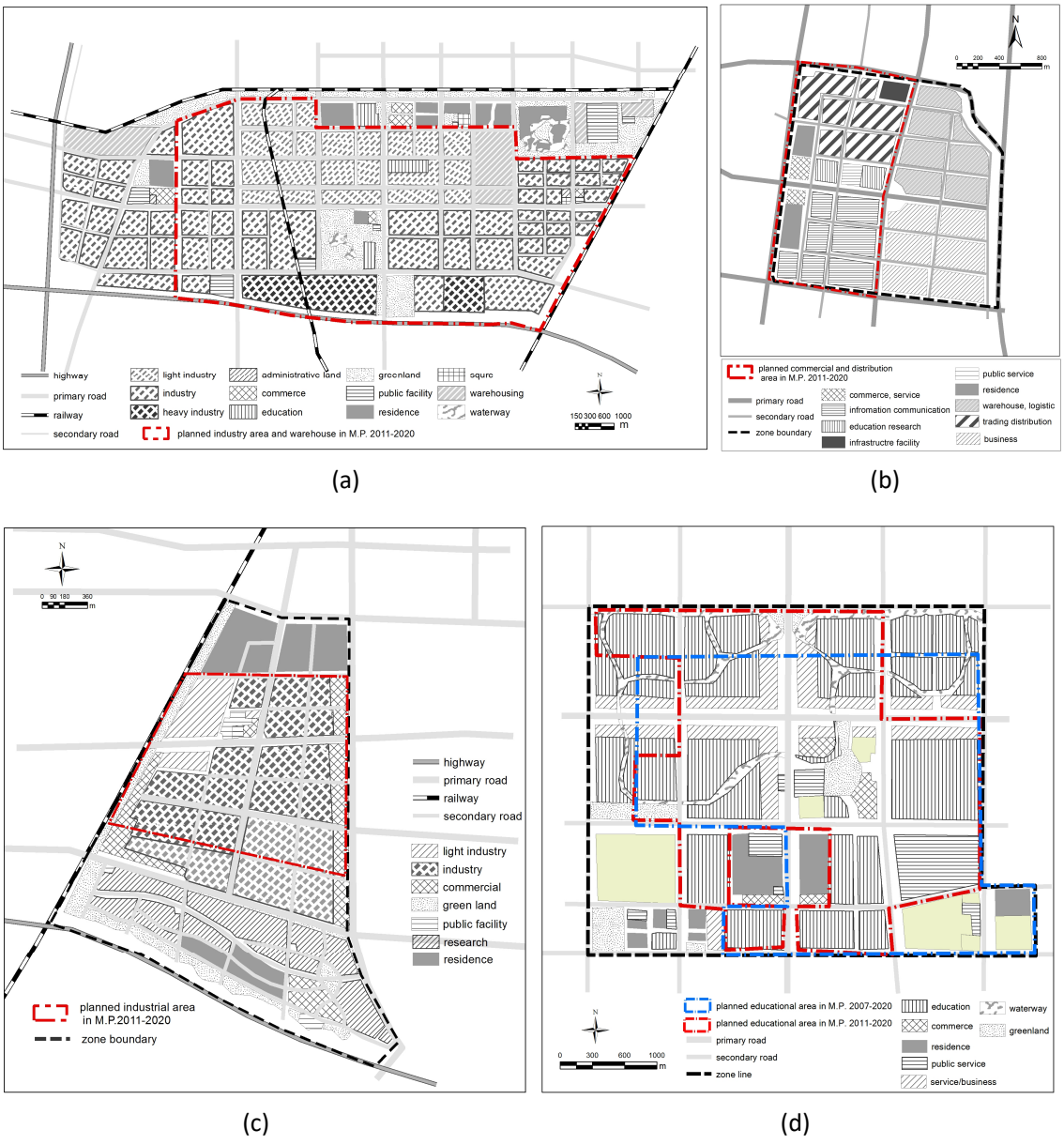


Fig. 6-3 Land use plan of specific zones with excessive supply of the specialized land use

a. Land use plan of ETDZ-2 in 2006; b. land use plan of Trade and Distribution Center(2008-2020); c. Land use plan of Jinfeng Industrial Zone(2020-2020); d. land use plan of Vocational Training Base (2008-2020)

development, as a strategic and frontier site, in 2007, the land use plan of this zone has accordingly turned to convert dominant parts of the land into residential use. Another zone with spatial strategic meaning is the new CBD designated by city government in 2010, the zone was designated to promote headquarter business of the city. The city government located this zone in the northern frontier of central area of the city, intending to make the zone a future employment center that serve the surrounding areas, where amount of housing projects were planned. The zone was predominately planned for business use.

It could been seen that, the planner of these zones, are either city government or administrative committee of ETDZs that directly report to city government, and the planning of these zone have kept to be in line with the city's overall spatial organization, incorporated with the considerations of their position in the whole city development, relationship with local surroundings and changing conditions of the city, and thus are more comprehensively planned and the excessively zoning are avoided.

Table 6-2 Institution and implementation of specific zones in Yinchuan city

	Designation		implementation		planning	
	Policy guidance	**Location**	**Main body**	**Financing[1]**	**Oversize zoning**	**Land use plan**
I	"Ningxia ought to lead the China Western Development"(*Provincial Party Committee, Jan 1st 2000*)	Strategic	Administrative Committee of ETDZs	1) Land leasing fee 2) banking		Mix
II	Id.	periphery	id.	id.		Single
Expand II			id	id.		
III	City's development strategy of "leap-forward Big Yinchuan", 2002	Strategic	City government	Grant from city government		Mix
VIII	The second step of the ETDZs development (*Administrative Committee of ETDZs, 2003*)	Strategic	id.	id.		Single->mix
IV	"Raise the Industry and Strengthen the county" (*Helan County, 2002*)	periphery	M.C. subordinated to the county government	Land leasing fee		Single
V	"Trading founds the district" (*Xingqing District, 2002)*	periphery	District government	1)Land leasing fee 2)Grants from city government		Single
Expand V		periphery	M.C. subordinated to the district government	id	√	
VI	"Facilitating trading and distribution development " (Yinchuan *city government, 2002)*	periphery	District government	1)Land leasing fee 2)Grants from city government		Single
VII	"Raise the Industry and Strengthen the district" (*Xingqing District, 2002)*	isolated	M.C. subordinated to the district government	Land leasing fee	√	Single
IX	"Raise the Industry, new-high technology and strengthen the district" (*Jinfeng District Party Conference, 2002)*	Isolated	M.C. subordinated to the district government	1)Land leasing fee; 2)Private investment 3) fiscal grant from *Jinfeng* district government	√	Single
X	"Raise the Industry and Strengthen the city" (*Yinchuan city government, 2001, No. 27; Xixa District Party Committee, 2004)*	Isolated	M.C. subordinated to the district government	1)Land leasing fee 2)Grant from *Xixia* district government 3)banking		Single
XI	-National Distribution industry plan -"Promote service development" (*Yinchuan city government, 2008)*	Periphery	Private developer; district government	Private investment	√	Single
XII	Provincial policy to "facilitate leap-forward development of vocational education"*(Province Party Committee, 2008 No.3)*	Periphery	Provincial government (M.C. established in 2014)	Grant from provincial government	√	Single
XIII	-"Inland open up pilot area" (provincial strategy, 2009) - support China-Arab Forum launched since 2010 - "Headquarter development of Yinchuan" (*Yinchuan city, 2009*)	strategic	M.C. subordinated to *Jinfeng* District and city government	Land leasing fee		Single

M.C.: Management Committee of the zone; 1 listed by primary source and secondary source

6.2 Land use pattern of the specific zones

Two dimensions of Land use pattern in the designated specific zones are estimated in this study: 1) development pattern –spatial locations of land developments and building activities; 2) land use layout- distribution of different land use types. This section explores the land use pattern of case special zones of different implementation characters. Due to unavailable of the land releasing data before 2010, majority of case zones that are explicitly examined here are zones designated or adjusted their land use plan around 2010.

6.2.1 Development pattern

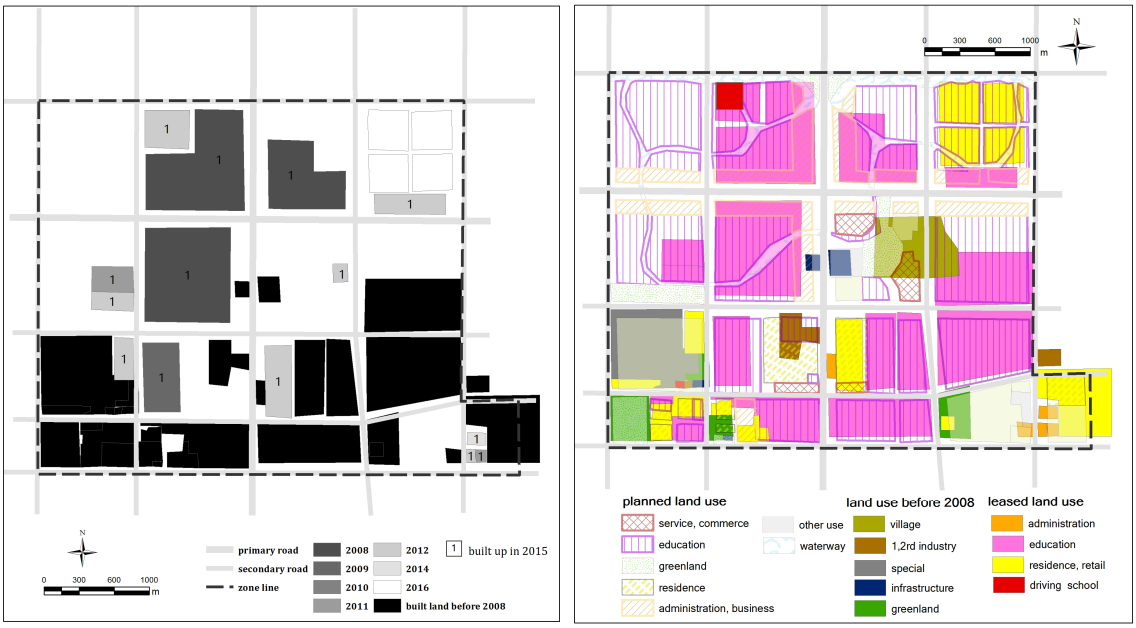
A summary of land development of the case study zones in the survey period is presented in Table 6-3. It could be seen that after 12 years of its establishment, in the 11.56 km² of designated area of the Jinfeng Industrial Zone (Ⅸ, *Isolated zone excessively planned of single specialized use*), land development progressed in a slow and piecemeal way (fig. 6-4, a). During 2010-2016, only 17.88% of the zone lands were leased out, and slightly more than half of the leased lands have been built up. From the land use map in 2008 and 2011, it is found that the development started from the north-west of the zone area, based on a previous rural village that became an "Urban Village" after it was included into this zone, to date, small workshops and low-end factories are concentrating in this village, while other new built factories jumped to more distant and scattered locations within the zone where new planned roads extended. After that, land development took the form to infill the undeveloped land in between and meanwhile spread to further locations in the excessive zoned area. Since primary funds of the zone development comes from land leasing fee, in order to seize land leasing fee to cover the cost and support zone development, the zone's management committee seems to prefer to expropriate rural lands as much as possible in the largely designated zone area and get infrastructure in place to convert the unequipped lands (raw land, *Shengdi*) into salable lands (*Shudi*, ripe land) in advance. However, the location and development of investment projects are more dependent on the profit seeking developers in accordance to market need. Moreover, once the land is leased, whether the factories or buildings are built on the leased land is not an urgent concern of the committee. Thereby, projects are mostly agglomerating around the intersection of primary roads and the ratio of unbuilt is high (41.88% during 2010-2015), often with levelled lands in the middle of a block undeveloped. As a result, built projects are loosely dispersing in this oversized zone, the patchwork of vacant lots and built up lots become prevalent landscape in this zone.

Table 6-3 Land leasing and built land in the case specific zones (unit: ha)

	zone area	leased land	ratio of to the zone land	built up land	ratio to the leased land	Ratio to the zone land	survey period
Jinfeng industrial zone	1156	206.64	17.88%	120.10	58.12%	10.39%	2010-2016
Vocational Training Base	1413	455.88	32.26%	346.24	75.95%	24.50%	2008-2016
Trading and Distribution center	623	292.52	46.95%	231.29	79.07%	37.13%	2009-2016
CBD	222	90.11	40.59%	63.93	70.94%	28.80%	2010-2016
ETDZ-3	524	236.99	45.23%	142.57	60.16%	27.21%	2010-2016

(a) (b)

Fig. 6-4 Land use pattern in the Jinfeng Industry Zone: a, land development process, b, land use layout



(a) (b)

Fig.6-5 Land use pattern in the Vocational Training Base: a, land development process, b, land use layout

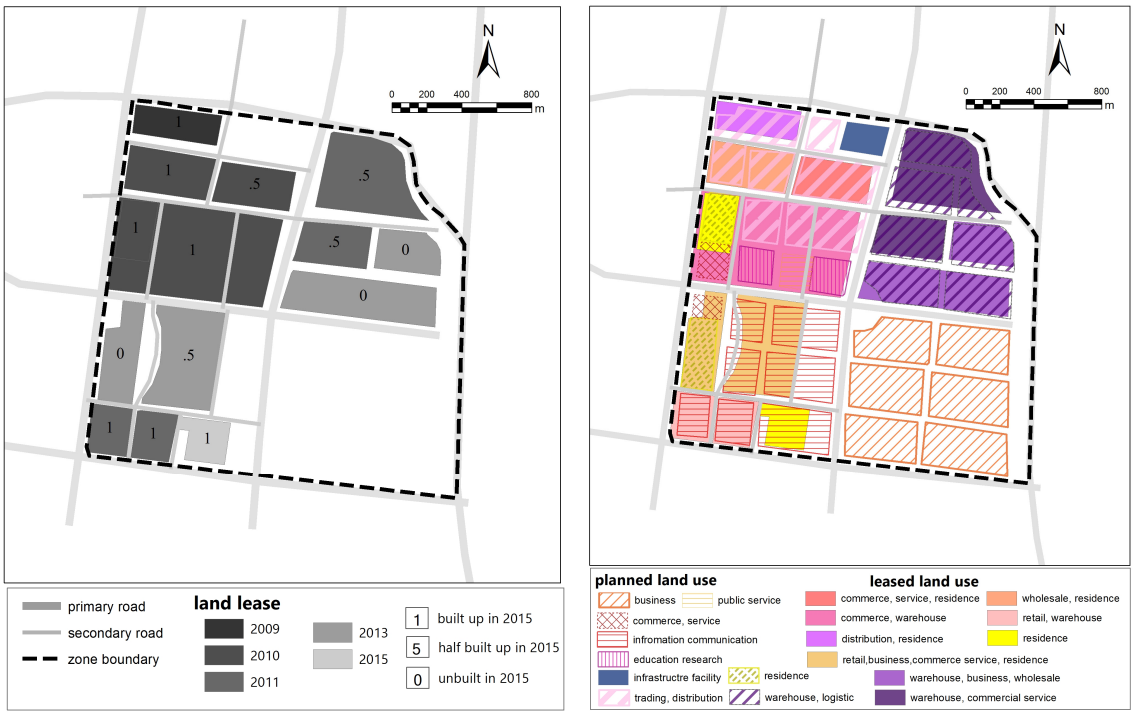
The fragmented development is also observed in the Vocational Training Base (Ⅻ), which was designated with fairly large size (14. 13 km²) at the periphery of the Xinshiqu. After almost 8 years of development, more than half of the lands in the zone are undeveloped, and still it seems that substantial infilling of the vast zone area is a tough task in current since most of the targeted collages (14/15) have already moved into the new-built campuses(Fig.6-5, a). However, different with the Jinfeng Industry Zone, the lands designated for campuses in this zone are administratively allocated by the city government, and campus construction are financed by the provincial authority, it is observed that urban land expropriation and well equipped infrastructures only confined in the area built with new campus. While open farmlands in the farer zone edge are kept as untouched. The built up ratio of released land in this zone is higher (75.95%) compare to Jinfeng Industry Zone, nevertheless, each campus occupies large area but built with extremely low density (average FAR of these campus are around 0.2).

The Trading and Distribution Center (Ⅺ) that is also excessively zoned from the viewpoint of city's master plan, is mainly invested and managed by a private developer. From 2008 to 2016, six mega commercial projects of scale ranged from 90967 m² to 673847 m² were successfully invited into this zone, moreover, a quarter of the zone area has been developed as one large public project – Logistic Park invested by Ningxia Transport and Logistic Corp (northeast), only east-south quarter of the zone is remained as unappropriated rural land (Fig.6-6, a). It seems that due to the rolling development

strategy adopted by the private investor, zone development is following a more ordered and tight way - more substantial development are gained (leased land occupies 46.95% of the zone land during 2010-2016). However, the zone development still lag behind the original goal that targeted to complete zone development in 5 years, probably due to the excessive zoning for distribution use and competence and overheated competence from the existing Commercial Strip (Ⅴ).

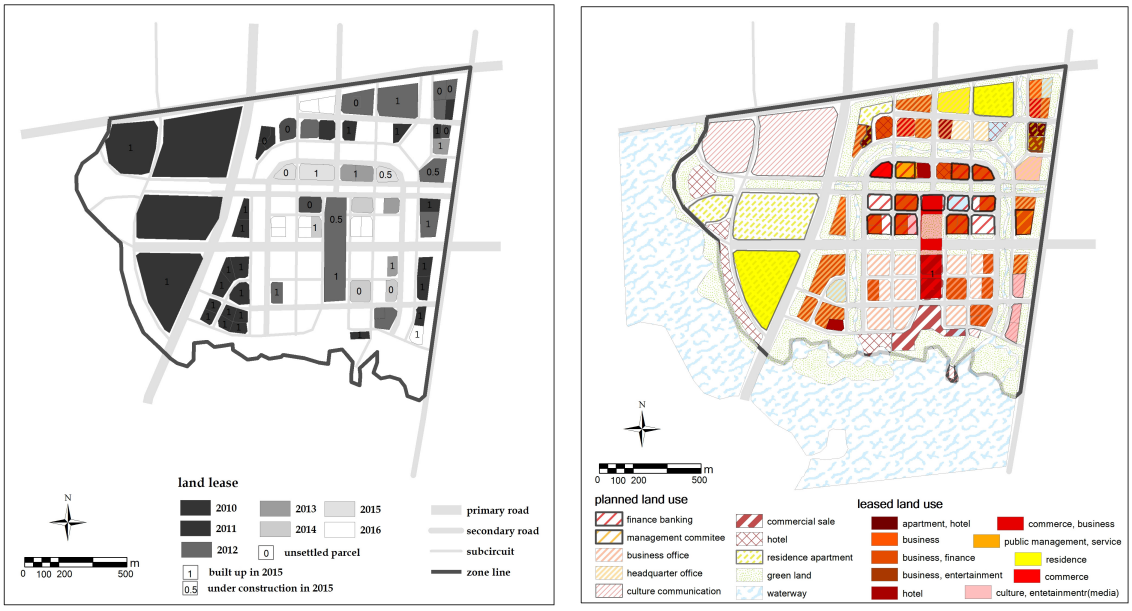
The new CBD (XIII) designated in 2010 was fully incorporated in the new master plan of 2011-2020 and designed with high-density (the FAR ranged from 2.4 for commercial retail to 7.3 for business use), land development seems more proximately and rapidly proceeding in this zone. After 5 years of development, leased out lands occupied considerable percentage of the total zone area (40.59%, it is notable that a large portion of the land in the CBD is planned as green land as 32.7%). However, due to the complete reliance on the land leasing fee, after all the rural lands were soon exploited and levelled, zone developments were not progressing in line with the sequence proposed in the land use plan: south to north, west to east. In fact, development projects were firstly carried out adjacent to the primary roads, similar with the Jinfeng Industry Zone, and are scattered concentrating in the south-west section, north section, east edge as well as the central area (Fig. 6-7, a), leaving unleased land in between.

It was recorded that by 2009, after 7 years of designation, only 28.03 ha in the total 1050 ha designated land of the NUZ (Ⅲ) were remained unleased. Moreover, before the adjustment of land use plan, five factories were dispersedly built in the ETDZ-3 (Ⅶ). After the plan adjustment, during a short period of 2010-2016, 45.23% of the zone lands were leased out and at present almost all the salable lands in this zone have been leased out (Fig.6-8, c). Comparing to the zones designated with oversized scale and lack of consideration with local context and coordination with city's spatial structure, these strategic positioned zones gained much more substantial development.



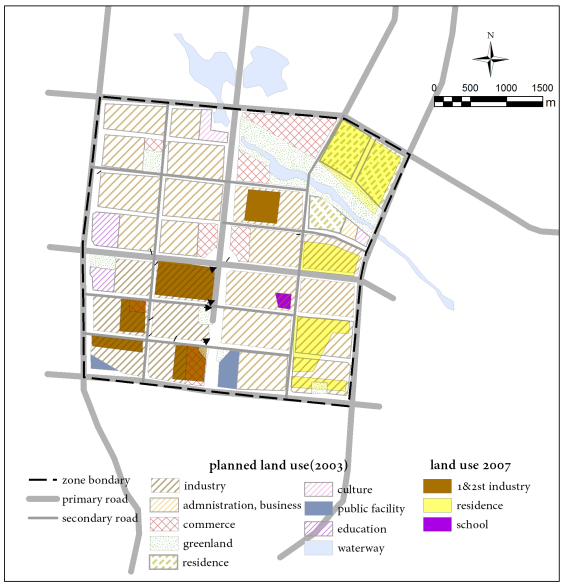
(a) (b)

Fig. 6-6 Land use pattern in the Trading & Distribution Center: a, land development process, b, land use layout



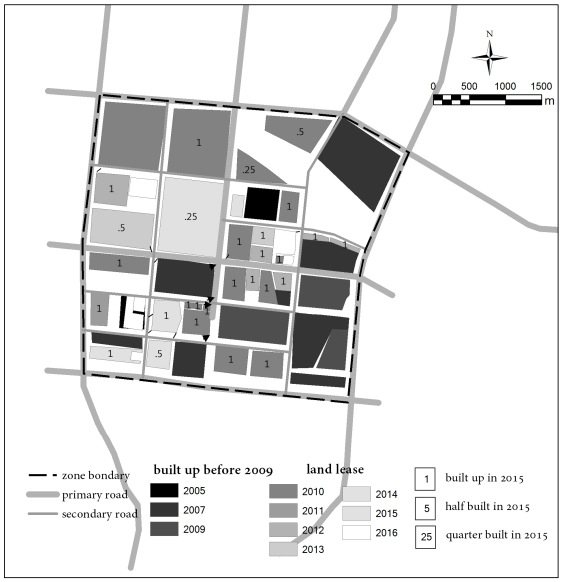
(a) (b)

Fig.6-7 Land use pattern in the CBD: a, land development process, b, land use layout



(a)

(b)



(c)

Fig.6-8 Land use pattern in the ETDZ-3

a. Land use plan of 2003 and land use of 2008
b. Land use plan of 2010 and land use of 2015
c. Development process

6.2.2 Land use layout

In 2010, land use layout plan of Jinfeng Industry zone was modified that a small part of originally planned industrial lands at the zone edge was set aside for commercial use and residential use. Afterwards, residential development and commercial development were rapidly carried out in this zone - lands leased by these use occupied 33.04% in the total leased lands during 2010-2016, however, development of the large core area that designated as industrial and technological use still slowly and fragmented progressed and even some parcels designated as industrial use have been converted to other development,

such as commercial use (car sale), that deviated from the original plans (Fig.6-4, b). This further demonstrates the imbalanced land use layout plan that over-planned of industrial land. As in 2016, addressed on the unexpected slow development of the in-zone technology park of Jinfeng Industry Zone (southern part of the zone), city government made a decision to shift the management authority of the park from the committee of Jinfeng Industry zone to the administrative committee of the ETDZs, expecting to improve coordinated development of technological industry in the entire city. At present, there is an obvious mismatch between the jobs and housings in this isolated zone. The employees in the zone has reached 7200 in 2012, however, before 2012 there was no housing supply in the zone or surroudnings, while three housing projects were just completed in 2012 after the adjustment of land use plan. In addition, due to the marginal location of these housing developments, most workers have to commute across the zone or from the outsides of the zone for a long trip.

In the case of Vocational Training Base, part of lands were not developed as education use as planned. For example, 0.52 km^2 of land in the north-east corner that planned as education use is going to be developed as the housings for faculties in 2016. Also, driving schools have taken the land planned as education use proximate to the college campuses. Moreover, despite in the land use plan adequate lands were designated for commercial and business use around the campuses, until now, very few commercial service has been developed there, instead, wide “green belts” are now enclosing these built campuses. In addition, a parcel of land planned of residential use in the central site is now occupied by a factory while another parcel in the central site that planned as a service center is still nailed by a big “urban village”, there is no signal that this center will be developed in the near future. The neat land use pattern envisioned in the original land use plan turns out as a confusing pattern in this excessively designated education zone (Fig. 6-5, b). It seems that this zone was mainly designated for political targets of the provincial authority and development priority are icon projects – new campuses, while the development of complementary use is less valued, moreover, housing development have been planned and developed at the east outskirt of the zone, it thus might difficult to attract more service development into the zone. As a result, students and teachers of the zone colleges have to travel to downtown for shopping, entertaining and communicating, moreover, as the collages are very isolated from each other due to the “green belt”, the whole zone appears as a desolate place, and especially the wide roads in this zone are used as driving training in vacation seasons (Fig. 6-9).

(a) (b)

Fig. 6-9 a. The large “urban village” in the central area of the Vocational Training base; b. wide “green belt” around a collage which was planned as commercial use

For the Trading and Distribution Center which gained relatively more substantial development in comparison with other oversized zones, by looking into the land use layout in this zone, it is clearly visible that a bulk of lands designated for commercial and distribution use have resulted in residential use, either in the form of apartments contained in one mega-comprehensive project or exclusive housing project (Fig6-6, b). This inconformity is particularly seen in the very recent projects, which also illustrate the conflicts between insufficient market needs and excessive zoning for the specialized commercial and distribution use. Thus, a land use pattern of intersperse of residential use with other use has been created in this zone, which is deviated from the zone plan.

In the new CBD which is single use dominated planned with business use. It could be seen that land planned for residential and culture use (public museum, etc.) have been mostly leased out and rapidly built up, while more lands zoned for business use are still undeveloped (Fig.6-7, b), however, present land use are basically consistent with the planned land use layout. In current, 9 of the total 17 high-rise offices that have been injected into the CBD are built by the public sectors, such as the headquarter of state-owned banks or branch of China Petroleum, it remains to see if the zone development will be toward more residential oriented if the invitation of more business projects become difficult in the future, and if the zone could become a magnetic employment center in the surrounding area.

On the other hand, from the land use map of NUZ in 2011, it could be seen that attribute to the planned multi-functions with adequate space for residence and commercial services, residential and commercial service developments are carried out in a balanced and coordinated way with business/administration use, which formed highly

mixed land use pattern as intended (Fig. 6-10). In particular, it was observed that started as an industrial use dominant zone, only a few factories were dispersedly developed in the ETDZ-3 before 2006, with a private housing project in the north-east corner was developed on the sole parcel planned as residential use. After the land use plan of the ETDZ-3 was adjusted toward mix-used with multiply use of high-technology, research, entertainment, business and residence, housing developments were promptly developed in this zone. Meanwhile, previous factories were gradually demolished and redeveloped as offices for research and high-tech. Today, the zone has been intensively developed in a mix used pattern as planned (Fig. 6-8).

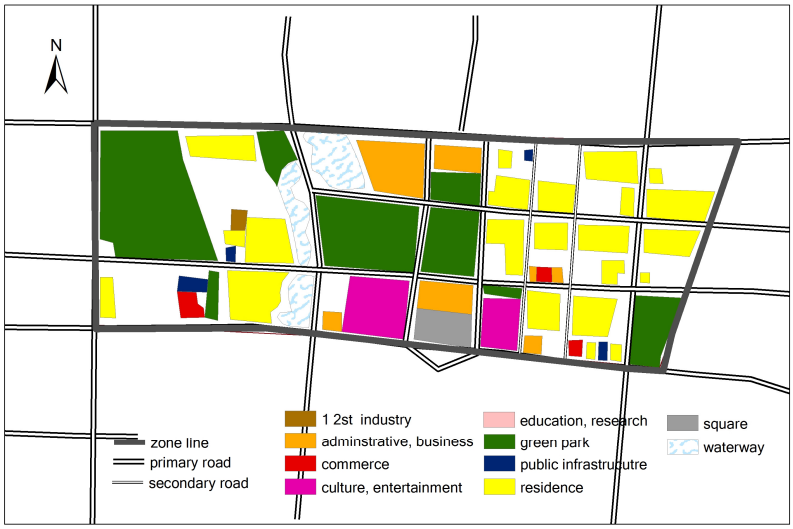


Fig.6-10 land use pattern in the New Urban Zone (2011)

Table 6-4 Comparison of land use pattern in case zones of different implementation characters

	Plan-ing	financing	development pattern	land use layout
Jinfeng Industry Zone	●	mainly land leasing	sluggish, unordered, land consumptive	Inconsistent with original plan that industrial land are developed into other use
Vocational Training Base	●	public grants	fragmented	Chaotic, inconsistent with plan
Trading and Distribution Center	●	Private investment and mangement	more substantial and phased	housing development disturbed planned layout
New CBD	◆	land leasing	substantial but unordered	Confirmed with plan, but development of core area designated as business use is a little insufficient
NUZ	◆	Public budegt	substantial, ordered	mix use as planned
ETDZ-3	◆	Land leasing	substantial and compact	turning to mix use as adjusted plan

● oversized zoning of a specialized use; ◆ strategicly coordinated

6.3 Implication of specific zoning in promoting efficient and ordered land use

By comparison of the case zones with different implementation features (Table 6-4), it appears that scattered development pattern and unexpected chaos of land use layout generated in the designated specific zones is a consequence of oversized zoning of a specialized land use all at once. The regulations of the special zones are generally prescriptive rather than proscriptive that allowable land use types are strictly defined in the detailed land use plans, however, land use outcome is largely dependent on market demands. As a result, in the zones with oversupplies of a special land use while there is inadequate market demand, loose and sporadic land use pattern is becoming prevalent. Moreover, for the specific zones with much less grants from upper government and private investment, persistent reliance on land leasing fee has pushed extensive land expropriation and infrastructure development in the large zone area, yet the land developments are piecemealed. Hence, consumptive land development and dispersed constructions are more striking in these zones. This is evident in the sluggish development of area zoned of industrial use in the Jinfeng Industry Zone where almost all the land were expropriated, while excessive expropriation of farmlands did not occur in the Vocational Training Zone. And also, in the Trading and Distribution Center, more phased development is observed while in the new CBD the development sequence is relatively unordered.

It is revealed that the excessive designation of a special use in a specific zone is closely associated with the unconsciousness of position and function of the specific zones in the urban development strategy and urban structure of the whole city. As Wang (2003) has pointed out, the planning of special development zones should be an integral part of the planning of whole city, the division of this two part will result in unfavorable effects on both sides of city development and zone development[82)]. Hence, for the zones designated on the periphery of the existing urban area, absence of consideration of coordination with surrounding areas caused problems of oversized zoning of a specialized use that sharpened local competition for investment, and resulted in insufficiency of development inside the zones. In comparison, the zones that strategically situated in the whole urban structure with spatial intentions, for example to lead new urbanization in a local area, were either more comprehensively planned or played a role in the surroundings. Probably because that intentions of city government still significantly influence urban development by considerable fiscal and administrative sources, more efficient and ordered land use were seen in these zones.

For the zones designated isolating from the existing urban area, like Jinfeng Industry Zone, due to insensitiveness to the ideas of promoting mix and balanced land use in this kind of self-sustained area, oversized zoning for industrial use in this zone has made the zone lost chance to set a phased development and confine the development project in a concentrated form in the beginning. Today there is still large stock of land in the core area of the zone remains buildable but unbuilt and leased lands scattered distribute along the infrastructure extensions, and there are no existing rules to prevent vacant use in these core areas. The management committee of this zone is making efforts to inspect leased but unutilized lands and urge developers to start the production project by the cost of withdrawing land use right, also the committee is actively helping enterprises in poor conditions to improve their economic performance. For example, the committee has successfully facilitate one food-processing enterprise to run an in-zone school jointly with other two enterprises. Yet, no actions have taken to deal with unleased lands in between the built lands. Unlike the Trading and Distribution Zone, where housing developments are more easily to be attracted to fill the vacant lots, investing housing or commercial developments in between the industrial projects of an industry zone seems less attractive to private developers, thus it is likely that these land have to wait for infilling of industrial projects and that may take a long time. It might be better if the land use plan of the specific zones were more compact, flexible for other land use, rather than proscriptive stipulations of single use in the first place. In current, re-estimation of the zone plans and making a phased development schedule based on an inventory of available land, and reorganize land use layout in the vacant area is an urgent task for the management committee and city's policy makers.

At last, it has been broadly recognized that in the market economy, involvement of local residents and private sectors in decision-making process is essential in coping with market conditions, public participation in the planning of special zones need to be improved as well. Moreover, in order to attract investment, land expropriation and basic infrastructure development of most special zones are mainly borne by the public sectors and largely dependent on the land leasing fee, which resulted in more extensive infrastructure supplies than actual development need. From the previous studies across the world, the cost-effective way of providing infrastructure is in the compact and physically continuous development, and inducing private developers to bear the cost may provide a prospecting way to reduce the leapfrog development (Pendall, 1999). More innovative approaches based on the price and market mechanism, for example, development impact fees and infrastructure payment, in combination with proper regulations, may reinforce policy efficiency in encouraging concentrated development to

save fiscal cost and preserve precious green lands

6.4 Conclusion

Specific question set out in this chapter is: what are the effects of specific zoning, an important planning tool employed by local governments to promote and control urban development, on land use pattern in Yinchuan city. In seeking to answer the question, we systematically estimated the implementation of the specific zoning within the institutional framework, further on, based on the studies of explicit cases of special zones with varied features of financing, zone designation and planning, the effects of implemented specific zoning on the land use pattern are clarified. The main findings are:

While most of the specific zones were designated for investment promotion and political achievement of local government, it seems that consideration of spatial and functional position of these zones in the local area or whole urban development were barely given in the zone planning: 1) in the specific zones that located isolating from the existing urban area, other than mix and balanced land use layout, single specialized land use is predominantly planned and often oversized; 2) in the specific zones designated on the periphery of the existing urban area, mostly a specialized land use that is homogenous with nearby existing areas was overly planned. Thus, in these excessively designated zones, land developments are spreading in a scattered pattern seen as jumbles of built-up land and unleased land, and the clean and organized land use layout designed in the zone plans were far from achieved. Moreover, the land consumptive development is more apparent in the zones that largely relied on land leasing. On the other hand, for the special zones that with strategic intentions in the urban development of the local area and the urban structure of the whole city, their planning are more coherent with overall spatial organizations and are more comprehensively planned or coordinated with surroundings. Development in these zones are carried out in a more concentrated and ordered pattern, and substantial development are gained based on diverse land use.

Thus, in the implementation process of the specific zoning, consideration of position of a specific zone in the urbanization and structure of entire city as well as the connection of the specific zone with local surroundings is influential in zone designation and zone plans, and further impose impact on land use condition of the specific zones. Low efficient land use, unordered development pattern and chaotic land use layout inside a specific zone that deviated from the planning intentions are likely a result of the excessive zoning of a single specialized land use and over reliance on land leasing, which is affected by the deficiency in strategic thinking during the specific zone design.

Chapter 7 Conclusion

This chapter draws together the main findings in this research. Further on, findings addressed on the specific questions and research aims raised in this research are extended to the discussion on the problems of present urban planning and policies. At last, based on the elaboration of challenges faced by the planners of Yinchuan city, visions and prospects of making Yinchuan, an inland city of China, a compact city or more sustainable city are discussed.

7.1 Main findings

This research aimed to estimate the effects of political measurements employed by the local governments of Yinchuan city on the urban development. Through the whole research, three questions about the practice of compact city in the local city of Yinchuan were suggested. The first is what are the political measurements are implemented for the rapid urbanization, during a process of continuously responding to the changing urban conditions; the second is how is the effectiveness of these planning and political responses in promoting or controlling urban development, and to achieve the sustainable goals. Lastly but not least, what are the problems during the implementation of these political measurements, and how to improve their performance and further remedy them to efficiently deliver more sustainable urban development. Dealing with these concerns, the main finding of the research are:

7.1.1 Effects of urban planning on urban expansion control

Since urban planning is the primary political measurement that employed by the local governments to manage urban growth, estimation of the effects of urban planning on urban expansion control is essential for understanding the local political context and planning conditions of Yinchuan in which the urban planning and other political measurements are implemented, and thus help to find out inherent problems in the planning process. The findings revealed from this objective will serve as a solid foundation for seeking how to adjust the urban planning to fit the local circumstances and improve the effectiveness of the planning. Therefore, this study analyzed mutual influences between the planning concepts in city's master plans, specific zoning as a main planning

tool of urban development promotion and control, and the urbanization, in light of the social-economic transition from the planned economy to market economy.

As a result of analysis, in the planned economy, specific zoning of "work units" yields the planning concept in the first plan of Yinchuan city; while in the transition toward the market economy and administrative decentralization, master plans still failed in plan-leading functions since the master plan of 1981 was revised in 1994 to accommodate a new promoted specific zone for economic growth and investment of local governments. However, before the China Western Development was initiated in 2000, despite the plans did not function in leading urban development, urban expansion was contained in the designated specific zones due to slowly progressed market economy.

In the period of rapid growth of market economy (2002-), facilitated by policy changes, local governments of Yinchuan began to designate various special development zones for promoting expected urbanization, these zones were largely beyond planning area of master plan of 1996-2010, and the plan lost leading force in plan-implementation. Consequently, a dynamic planning concept was proposed in the master plan of 2007-2020 by enlarging urban promotion area based on utilizing of private investment, but the intention of planning control was not discarded yet. Thus, the 2007 plan transformed significantly from urban expansion constrain to promote rapid urban growth, in an effort to keep up with intentions of city government. Nevertheless, the new plan still failed in the function of leading urban development, which is evident in the continued promoting of new specific zones by local governments beyond the planning and constant modification of the plan to incorporate the overgrown zone areas. As a result, excessive zoning was observed in repetitive functions of specific zones and low land efficiency.

Moreover, it was found that designated specific zones could not well control the urban developments under the rapid growth of market economy, urban developments are sprawling outsides the zones and even invading the planned green belts or urbanization control areas (east of the Old Town) where are more market attractive, however, leaving the levelled lands inside the specific zones undeveloped.

7.1.2 Effects of public promoted programs on housing development

Rapid housing development of Yinchuan city began after the "housing reform" in 1998, from this period commercialized housing development became the dominant development type in the city. However, it seems that powers of states and public sectors in manipulating this market-based housing development are not disappearing. The public promoted programs, development projects that planned by the governments and financed or partly

financed by the government by public-private cooperation, are important fiscal tools utilized by the local governments to intervene urban development in a market economy. In the recent housing booming of the city since 2008, housing development in Yinchuan appears in an unordered expansion, questions arise as what are the roles of the public promoted programs played in this rapid housing expansion? And are these programs have assisted city's housing promotion strategy to achieve the planning intentions? Led by these questions, this study estimated the impacts of a variety of public promoted programs on housing developments, especially in market-oriented period, and further evaluated the effectiveness of these programs by comparison of the resulted housing expansion with housing promotions areas proposed in city plans.

The study first analyzed relationship between the housing supply and urban population growth in the city, and pointed out that in current there is a problem of excessive supply of housings. Further on, it could be seen that the public housing projects, including social housings and housings for resettlements, have been utilized by the governments in Yinchuan city to promote private housing development. For example, in the new planned mix-use zones, large-scaled public housing projects were first to be developed and then followed by service facilities and private housing projects. Moreover, the concentration of large public housing projects in the central and east area of the city have largely promoted housing expansions in these areas, while both public and private housing projects have been scattered developed in the west. Meanwhile, development of public amenities by local governments, like key schools and large-scale natural parks, have stimulated amount of commercialized housing development around these new facilities. Yet, it was observed that most of the new developed public amenities have concentrated more in the east and central part of the city rather than the west, which accelerated gaps of housing investment environment between the east and west, seen in the enlarged gaps of residential land prices between the two areas.

Based on the review of housing promotion areas in the city's plans (master plan of 1996-2010, master plan of 2007-2020 and subsequent housing plans), the intention of controlling eastern expansion and prioritizing west to balance housing development between the two sides was clear. However, it was observed that housing development of the city after 2000 seems continued to agglomerate in the east and further pushed the eastern frontier beyond planning boundaries while the west experienced much fewer housing developments. Giving the facts that public promoted programs have significant effects on promoting private housing investment, it could be concluded that imbalanced distribution of these public programs between the east, central and west area have contributed to the imbalanced housing expansion within the city. This suggested rather

than physically control eastern expansion, the coordination between the promotion of public programs and city's overall housing strategy is critical in managing critical housing issues.

7.1.3 Effects of specific zoning on land use pattern

As a basic planning tool, the specific zoning is extensively utilized by local governments to control and promote urban development for special development purpose in a market economy. In Yinchuan city, designated specific zones occupy considerable urban planning area, the importance of these designated specific zones lies upon their capability to promote urban development in a phased pattern and planned manner both at city and local scale. At local scale, the implementation of the specific zoning could impose direct impacts on land use patterns. Thus, it is crucial to assess the implementation of specific zoning and its effects on the local land use, in order to help planners and policy makers to better identify key problems in the specific zoning design. This study first analyzed implementation characters of the specific zoning, including the financing, designation of main functions and detailed land use plans of the specific zones within the institutional framework, and then, based on the comparison of case specific zones of different implementation characters, the impacts of implementation of specific zoning on land use patter is clarified:

Under the institution organization of specific zoning, within which planning, land expropriation, land leasing and infrastructure development of the specific zones are predominantly carried out by the management committees that function as government-owned development corporations, there are three types of zone development financial sources: the primary fund for most of the zones is land leasing fee, while a few zones are majorly funded by public budgets or private investment.

It was observed most of the specific zones are located isolating from the existing urban area or on the periphery of the urbanized area. They are inclined to be planned of large size with dominance of a single specialized land use, and very often, the zoned area of the specialized use exceed the area planned for the corresponding use in the city's land use layout plans. Thus, it seems that the position of these zones in the overall urbanization of the city and their spatial functions in the local areas are barely considered during the zone planning process. The analysis of land use in these zones revealed that, the likelihood of sluggish and scattered development of land zoned as the dominant specialized use as well as chaotic land use layout in this type of specific zones is relatively high, which is quite deviated from the original land use plans. For example, the land arranged for

distribution use have resulted in housing development. Moreover, for the zones heavily relied on land leasing fee, more land consumptive developments are likely occurred in the excessively zoned area. In contrast, the zones that designated for the purpose of supporting city's spatial strategy or the zones have been connectively planned with local surroundings, for example, the New Urban Zone strategically designated for directing new urban development focus of the entire city, or the CBD designated as an employment center for the adjacent areas, are usually comprehensively planned of mix used or planned with concerns of functional coordination with local context. These zones have shown different land use pattern. More substantial developments and compact development pattern were observed in these zones. Thus, the planning intentions of each specific zones are not always maintained and the land use pattern in the specific zones varied according to different implementation characters. It was suggested that strategic planning intentions in designating and planning of a specific zone play a critical role in shaping the land use pattern of the zone toward high-efficient and ordered manner.

As a brief conclusion of the main findings, the main content of this research is to understand practical issues and figure out local problems in the planning and city management in a rapid growing city in inland China. In a broad context of decentralized administration and rapid growth of market economy in Yinchuan city, despite the planning efforts to keep control on the urban expansion and attempts to catch the intentions of city government who are actively pursuing rapid urbanization, the master plans still failed in plan-leading function, seen in constant plan modifications to follow the specific zones promoted by local government. Moreover, the designated specific zones are not performing well to promote or control the urban expansion into a phased and planned manner at the city scale. Meanwhile, the public programs have been extensively utilized by the local government to promote market-oriented housing development and have led housing expansion, however, the development of these programs are not coordinating with city's housing promotion strategy, as a result, contributed to imbalanced housing development within the city area. Also, it is likely that inside the specific zones that designated and planned either without strategic intentions to integrate with city's whole urban structure and spatial organization, or lack of consideration of position of the specific zones in the local area, developments of the land zoned as specialized use is sluggish and land use patterns are more scattered and chaotic. These specific zones have failed to promote ordered land use at local scale.

7.2 Discussion

Based on the findings in this research, the political implications of these findings in the policy making and planning practice to achieve and implement more sustainable and compact urban vision in Yinchuan city are discussed.

7.2.1 Challenges of implementing sustainable urban development in Yinchuan city

In 2015, urban built-up area per capita in Yinchuan's Central Urban Area has reached 122 m^2 that surpassed the quota prescribed in the 2007 M.P. (117 m^2). This excessive urban expansion has raised sustainable concerns regarding economic efficiency, environmental sustainability and social stability. Since the expropriated farmlands in the designated zones cannot be easily recovered and the housing developments continue to consume more green lands, the waste of land could have future negative effect on the local economy that relies on advantaged agriculture. An annual decrease of cultivated land of 3.01% in the city has been recorded during 2007-2015. Uncontrolled housing developments, has generated problems of high vacancy in the large-scale projects. These land consumptive developments imposes great pressure on the provision of infrastructure and public facilities, which further pushes local governments' requisition of cheap farmlands for budget balances. Employment and insurance of farmers who lost their lands are critical as well. According to a survey conducted in 2008, 48.4% of former farmers in Yinchuan city proper are now living from the land compensation and subsidies from government (Su, et. al., 2008)[83]. Besides, mismatch between housing and workplace has caused residents to daily commute for a long time, which is seen in the transport congestion at peak hours especially on the road that connect the east and the west.

These issues calls for immediate strategy and approaches to promote a more compact and sustainable urban form. However, the implementation of sustainable urban development is by no means an easy task. As advocated by Vliet (2000), the barriers to sustainability implementation within a municipal planning context could be categorized as: 1. Perceptual/attitudinal/behavioral; 2. Institutional structures and capacities (political, regulatory, procedural, legal); 3. Economic/financial; 4. Others[84]. From these respects, there are great constrains faced by planners and policy makers of Yinchuan city in present days to deliver a sustainable urban development:

Foremost, local states play a significant role in the urban development of Yinchuan. As discussed in Chapter 4, brought by the national policies changes of "Fiscal reform" (1994), "Western China development" (2000) and a series of market reforms, the

municipality has been stimulated to actively promote rapid urban growth. The city government has become an active driver of land-centered urbanization especially after 2002. In 2003, 3.5 km^2 of land leased by the city government generated a revenue of 1.02 billion Yuan, which is 12 times more than in 2002. In 2015, the share of land transfer fee in the total fiscal revenue of the city proper was approximately 24.49%, and the construction tax, urban land use tax and land premium tax occupied 13.88% of the total tax revenue. Unlike the central government which has boosted Sustainable Development as a national strategy since 1996 and has highlighted "saving and intensive land use" by rigidly regulating the conversion of Basic Farmlands, tightening development land quota and so forth (Jiang and Yeh, 2009)[10], local governments usually have less motivation in urban expansion control (Yang and Wang, 2008)[85]. Thus, while economic growth is put in the central place in the agenda of government, an attitude toward conservation of green lands to sustain local environment could be hardly generated. Consequently, local governments in Yinchuan city are expropriating as much as land by designating large specific zones and permitting excessive development of housing projects, even though they are inconsistent with planning intentions. Moreover, without a perception of structuring an organized urban growth that sustains in the long term, the specific zones would not be properly planned to bone their specialized functions in the development of local area and the whole city, and readily to adapt to the constant changing urban conditions.

Secondly, urban planning is a fundamental tool to guide and regulate urban development. Thus, based on the specified sustainable planning goals and effective implementation, this tool has great potential to support sustainable practice. However, in Yinchuan city, it seems that the effectiveness of urban planning in controlling urban expansion is frustrated. In the US, local regulations have failed to alleviate region-wide urban sprawl owing to institutional fragmentation, which calls for jurisdictional cooperation and centralized land use governance within a metropolitan (Carruthers and Ulfarsson, 2002)[86]. In China, it seems that the institutional incompatibility in plan-making and implementation is an influential factor behind the dysfunction of master plans. Due to the strict top-down planning approval system, the plan-making process is highly centralized. The intentions of the central government to limit city size evidently penetrated the planning concepts of Yinchuan's 1981 Master Plan and 1996 Master Plan. However, as of the 1980s the plan implementation has evolved to become decentralized since local governments are gaining discretion over the detailed plans, as well as development control and land expropriation. Thus, the frequent breaches of the master plans by the specific zoning can be explained by the interests of local governments that conflicted with central government within an uncoordinated planning institution.

Furthermore, due to fiscal reform of Yinchuan city in 2003, district/county level government (including administrative committee of ETDZs) have gained considerable autonomy in urban development as well, these lower governments have their own interests to promote their economic development and retain fiscal revenues, in competition with other districts/counties. Due to this decentralized powers, the public promoted programs developed by these government bodies and specific zones planned and developed by the management committees subject to these governments, may not coordinate with city's plans and overall strategies.

Thirdly, as a legacy from the planned economy, master plans are still perceived as long-term blueprints generally without consideration for financial arrangements, management programs and uncertain developments (Wei and Zhao, 2009)[37]. As long as the distribution of budgets is decided by the city's Economic and Development Committee, the master plan can hardly be empowered. Thereby, the capacity of master plans in the implementation is questionable. The Five-year Short-Term Construction Plans, which are defined as the base of master plan implementation, are instead used to spatially distribute key projects listed in the city's Five-year Economic and Society Development Plans. In effect, it is the short-term economic interest that overrides the long-term spatial planning. Hence, master plans are placed in a reactive position especially under the dramatic policy changes (Ding, 2009)[5]. The conflicts of central and local governments and the dilemma of planning in face of the new wave of development brought by policy changes are together reflected on the lengthy approval of the 2007-2020 plan, which was finally approved in the end of 2016.

At last, the discord between policy design and local context leads to ineffectiveness of a specific planning tool (Sorensen, 2000)[87]. In Yinchuan, the inefficiency of specific zones to promote urban development into a phased pattern is not only affected by the in-concordance of the specific zones with the spatial strategies of the city that brought repetitive functions between the zones, but also seemingly influenced by the incoordination between the zone design and surrounding developments that stirred excessive competition for specialized investment in the local area. In addition, the zone plan-formulation is exclusively undertaken by the government institutions without public participation, and once the detailed plan is approved, the complicated procedure involved in the plan revision impedes planners to improve the plans according to changing situations. Theses sheds light on the fact that industrial projects promoted in the industrial zones are often inadequate whereas other developments are sprouting outside the zones, and incapacity of specific zoning to promote efficient and ordered land use.

7.2.2 Visions and strategy of compact city for growing city - Yinchuan

In the very recent days, the economic and population growth of Yinchuan city are both trending toward stable (growth speed of GDP has continued to decline and growth rate of urban population has kept below 2% since 2011), which may accentuate the undesirable outcomes of excessive zoning and excessive housing expansion if the current uncontrolled urban development continues. However, on the other hand, the present situation offers a good chance for the city to re-estimate its ongoing development conditions, and subsequently to adjust present planning actions and development approaches based on an adaptive strategy that incorporated perception of sustainable urban development and well-suited concept of compact city.

It is imperative to firstly build a vision of sustainable urban form and compact city based on the current urban context, and subsequently incorporate this tendency into the planning courses. A sustainable urban form enables sustained and viable local economy growth, favorable living environment and rich natural resources as well as harmonious society. Based on these shared features, there are various ideas of compact city across the world differentiated by the economic and social conditions. In the developed countries, faced with de-urbanization, economic stability and population decrease, compact city are more utilized as a planning agenda for retrofitting the existing sprawled urban forms characterized as low-density and extensive urban development, usually through the approaches of promoting high-density development, urban center revitalization, development on the brownfields, public transit and mix uses for good accessibility and so forth. On the other hand, for the rapid-growing cities in the developing areas, like Yinchuan city in western China, the current urban issues remain as how to guide the new urban developments and plan for the high-speed urban expansion.

Yinchuan city has long been an agriculture center in the local region attribute to its unique geographical conditions that on a flood plain with plenty of waterways. The most fertile farmland of Ningxia region are mainly found on the three urban districts of Yinchuan (*Land use plan of Ningxia Yellow River Economic Strip, 2012*), where urban population and development pressure is mostly concentrated as well. If the advantaged agriculture economy and a livable environment sustain, the farmlands of good quality and green areas now surround the existing urbanized areas in the city need to be preserved. This implies a compact urban form where urban expansion is properly constrained. Furthermore, Yinchuan is a city with long history of culture significance in the local region, the historical areas of Old Town and New Town and the industrial heritages in the planned economy needs to be preserved, which suggests the prevention of inappropriately

high dense development in these areas and properly channel the urban developments in the east where has a quite high population density (250-350 people/ha around the Old Town area) into less intensive areas, while seeking the balance between new development and historic urban areas. Thus, this vision could be based on channeling excessive urban development from the east toward the central and west, and also on promoting phased new urban growth areas to cope with needs for rapid urbanization.

To meet these objectives, city's general plans and spatial strategies should be put in the center to organize the whole urban structure and arrange the phases of urban activities. Under the guidance of the strategic plans, a network of the city may be constructed by designating both urban growth priority areas and agriculture protection areas/open space conservation areas, where the growth priority areas concentrate the urban development with intensive and mix land use. For the city of wide scale like Yinchuan with a big population on the urban and rural areas, the new growth areas could be isolated from the existing urban areas but not far away, might be based on the adjacent rural towns or villages or as extensions of urban areas that functionally coordinated with the existing urban cores. Meanwhile, it is necessary to designate the growth priority areas in the existing urban areas where land use could be intensified, such as old industrial areas in *Xinshiqu* or existing specific zones with low land use efficiency. Overall, the designation of these growth priority areas are dependent on careful examination of the land use conditions and urban needs.

Inside the growth priority areas, development and infrastructure should be taken place in a coordinated and timely manner, and employment land is in a coordinated and timely manner with residential land (OECD, 2012). In this sense, the designated specific zones that well-equipped by a framed infrastructures and granted of substantial subsidies but not substantially developed, might be prioritized as strategic growth priority areas. This involves careful design of detailed plans of these zones, which incorporated considerations of their specialized functions in the entire urban growth and the coordination with local areas, as well as ongoing market demands and interests of a variety of city stakeholders. Also, in consistency with this strategic arrangement, to efficiently pull the urban development into the targeted areas and away from the green land protection areas, public promoted programs should be accordingly distributed to improve investment environment and stimulate market-oriented developments in the designated areas. In addition, combined with other carefully designed approaches that based on the market-mechanism, for instance, incentives and development procedural regulations, the concentration of the developments is likely to be more enhanced. By so to move toward a sustainable urban form, securing sufficient farmland and green space and

reducing unnecessary travels dependent on automobiles may become possible.

This vision might be apply to the other fast-growing central cities of local region in China, which face the balance of local economy based on the agriculture and upcoming extensive urbanization. These kinds of cities are not few in current inland China.

7.2.3 Opportunities to build a compact city in Yinchuan city

Nevertheless, in essence, realizing of all of these ideas of compact city or sustainable urban form are grounded on the effectiveness of the comprehensive plans in guiding the implementation of the designated growth areas and coordination of the public actions. Mere physical regulation seems forceless. A reform of master plan is required to cover the financial agenda, management programs and flexibility for the dynamic development, an inclusive strategy for reconciling different interests in the specific zones and public projects is also needed. More importantly, unlike cities of advanced market economy, in Yinchuan, the predominance of state embodies the essence of attitude of city government in the urban growth control. In particular, while the growth of economic and urban population is trending toward stable, the city's political will to revalue the tradeoff between green land protection and surging urban expansion is the key condition for embracing sustainable principles into local development strategies and effective implementation of any responsible regulations. As revealed in Randstad Holland, a vertically coherent institution for planning guidance and plan implementation, in which the national government holds decisive power over infrastructure development, the budgets of municipal governments and the consensus on planning doctrines created on different levels of governments, is a guarantor of implementation of the strategic plans (Dijst, 2000)[88]. Informative national and municipal policies that gives weight to sustainable issues supported by financial leverage in addition of demonstration projects may play a central role in mobilizing local governments to reach planning consensus, and thus a coordinated platform is built on which the planning and implementation of sustainable urban development could steadily progress.

Lastly, in the land management system of China, the development control of rural land has been generally looser than the urban land. It is observed that within Yinchuan's Central Urban Area, considerable planned township built areas and village built areas, are actually utilized to accommodate the unplanned urban developments that spilled out to the adjacent rural areas. Moreover, the urban planning which mainly focused on urban development always conflicted with the land use planning which is charged by Land Resource Department focusing on agriculture land protection. With the new Urban and

Rural Planning Act enacted in 2008, integrated control of urban and rural developments, began to be stressed in China. The act also emphasis on the cooperation between the urban planning and land use planning, pushing urban planning to consider the Basic Farmland designated in the land use planning. Facilitated by this new act, an urban system plan that comprehensively overviews urban planning and rural planning is set in place. Moreover, designation of a City Development Boundary, based on the analysis of development demands on both urban and rural lands, land suitability and protection of permanent green lands are broadly debated. This also demonstrated the importance of legislation in the progress toward efficient planning and offering opportunities to translate sustainability. However, any application of new political tools should be well rooted in the local planning setting, supported by active commitment of major actors like local governments and the coordinated institutions.

7.3 Prospect for future studies

In the last fifty years of development in China, due to the "Resident Register system", cities and villages were dealt with separately. In 2007, a new national planning act "Rural and Urban Planning Act" was enacted to replace the previous "City Planning Act" of 1989, this implies the state is recognizing the importance of breaking the divide between urban and rural area. Development that integrate big cities and their surrounding towns, villages is highlighted to achieve an overall sustainable development. Chinese cities are preparing plans to include urban and rural areas under a comprehensive planning concept and coordinated planning control. While this research focused only on the Central Urban Area of Yinchuan city, it is realized that study on a broader scale, and an integrate analysis of conditions of rural area and urban area will contribute to a more systematic and holistic understanding of development of the city.

This research addresses on the effects of urban planning and public programs on the urban development based on the methods of document analysis and data analysis, however, to fully grasp the intentions and ideology of local governments, research approach of personal interview with officers and planners of the city will help to obtain deeper information. For example, in the chapter of impacts of public programs on housing development, this study only explored the effects of the spatial locations of the public programs on the housing development and merely evaluated the effectiveness from the viewpoint of urban planning. Further studies are necessary to clarify the decision making mechanism in site allocation of these public programs, in this case, hearing from the people who are in charge of organizing the public projects is needed. Similarly, in the study

of effects of specific zoning on land use pattern, it is necessary to learn the considerations of upper government institutions, zone management committee of as well as private developers in developing the zone area, in order to identify fundamental factors underlies the problems in the zone development. Furthermore, the effects of any planning activities or political measurements are largely influenced by the social-culture context and ideology of the people, consideration toward needs and behaviors of local residents are crucial in successfully implementing sustainable development, approaches of interview and questionnaire with local people may provide a straight way to help improving the policy design and political effectiveness.

Finally, concept of compact city provided a variety of perspective to evaluate development condition of a specific city. The viewpoints of this research mainly concentrated on the aspects of urban expansion control, balance of housing and jobs as well as efficiency of land use pattern. Studies that based on other perspectives, for instance, coordination of public transportation with land use, urban design of a neighborhood, accessibility to service facilities, are expected to be conducted in the future.

Reference

1) Bak, J.M., Sustainable Urban Development in South Korea: Compact Urban Form, Land Use, Housing Type, and Development Methods, Ph.D. thesis, University of Birmingham, 2014

2) Alberti, M., Urban Form and Ecosystem Dynamics: Empirical Evidence and Practical Implications, from *Achieving Sustainable Urban Form*, Edited by Williams, K., Burton, E., and Jenks M., E&FN Spon, London, 2000

3) Jenks, M., Burton, E., Williams, K., The Compact City: A Sustainable Urban Form? E&FN Spon, London, 1996

4) OECD, Compact city policies-A Comparative Assessment, OECD Green Growth Studies, 2012

5) Ding C., Policy and Planning Challenges to Promote Efficient Urban Spatial Development during the Emerging Rapid Transformation in China, Sustainability, 1, pp.384-408, 2009.

6) Zhu, Q., Master plan, plan adjustment and urban development reality under China's market transition: A case study of Nanjing. Cities, 30, pp.77-88, 2013.

7) Cheng, J., Masser, I., Urban growth pattern modeling: a case study of Wuhan city, PR China. Landscape and Urban Planning, 62, pp.199–217, 2003

8) Deng F.F., Huang, Y., Uneven land reform and urban sprawl in China: the case of Beijing. Progress in Planning, 61, pp.211–236, 2004

9) He S., Wu, F., Property-led redevelopment in post reform China: A case study of Xintiandi redevelopment project in Shanghai. Journal of urban affairs, 27(1), pp.1-23, 2005.

10) Jiang, X., Yeh, A., Decoding urban land governance: State reconstruction in contemporary Chinese cities. Urban Studies, 46(3), pp.559-581, 2009.

11) Wei, Y.D., Zone fever, project fever: development policy, economic transition and urban expansion in China. Geographical Review, 105 (2), pp.156–177, 2015

12) Yeh, A. G.-O., Wu, F., The transformation of the urban planning system in China from a centrally-planned to transitional economy. Progress in Planning, 51(3), pp.167-252, 1999.

13) Kaiser, E.J. and Godschalk, D.R, Twentieth Century Land Use Planning: A Stalwart Family Tree, Journal of the American Planning Association, 61:3, 365-385,1995

14) Carruthers, J.I., Evaluating the Effectiveness of Regulatory Growth Management Programs-An Analytic Framework, Journal of Planning Education and Research, 21, 391-

405, 2002

15) Norton, R. K., Using Content Analysis to Evaluate Local Master Plans and Zoning Codes, Land Use Policy, Volume 25, Issue 3, pp. 432–454, 2008

16) Shen, Q., Spatial Impacts of Locally Enacted Growth Controls: the San Francisco Bay Region in the 1980s, Environment and Planning B: Planning and Design, Vol. 23, pp. 61-91, 1996

17) Nelson, C.A. and Moore, T., Assessing Growth Management Policy Implementation, Land Use Policy, Volume 13, Issue 4, pp. 241–259,1996

18) Anthony, J., Do State Growth Management Regulations Reduce Sprawl? Urban Affairs Review, vol. 39, no. 3, 376-397, 2004

19) Hebbert, M., Sen-biki amidst Desakota: Urban sprawl and urban planning in Japan. In Planning for cities and regions in Japan, Shapira, P., Masser, I., Edginton, D.W., Eds.; Publisher: Liverpool university press Liverpool, UK, 1994; pp. 70-94.

20) Tang, B., Wong, S., Lee, A.K., Green belt in a Compact city: a Zone for Conservation or Transition? Landscape and Urban Planning, Volume 79, Issues 3–4, pp. 358–373, 2007

21) Howlanda, M., Sohna, J., Has Maryland's priority funding areas initiative constrained the expansion of water and sewer investments? Land Use Policy, 24(1), pp. 175-186

22) Shen Q. and Zhang F., Land-use Changes in a Pro-Smart-Growth State: Maryland, USA, Environ Plan A,vol. 39,no. 6,pp.1457-1477, 2007

23) Jitsu, M., Urbanization Process of Niigata City after World War II (No. 1) :The Mechanism of the Growth of Residential Area, The Tohoku Geographical Association, 26(4), pp.234-239, 1974

24) Shen, J., Suburban Development in Shanghai: A Case of Songjiang, Ph.D thesis, Cardiff University, Wales, United Kingdom, 2011

25) Mayer, C.J. and Somerville, C. T., Land Use Regulation and New Construction, Regional Science and Urban Economics, Vol. 30, Issue.6, pp. 639-662, 2000

26) Pendall, R., Do Land-Use Controls Cause Sprawl? Environment and Planning B: Planning and Design, vol. 26, pp. 555-371, 1999

27) Towe. C., Klaiber, H.A., Wrenn, D., Newburn D., Irwin, E. G., Exploiting Spatial and Temporal Variations in Residential Subdivision Development to Identify Urban Growth Spillovers, Agricultural and Applied Economics Association in its series 2011 Annual Meeting, July 24-26, 2011, Pittsburgh

28) Talen, E., Zoning For and Against Sprawl: The Case for Form-Based Codes, Journal of Urban Design, 18:2, pp.175-200, 2013

29) Wu, F.L., Yeh, A.G.-O., Urban Spatial Structure in a Transitional Economy. Journal of the American Planning Association, 65(4), pp.377-394, 1999

30) Gaubatz, P., China's urban transformation: patterns and process of morphological change in Beijing, Shanghai and Guangzhou, Shanghai and Guangzhou. Urban Studies, 36 (9), pp.1495–1521, 1999.

31) Yue, W., Liu, Y., Fan P., Polycentric urban development: the case of Hangzhou, Environment and Planning A, 42, pp.563-577, 2010

32) Feng, J., Zhou, Y., Suburbanization and the Changes of Urban Internal Spatial Structure in Hangzhou, China, Urban Geography, 26,2, pp. 107-136, 2005

33) Gu, C., Kesteloot, C., Cook, L.G., Theorizing Chinese urbanisation:A multi-layered perspective. Urban Studies, 52(14), pp. 2564-2580 2015

34) Luo, J., Wei, W.H.D., Modeling spatial variations of urban growth patterns in Chinese cities: The case of Nanjing, Landscape and Urban Planning, 91, pp. 51-64, 2009

35) Ng. M., Tang, W., The Role of Planning in the Development of Shenzhen, China: Rhetoric and Realities, The Town Planning Review, 75(2), pp.173-203, 2004

36) Wei, Y.D., Planning Chinese cities: the limits of transitional institutions. Urban Geography, 26 (3), pp.200–221, 2005.

37) Wei Y., Zhao M., Urban spill over vs. local urban sprawl: Entangling land-use regulations in the urban growth of China's megacities, Land Use Policy, 26, pp.1031–1045, 2009.

38) Luo, X., Shen, J., Why city-region planning does not work well in China: The case of Suzhou–Wuxi–Changzhou. Cities 25, pp. 207-217, 2008,

39) Zhao, P., Managing urban growth in a transforming China: Evidence from Beijing, Land use policy, 28(1), pp.96-109, 2011

40) Zhao, P., Sustainable urban expansion and transportation in a growing megacity: Consequences of urban sprawl for mobility on the urban fringe of Beijing. Habitat International, 34, pp.236–243, 2010.

41) Tian, L., Shen, T., Evaluation of plan implementation in the transitional China: A case of Guangzhou city master plan, Cities, 28, pp.11-27, 2011.

42) Wang, Y., Murie, A., Commercial housing development in urban China. Urban Studies, vol. 36 no. 9 pp.1475-1494, 1999

43) Wang, Y., Urban housing reform and finance in China, a case study of Beijing. Urban Affairs Review, vol. 36 no. 5, pp.620-645, 2001

44) Wang, Y.P. and Murie, A., Social and Spatial Implications of Housing Reform in China, International Journal of Urban and Regional Research, 24, 2, pp.397-417, 2000.

45) Zhao, W. and Wang, J., A Study on Planning Evaluation of Key Area Development in China: The Case of Hangzhou Riverfront CBD, Urban Planning Forum, vol.3, pp.77-85, 2013

46) Wu, J., Barnes T., Local Planning and Global Implementation: Foreign Investment and Urban Development of Pudong, Habitat International, Volume 32, Issue 3, pp. 364–374, 2008

47) Li, H., Wei, Y.D, Huang, Z., Urban Land Expansion and Spatial Dynamics in Globalizing Shanghai. Sustainability, 6, pp.8856-8875, 2014.

48) Wang, H., Inter - Relations and Spatial Effect between New Development Zones and Their Mother City, Planning Studies,Vol.27,No.3,pp.20-25,2011

49) Hua, C. and Ma, L., From "Island" to City An Exploration on the Higher Education Campus of Xiasha in Hangzhou,Planners,Vol.22,No.2, pp.49-52, 2006

50) Mai, J., Zhang J.， Chen, H., Transition of Development Park toward New Urban District: Wuxi Example, Planners, Vol.27, No.9, pp.20-25, 2011

51) Wang, X., Study on Spatial Structure Transformation of Suburban Industrial Development Zone, Planners, Vol.27, No.3, pp.93-98, 2011

52) Wang, K., Cheng, H., Li G., The Evolvement of Urban Spatial Structure in Yinchuan from the Perspective of Agglomeration Effect and Land Use Structure, social sciences in Ningxia,No.4,pp 81-85,2006

53) Liu, X.W., The Study On urban land expansion of Yinchuan city, in Chinese, Master thesis, Taiyuan science and technology university, Taiyuan, 2008, in Chinese.

54) Liu, X., Research on the Expanding of City Constructive Land in Yinchuan City, Journal of Shandong Agricultural University (Natural Science), Vol43. 4, No.2, pp. 579-584, 2012

55) Liu, X. and Mi, W., Research on the development of urban housing area and their optimization of Yinchuan city in 1990s, Economic Geography, 22, 3, pp.327-330, 2002, In Chinese.

56) Li, J., Liu, X., Zhao, X., Analysis of Real Estate Development and Planning Layout in Xixia District of Yinchuan City, Journal of Ningxia University(Natural Science Edition), No. 2,

pp.188-192, 2004

57) Ma. H. and Mi W., The Relation, Problems Existed and Its Solving Measures Between City Planning and The Development Of Housing Industry in Yinchuan, Journal of Ningxia University(Natural Science Edition), No.2,pp.157-160, 2003, in Chinese

58) Zhang Q., Study on Dynamic Distribution of Urban Land Price of Yinchuan City based on GIS, Chang`an University, Xi`an, 2012, in Chinese

59) Williams, K., Jenks, M., Burton, E., The potential of the Compact City for Promoting Social Equity, From 'Achieving Sustainable Urban Form', Edited by Williams, M., Burton, E., Jenks, K., Taylor & Francis ,London,2000

60) Jabareen, Y.R., Sustainable Urban Forms: Their Typologies, Models, and Concepts, Journal of Planning Education and Research Vol.26, No.1, pp.38-52, 2006

61) Jenks, M., Dempsey, N., Future Forms and Design for Sustainable cities, Taylor & Francis, London, 2005

62) Frey, H., Designing the City-Towards a more Sustainable Urban Form, Taylor & Francis, London, 1999

63) Dantzig, G.B., Saaty, T.L., Compact City: A Plan for a Livable Urban Environment, Operations Research, Vol. 22, No. 2 , pp. 446-448,1974

64) Newman, P., and Kenworthy, J., New Dimensions Sustainable Urban Form: the Big Picture, from 'Achieving Sustainable Urban Form', Edited by Burton E., Jenks M.，Williams, K., Taylor & Francis, London, 2000

65) Thomas, L., Cousins, W., The Compact City: a Successful, Desirable and Achievable Urban Form? From 'The Compact City: a Sustainable Urban Form? ', Edited by Jenks, M., Burton, E., and Williams, K., Oxford Brookes University, Oxford, UK,1996

66) Scoffham, E, Vale, B., How Compact is Sustainable-How Sustainable is Compact? From 'The Compact City: a Sustainable Urban Form?', Edited by Jenks, M., Burton, E., and Williams, K., Oxford Brookes University, Oxford, UK,1996

67) Churchman, A., Disentangling the Concept of Density, Journal of Planning Literature, vol. 13, no. 4, pp. 389-411, 1999

68) Burton, E., The Compact City: Just or Just Compact? A Preliminary Analysis, Urban Studies, vol. 37 no. 11, pp.1969-2006, 2000

69) Burton, E., Measuring Urban Compactness in UK Towns and Cities, Environment and Planning B Planning Design, vol. 29, no. 2 pp.219-250, 2002

70) Neuman, M., The Compact City Fallacy, Journal of Planning Education and Research, vol. 25 no. 1 pp.11-26, 2005

71) Daneshpour, A., Shakibamanesh, A., Compact city: Dose it Create an Obligatory Context for Urban Sustainability? International Journal of Architectural Engineering & Urban Planning, Vol. 21, No. 2, 2011

72) Burgess, R., The Compact City Debate: a Global Perspective, From 'Compact Cities: Sustainable Urban Form for Developing Countries', Edited by Jenks, M., Burgess, R. ,Taylor & Francis, 2000

73) Gordon, P., Richardson, H. W., Are Compact Cities a Desirable Planning Goal? Journal of the American Planning Association, Vol.63, Issue 1, 1997

74) Talen, E., and Knaap G., Legalizing Smart Growth an Empirical Study of Land Use Regulation in Illinois, Planning Education and Research, vol. 22, no. 4, pp.345-359, 2003

75) Bengston, D.N., Fletcher J. O., Nelson K.C., Public Policies for Managing Urban Growth and Protecting Open Space: Policy Instruments and Lessons Learned in the United States, Vol. 69, Issues 2–3, pp. 271–286, 2004

76) Ma, L.J.C., Urban transformation in China, 1949-2000: a review and research agenda. Environment and Planning A, 34, pp. 1545-1569, 2002.

77) Kang, R., Research on Urban Spatial Structure of Yinchuan since 1949, Xi`an University of Architecture and Technology, Xi`an, 2015

78) Wang, X.Y., A study on the evolution of Yinchuan internal spatial structure. Urban Problems, 7, pp.41-44, 2006, in Chinese.

79) Gu., C., Wei, Y.D., Cook., L.G., Planning Beijing: socialist city, transitional city, and global city. Urban Geography, 36(6), pp.905-926, 2015.

80) Yeh, A.G. -O., Wu, F., The New Land Development Process and Urban Development in Chinese Cities. International Journal of Urban and Regional Research, 20(2), pp.330-353, 1996

81) Wei Y.D. and Leung C. K., Development Zones, Foreign Investment, and Global City Formation in Shanghai, View issue TOC, Volume 36, Issue 1, pp. 16–40, 2005

82) Wang, X., The problems of the development zone management, city planning review, vol.27, no.11, 39-43, 2003, in Chinese.

83) Su, D., Luo, Q., Wang, L., Present situation of social insurance of land-lost farmers in minority region-A case study of Yinchuan. Journal of Ningxia University (Humanities &

Social Sciences Edition), 30(3), pp.153-160, 2008, in Chinese.

84) Vliet, D., Development/Demonstration: An adaptive Strategy, from Achieving Sustainable Urban Form, Edited by Williams, K., Burton, E., Jenks, M., E&FN Spon, London, 2000

85) Yang, D.Y., and Wang, H., Dilemmas of local governance under the development zone fever in China: a case study of the Suzhou region, Urban Studies 45, 2008, 1037-1054

86) Carruthers, J.I. and Ulfarsson, G. F., Fragmentation and Sprawl: Evidence from Interregional Analysis, Growth and Change, Vol. 33, pp. 312-340, 2002

87) Sorensen, A., Land readjustment and metropolitan growth: an examination of suburban land development and urban sprawl in the Tokyo metropolitan area. Progress in Planning, 53, pp.217-330, 2000

88) Dijst, M., Compact urban policies in Randstad Holland, in the book "Compact cities and sustainable urban development: a critical assessment of policies and plans from an international perspective", edited by Roo, G.D. and Miller D., 2000, Ashgate Publishing Limited, England

89) Acioly Jr, CC., Can Urban Management Deliver the Sustainable City? Guided Densification in Brazil versus Informal Compactness in Egypt, from 'Compact Cities: Sustainable Urban Form for Developing Countries', Edited by Jenks, M., Burgess, R., Taylor & Francis, London, 2000

90) Aldous, T., Urban Villages : a Concept for Creating Mixed-Use Urban Developments on a Sustainable Scale, Urban Villages Group, London, pp. 11-13,1992

91) American planning Association, Growing Smart Legislative Guidebook, 2002

92) Arbury, J., From Urban Sprawl to Compact City – An analysis of urban growth management in Auckland, unpublished thesis, Auckland University, 2005

93) Breheny, M.J., Sustainable Development and Urban Form (European Research in Regional Science), Pion Limited, London, 1993

94) Calthorpe, P., The next American Metropolis : Ecology, Community, and the American Dream, Princeton Architectural Press,1993

95) Dempsey, N., Jenks, M., The Future of the Compact City, Built Environment, Vol. 36, No. 1, pp. 116-121, 2010

96) Dieleman, F.M., Dijst, M.J., Spit, T., Planning the Compact City: the Randstad Holland Experience, European Planning Studies, Vol.7,Issue 5,pp.605-601,1999

97) Downs, A., Smart Growth: Why we discuss it more than we do it. Journey of the American

planning Association, Vol.71, No.4, pp.367-378, 2005

98) Duany A., and Plater-Zyberk, E., The Neighborhood, the District and the Corridor, McGraw-Hill, 2000

99) Echenique, M., Forecasting the Sustainability of Alternative Plans: the Cambridge Futures Experience, From 'Future Forms and Design for Sustainable Cities', Edited by Jenks M. and Dempsey N., Taylor & Francis, London, 2005

100) Franklin, B., Tait, M., Constructing an Image: The Urban Village Concept in the UK, Planning Theory, Vol.1, No.3, pp.250-272, 2003

101) Gaubatz, P., Understanding Chinese Urban Form: Contexts for Interpreting Continuity and Change, Built Environment, Vol. 24, No. 4, Eastern Urban Form and Culture, pp. 251-270, 1998

102) Han, J., Fontanos, P., Fukushi, K., Herath S., Heeren, N., Innovation for Sustainability: toward a Sustainable Urban Future in Industrialized Cities, Sustainability Science, Vol. 7, Supplement 1, pp 91–100, 2012

103) Handy, S. L., Regional Versus Local Accessibility: Neo-Traditional Development and Its Implications for Non-work Travel, Built Environment, Vol. 18, No.4,pp.253-267,1992

104) Kaido, K., Compact City: Seeking a City Image of a Sustainable Society, Academic publisher, 2001

105) Kaido, K., Urban Densities, Quality of Life and Local Facility Accessibility in Principal Japanese Cities, From 'Future Forms and Design for Sustainable Cities', Edited by Jenks M., Dempsey, N., Taylor & Francis ,London, 2006

106) Kaido K., Compact City Plan and Design (コンパクトシティの計画とデザイン), Academic publisher(学芸出版社) ,2007

107) Jenks, M., Burgess, R., Compact Cities: Sustainable Urban Forms for Developing Countries, Taylor & Francis, 2000

108) Jenks M., Jones, C.A., Dimensions of the Sustainable City, Springer Netherlands, 2010

109) Lin, J., Yang A., Does the Compact-city Paradigm Foster Sustainability? -An Empirical Study in Taiwan, Environment and Planning B Planning Design, vol. 33,no. 3,pp.365-380,2006

110) Lock. D., Room for more within City Limits? Town and country planning, 64 (7),pp.76-173,1995

111) Masnavi, M.R., The New Millennium and the New Urban Paradigm: the Compact City in

Practice, From 'Achieving Sustainable Urban Form', Edited by Burton E., Jenks M., Williams K., Taylor & Francis, London, 2000

112) Neal, P., Urban Villages and the Making of Communities, Taylor & Francis, London, 2003

113) Okabe A., Towards the Spatial Sustainability of City-regions: A Comparative Study of Tokyo and Randstad, From 'Future forms and design for sustainable cities', Edited by Jenks M., and Dempsey, N., Taylor & Francis, London, 2005

114) Roo, G. and Miller D., Compact cities and sustainable urban development: a critical assessment of policies and plans from an international perspective. Ashgate Publishing Limited, Hampshire, England, 2000.

115) Wang, M., Krstikj, S., & Koura, H., Effects of urban planning on urban expansion control in Yinchuan City, Western China, Habitat International, 64, 85-97, 2017

116) Sonne, W., Dwelling in the metropolis: Reformed Urban Blocks 1890–1940 as a Model for the Sustainable Compact City, Progress in Planning, Vol. 72, Issue 2, pp. 53–149, 2009

117) Song, Y., Knaap, G.J., Measuring Urban Form -Is Portland Winning the War on Sprawl? Journal of the American Planning Association, vol. 70, Issue 2, pp.210-225, 2004

118) Takeda H., Shibata M., Arima, T., City Ranking and Evaluation Using Compact City Indexes-Comparison Analysis of 39 Densely Inhabited Districts, Journal of Architecture and Planning (Transactions of AIJ),Vol. 76 ,No. 661 pp. 601-607,2011

119) Thompson-Fawcett, M., The Contribution of Urban Villages to Sustainable Development, From 'Achieving Sustainable Urban Form', Edited by Burton, E., Jenks, M., Williams K., Taylor & Francis ,London, 2000

120) Cervero, R., Ferrell, C., Murphy, S., Transit-Oriented Development and Joint Development in the United States: A Literature Review, TCRP (Transit Cooperative Research Program) Research Results Digest No.52, 2002

121) Tsai, Y.H., Quantifying Urban Form: Compactness versus 'Sprawl', Urban Study, vol. 42, no. 1, pp.141-161, 2005

122) Weitz, Z., Moore, T., Development inside Urban Growth Boundaries Oregon's Empirical Evidence of Contiguous Urban Form. Journal of the American Planning Association, 64(4), pp.424-440, 1998.

123) Wheeler, S. M., Planning for Metropolitan Sustainability, Journal of Planning Education and Research, vol. 20 no. 2, pp.133-145, 2000

124) Yeh, A. G., Wu, F., Internal structure of Chinese cities in the midst of economic reform. Urban Geography, Vol. 16, Issue 6: Chinese Cities and Urbanization I, 1995

125) Yeh G., Li, X., The Need for Compact Development in the Fast-growing Areas of China: The Pearl River Delta, from "Compact Cities: Sustainable Urban Forms for Developing Countries", Edited by Burton E., Jenks M.， Williams, K., Taylor & Francis ,London, 2000

126) Wang, M., Krstikj, S., & Koura, H., Study on the housing supply and public programs impacts on the housing development in Yinchuan city, Western China. Journal of Architecture and Planning (Transactions of AIJ), 82(732), pp.469-476, 2017

127) Zhao, P., Lv, B., Roo, G., Performance and dilemmas of urban containment strategies in the transformation context of Beijing, Journal of Environmental Planning and Management, Vol. 53, No. 2, pp.143–161, 2010.

128) Editorial Committee of Chronicle of Yinchuan city. Yinchuan Chronicle. Ningxia People's House: Yinchuan, China, 1998, in Chinese.

129) Editorial Committee of Chronicle of Yinchuan. Yearbook of Yinchuan (2000 – 2014), Ningxia People's House: Yinchuan, China, 2000-2014, in Chinese.

130) Editorial Committee of Chronicle of Xixia District. Chronicle of Xixia district. Chang, X., Liu, X., Eds.; Ningxia People's House: Yinchuan, China, 2010, in Chinese.

131) Editorial Committee of Yearbook of Jinfeng District. Comprehensive Yearbook of Jinfeng District (2007-2012), Jin, H., Li, Q., Eds.; Ningxia People's House: Yinchuan, China, 2014, in Chinese.

132) Editorial Committee of Chronicle of Xingqing District. Yearbook of Xingqing district in 2013, Dai, L., Eds.; Ningxia People's House: Yinchuan, China, 2014, in Chinese.

133) Yinchuan city government, Outline of Eleventh Five-year Yinchuan city' s National Economy and Social Development Plan, 2010

134) Yinchuan housing development chronicle Ⅰ, edited by Chen, Y., Dong, Q., Yinchuan housing development chronicle editor group, 1990.

135) Yinchuan housing development chronicle Ⅱ, edited by Xu, L., Yinchuan housing development chronicle editor group, 2000.

136) Yinchuan Planning Bureau. Urban planning chronicle of Yinchuan. Yinchuan Planning Bureau: Yinchuan, China, 2005, in Chinese.

137) Yinchuan Statistic Bureau. Annual statistic of Yinchuan (2000-2014). China Statistic Press: Beijing, China, 2000-2014, in Chinese.