

Spatial Structure of Rapid-growing Urban Areas in Yinchuan City, Western China

— based on the analysis of spatial strategies —

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1. Introduction

Cities in China have experienced rapid growth since 1978's "Reform and Opening Up", the high-speed developments have resulted in tremendous conversion of farmlands and natural lands into urban land use. Although various researches have focused on the urban development issues of Chinese cities in these decades, very few pay attention to the cities in peripheral region of Western China. In this study, Yinchuan city, a locally central city located in inlands of western China, is undergoing incredible rapid growth in recent ten years resulted from the transition of economic system and development strategies. Such abrupt growth calls for the immediate understanding of the present situation to guide future urban development, however, such concern is generally absent.

Therefore, this study focused on the public policies, spatial plans and implementations of the urban development projects after 1949 that have formed Yinchuan's present urban structure and also the urban expansion. Through the analysis of spatial and functional intention of the development projects as well as their locational impacts to the urban structure, 1) the strategic intention of the planned projects in each period and their progress at the present are examined to identify land use issues, and 2) the transformation of urban structure is clarified.

2. Study area

(1) Outline of Yinchuan city

Yinchuan is the capital city of Ningxia Hui (Minority People) Autonomous Region in west-northern China. Historically, the city

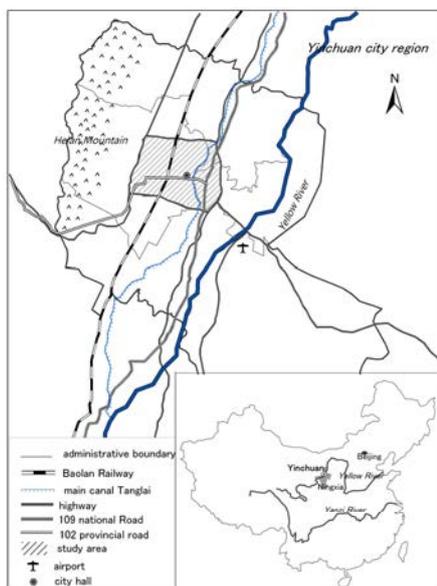


Fig-1 study area

originated from a walled town of approximate 3 km² built in A.D. 678, which once thrived as capital of Xixia Empire (907-1227). In 1739, the camp of Manchu's troops was built at 7.5km west of the existed town and formed another smaller town of 1.1km². The areas of

these two historical towns are called as "Old Town" and "New Town" today.

(2) Study area

In this study, the area within the urban loop highway, which is designated as Main Urban Area in the master plan of Yinchuan (2007-2020), is focused as the study area. This area covers about 400 km² and most of the urban development have been planned and implemented within this area. More than half of the total population in Yinchuan city region (approximate 1.11 million in 2010) is concentrated in this area.

The study area is seated on the flood plain between Helan Mountain and Yellow River characterized by many waterways. Tanglai main canal (built in Tang Dynasty) and Baolan railway line were developed to go through this plain area. 109 National Rd and 102 provincial Rd crossing by have long been functioned as primary transport arteries of the city (Fig-1).

3 Development strategy and implementation

(1) Four phase of Modern development

At the time of 1949, so-called "Old Town" and "New Town", which were historically developed as fortified zone, form the twin cores of Yinchuan urban center. Modern developments started after 1949, and have gradually transformed urban structure. Now, city is facing critical conditions that have brought about by the rapid urban expansion.

This Modern development era after 1949 in Yinchuan is possibly divided into 4 periods that are mainly distinguished by economic policy:

- Planned Economy and industrialization (1949-1977)
- Transition period to market economy (1978-1998-2001)
- Impacts of Market Economy (2002-2006)
- Expansion of Market Economy (2007-)

(2) Planning intentions of each period

a. Planned Economy and industrialization (1949-1977)

After 1949, industrialization in the cities of China was eagerly pushed forward under communist thought and the urban development was dominated by the economic plan set by state central government. At the city scale, economic plan was implemented based on "work unit system" that "work units" (state-owned enterprises, factories, public institutes, schools, etc.) were allocated according to the plans of different economic departments, and each work unit build their own workplace, houses and service facilities as a package in the designated territories.

In 1958, Yinchuan city was designated as capital city of new established Ningxia *Hui* Autonomous Region(province), and first railway *Baolan* was built across west edge of the city, which facilitated planning of a new urban area at the west of railway named as *Xinshiqu* (新市区). In 1958's master plan, *Xinshiqu* was underlined as the new urban core for the vital development of provincial industry, education, administration, so as to accommodate allocated "work units" from these sectors.

b. Transition toward Market Economy (1978-2001)

Due to 1978's economic reform, China began to progress toward decentralized government and market economy. Local government has gained more power to guide urban development via comprehensive urban plan. Gradual reforms in terms of land market and housing system in this period have brought about new and fast development in cities¹⁾. Yet, due to the location as remote inland city, Yinchuan didn't launch rapid growth as eastern coastal cities which benefited more from foreign investment and experimental policies. "Work unit system" still remained prevailing.

However, economic position of the *Old Town* has been re-enforced, a "Triple Cores" (*Xinshiqu*, *Old Town* and *New Town*) spatial strategy was proposed in 1983's master plan. Development was attempted to re-direct toward *Old Town* through large planned housing project surrounding the town and large-scale redevelopment inside of the town. Before 2000s, master plan (1996-2010) further confirmed a "Four Cores" strategy that a new comprehensively planned zone-Yinchuan High-tech Development Zone (established in 1992, 5.2km²) was incorporated as the forth development foci, and development were meant to be confined on these four cores. In the same time, several large "work units" were sporadically allocated in the city (Fig-2).

c. Impact from Market Economy (2002-2006)

State's "Housing Reform" in 1998 eventually terminated the role of "work units" in providing houses and thus triggered rapid growth of commercialized housing development in 2000s. Soon after, in response to the state policy of "China Western Development" started in 2000, Yinchuan proposed development strategy of "Big Yinchuan" in 2002 which aimed to create a regional central city by opening up great opportunities for the market-based developments. In order to provide preferential environment for private investment,

following the three state-level ETDZs(Economic and Technology Development Zone) approved in 2001, various industrial zones, technology parks and commercial zones were initiated by different levels of government (province, city or districts, Table-1). It is manifested by the increase rate of investment on infrastructure as 62.29% and 90.05% in 2002 and 2003, as well as explosive urban expansion that merely in the year of 2003, built urban areas was increased by 30.41%. Meanwhile, decision of transforming the development focus toward areas between *Old Town* and *New Town* was settled and planning of a New Urban District (新市区) that mainly functions as a civic center was authorized in 2002.

d. Expansion of Market Economy (2007-)

Yinchuan's subsequent strategy "*Liang Yi* city (Dually Cozy, cozy for living and cozy for working)" settled in 2006 further targeted to attract massive investment into the city. And because the leap-forward urban development in the beginning of 2000s has far exceeded spatial intentions in 1996's plan, a new spatial strategy of "Four development axis with multi-centers" was proposed in Master plan (2007-2020) to lead expanded market-oriented development. Later, coordinated with the development strategy and spatial plan, development zones with specialized functions were established, such as Educational Base, Trading and Distribution Center and new CBD (Table-1, Fig-3).

(3)Implementation and progress of urban development

1) Planning-oriented "Triple Cores" development

In line with the intention of the original plan, by half-century development, *Xinshiqu* has grown to an urban core where numerous "work units" - key factories, collages and governmental institutes clustered. Until 2000s, urban development were generally confined in the planned areas of "Triple Cores" and several scattered large "work units" (Fig-2).

2) Developments progressed in planned zones

After almost 20 years development, ETDZ-1(former Yinchuan High-tech Development Zone) has evolved into a major economic core of fully developed multi-functions including high-tech industry, business and residence. ETDZ-3 is almost developed after its key function zone IBI opened in 2013 surrounded by a number of housing development and ETDZ-2 is currently rising as another

Table-1 Planning and implementation in special development zones

No	name	planning			implementation			
		year	level	scale (km ²)	function	basic infrastructure	developed/completed	major project/development
I	ETDZ 1*	2001	state	2.26	high-technology industry, finance, business	●	■	30 factories, 7 high-tech enterprises in 2010
II	ETDZ 2	2002	state	5.24	heavy industry, distribution	●	□	47 factories in 2010
III	New Urban District (Civic Center)	2002	city	10.56	administration, business	●	■	City Hall, Exhibition Center, Provincial library, Provincial Museum, Art Center, Provincial science museum
IV	Industrial Park	2002	province	16.32	Food processing, manufactures, trading	●	□	400 enterprises in 2009
V	Commercial Strip*	2003	district	7.2	wholesale marketing, distribution	●	■	Agriculture material town, Automobile town, Hardware town, Building material market, 3 Furniture towns, etc.
VI	ETDZ 3(IBM)	2005	state	3.4	high-new technology, business, leisure	●	□	308 enterprises of 4000 employees in IBI in 2014
VII	Technology Park	2003	district	3.23	Technological industry, distribution	●	□	19 settled enterprises in 2007, 2343 employees in 2012
VIII	Distribution center*	2004	district	2.11	distribution	●	■	Building-Material Town
IX	Industrial Zone	2004	city	11.56	machinery/electronic/textile/food industry, technology	◎	□	192 settled enterprises, 7000 employees in 2011
X	Vocational Training Base	2008	province	8.8	education	●	□	8 collages in 2010
XI	Trading & Distribution Center	2008	city	6.23	wholesale and trading business, communication, headquarter economy	●	□	Muslin Trading Town, Cold-chain logistic, Service outsourcing park, etc.
XII	New CBD	2010	city	2.22		○	×	

Data was compiled from materials of Management Committee of ETDZ, Yinchuan commercial Bureau, Economic cooperation Bureau, websites of each zones or local district government, and chronicle of Yinchuan.
 * V, VIII are designated zone to integrate existed scattered markets; VII was readjusted as trading and commercial zone in 2011.
 Basic infrastructure: seven connections (water supply, drainage, electricity, gas, road, telecommunication) and land leveling. ● completed; ◎ partly completed; ○ under construction
 Developed situation was judged by site visiting in 2014 to check complementation status of projects and land development: ■ fulfilled developed; □ partly infilled, under-developing
 IBI: Incubation Park of information technology, bio-technology and intellectual

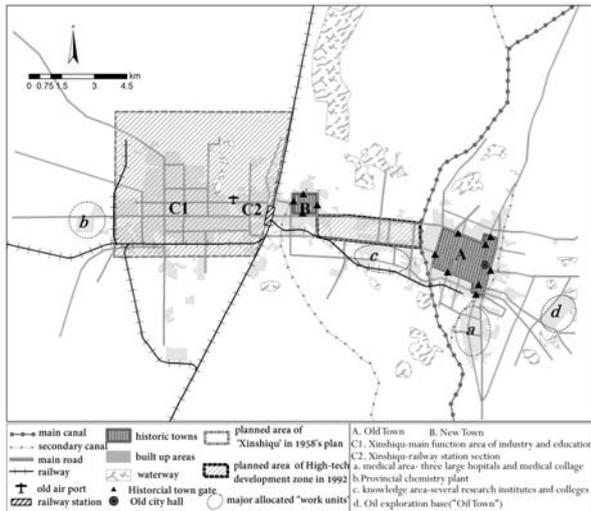


Fig-2 Planning and development prior rapid growth

(Adapted based on the urban map of 1997, planned area of *Xinshiqu* was much larger due to the unrealistic thinking of "Great Leap Forward" at that time)

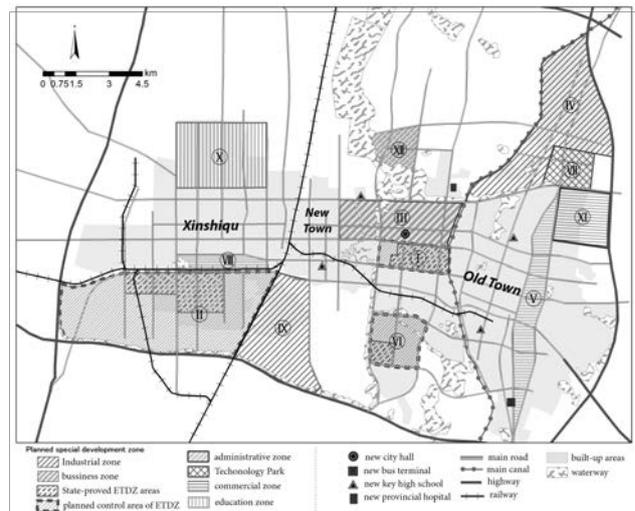


Fig-3 Planned zones and development in 2000s

(Adapted based on the urban map of 2014 and planning maps of zones)

industrial core. Also, substantial development has been gained in commercial strip where diverse wholesale complexes gradually raised. Specially, directed by moving of City Hall to New Urban Districts in 2006, in addition that various culture facilities built around City Hall, high-rise offices and housing development promptly spurred in this area and formed a new Civic Center soon. Urban structure was largely transformed by the development of these zones and also stretched by other peripheral zones which are under development (Table-1). By 2013, built-up urban areas of the city has reached 148.6km², which is fourfold of that in 2000.

3) Impacts of the planned development

Own to the purpose of facilitating more convenient and faster connections among development zones and new urban areas, transportation of the city have been greatly promoted by standardized construction of 8-lane arteries, a "Six horizontal and sixteen vertical road system" has been created and a diversity of public facilities were built, such as large natural parks based on restored waterways, key schools and hospitals distributed out from the historic towns. These promoted infrastructures stimulated considerable market-based development not only in the planned zones but also adjacent to the planned areas (Fig-3).

4. Spatial analysis and present urban structure

(1) Locational intention of the planned development

a. Central line of new development foci

Knowledge area(c) that tightly joint with ETDZ-1 and then connects with ETDZ-3 at south, constituted a development line of high-tech and business cores. Follow the line to the north, new Civic Center as administration and culture center as well as new CBD as future business center, intention of focusing prospective and primary development into the central line of the city is clear.

b. East line of commercial and trading

By virtue of *Old Town*'s historical dominance as trading center, combining with transport advantage based on No.109 national Rd,

Commercial Strip, Trading and Distribution Center, moreover, Technology Park and industrial zone were located in the east of the city to form a line of commerce and trading.

c. West line of industry and education

Relied on *Xinshiqu*'s significance as traditional industry and education core, ETDZ-2 with main function of heavy industry and educational base were thus distributed extended from *Xinshiqu* with intention of strengthening the development in the west of city.

(2) Present urban structure (Fig-4)

Grounded on the above analysis of locational and functional intentions as well as the development situation progressed in and out of intended areas, present urban structure is clarified:

Urban centers

By characters of sustained commercial vigor and most dense population, *Old Town* area is considered as commercial center and New Civic Center is perceived as administration and culture center, while New CBD which is under construction, might be a potential business center in the long term.

Generated economic cores

As expected to play the role of agglomerative economic development, industrial, technology and commercial zones are generated economic cores of the city.

Main urban development axis

First, an E-W main urban axis is already consolidated by linking the development nodes that hold historical and strategic significance: *Old Town*-ETDZ 1-*New Town*-*Xinshiqu*. Moreover, a new N-S development axis is identified based on the central line that is given the priority for newly essential developments.

Emerging sub development axis

Partly developed or still under developing, the west industrial and education line and east commercial line are emerging as sub development axis with specialized functions.

Urban expansion areas

Unintended developments sprawled from the existed urbanized

areas or interspersed among planned areas, which are not coherent with spatial strategy or planned with ordered patterns are regarded as urban expansion areas. For instance, despite that master plans since 1996 all emphasized to control the development at the east of city for hazard prevention, developments are still continuously encroaching toward east.

5. Discussion

The foremost consequence of dramatic expansion of urban areas in a short time is disappearance of vast good-conditioned farmlands, which resulted in problems such as threaten on the local economic advantage –agriculture. And further problems are revealed:

(1) Issues associate with planned areas

Since 1990s, as a consequence of deepened marketization, most state-owned factories in *Xinshiqu* faced bankrupt and caused stagnant development of *Xinshiqu* in recent decades²⁾. In current, severe decline of the area is symbolized by vacant factories and deteriorated houses that accommodate laid-off workers. On the other hand, ambitiously established development zones always occupy fairly large areas and even larger than the areas designated in spatial plans. Initiated by different levels of government, some of them are planned with repetitive functions and regardless of local context, besides, the efficiency in such “land enclosures” are remained to examine¹⁾. For instance, *Technology Park(XII)* suffered sluggish development since establishment and thus was redefined as Commercial and Trading Zone in 2011. How to consolidate these development zones to be tightly tied to the local economic and strengthen intensive development with concerning of the abandoned old industrial lands is an essential issue to deal with.

(2) Issues concerning sprawled expansion areas

Most sprawled expansion areas are composed by mushrooming housing developments. In some cases, they occurred in the period of 2002-2006 when an instant plan was absent. In other cases, notwithstanding defined development directions in the spatial plan implemented since 2007, large housing projects that stimulated by recent real estate booming are still spreading uncontrolled. For example, a project around the south lake with total housing units of 20000 is still under construction in spite of the seemly high vacancy in the new completed projects close by. It is found that the project was brought into modified master plan (2010-2020), where was designated as green land in 2007’s plan. Seeking appropriate measures to efficiently prevent and direct residential sprawl is necessary to be addressed as soon as possible.

6. Conclusion

In this study, we attempted to sketch contemporary spatial structure of rapid growing urban areas in Yinchuan city based on the analysis of development strategies, planning intentions and their implementations or impacts in different development period. Gradually shifted from the constrained development under planned economy, leap-forward development strategies that achieved by planned functional zones have led dramatic transformation of urban structure as well as rapid urban expansion that conditioned in market-oriented development. While the present urban structure is clarified by two main urban axis and two sub development axis referring to the spatial strategies, sprawled expansion areas were concurrently and widely observed. Solutions for the issues identified within planned areas and sprawled areas are now urgently needed.

Reference

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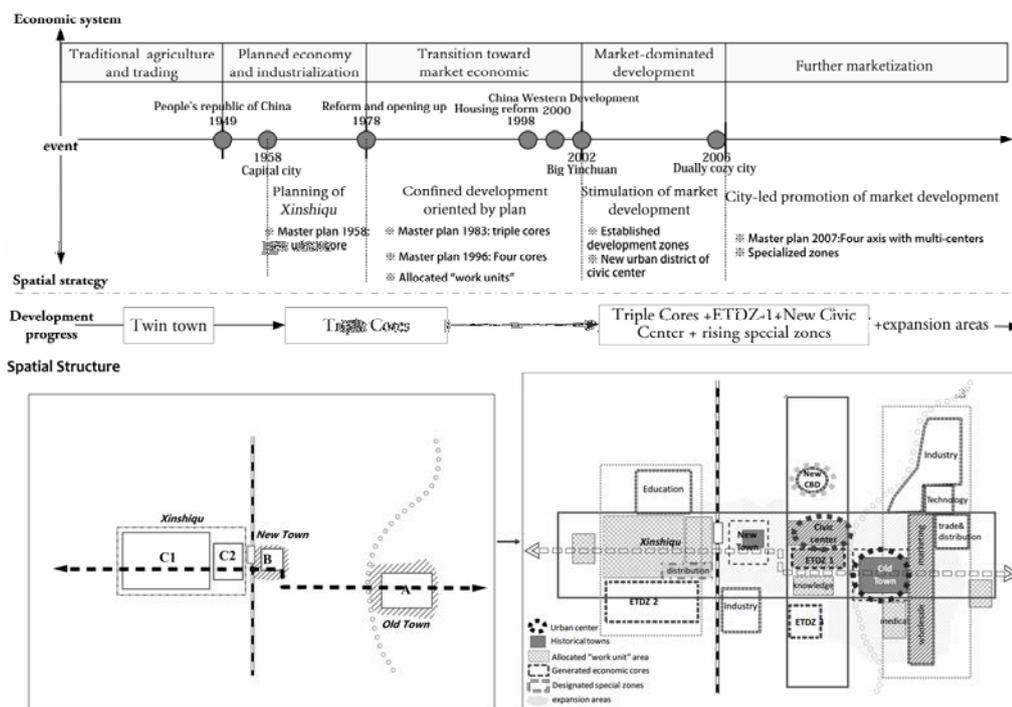


Fig-4 Transformation of urban structure