

Study about the Development of Small Towns in the Metropolitan Fringe in Developed Area of China—A Case Study of Sandun Town in Hangzhou

Haifeng Jiao, and Chuankun Rao

Abstract—Due to the Rapid Urbanization in China, the influence of metropolises to surrounding areas grows by a tremendous speed in developed region. One of the most obvious influences is the expansion of the urban built-up areas which covers the land belongs to small towns. Around metropolitan fringe, the boundary between city and village becomes more and more obscure. So being the most sensitive area, the small towns on the fringe of metropolises have the special meaning on the research into the small towns' development. This paper chooses Sandun Town in Hangzhou of Zhejiang Province as an example, emphatically focus on aspects such as the central area proliferation, the industrial shift, the position effect, the subway effect and the commercial development, reviews a few problems of small towns in the future and the important problems in their planning by the analysis of the characteristics of the present conditions and the developing motive mechanism, so that guides small towns to develop properly by liking with these small towns and center metropolises.

Keywords—Metropolitan fringe; Small towns; Sandun Town; Motive mechanism.

I. INTRODUCTION

SINCE early 1980s, China's urbanization enters a fast developing stage, the metropolis gradually expand to peripheral areas. As the interactional region between cities and villages, the metropolitan fringe begins to be the most sensitive areas. Due to the differences between central city and the metropolitan fringe, such as land use pattern, interest subjects, formation and development mechanism, there exists more and more complicated problems in the fringe zone.

Starting from 1990s, metropolitan fringe arouses a universal attention among academic circles and planning sector in China. The scholars do an abundant research in the field of metropolitan fringe, mainly including the research areas like ecological environment, land use and social development and governmental policies. In this paper, the writer sets Sandun Town in Hangzhou as an example, analyzing its developing background, developing characteristics and motive mechanism, in order to reveal some enlightenment for further development of metropolitan fringe.

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A. Metropolitan Fringe

Metropolitan fringe, also known as urban fringe, urban edge, marginal area, rural-urban fringe zone, urban sprawl area and urban shadow areas, was first proposed by the German geographer Herbert-Louis in 1936 in his study of the geographical structure of Berlin. (Fig. 1 is a clear regional structure of a metropolis) [1].

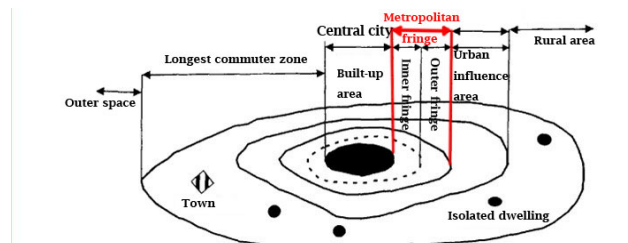


Fig. 1 The regional structure of a metropolis by L.H. Russwurm

Metropolitan fringe is not a specific geographical entity, but is an dynamic zone which existing between urban and rural areas [2]. Influenced by urban and country, it has characteristics both of them in social factors, economic feather. Metropolitan fringe plays an important role in connecting urban and country. Due to the unique position, metropolitan fringe shares common characteristics: transitivity, variousness, hierarchy, dynamic and extensiveness [3].

In this paper, the metropolises in developed area in China refer to the cities in coastal developed regions of eastern China, with a population over one million. These cities are the most developed regions in China, thus the fringe areas are also the most sensitive ones.

B. Small Towns

Small towns, literally means towns with small scale, are a concept between city and country. In China, the definition of small towns is indistinct. Broadly speaking, the concept of small towns includes not only county towns and designated towns, but also market towns. Narrowly speaking, the concept of small towns refers to towns except designated towns.

In this paper, the small towns in metropolitan fringe refer to all the towns located inside of the city planning area. These towns are the most active and sensitive ones comparing with others. They are close to the core of the urban, which make it easier to absorb the radiation of the development. In general, the small towns in metropolitan fringe still develop as a

individual system, but all of the elements of production are affected by the central city to varying degrees.

II. RESEARCH AREA INTRODUCTION

A. Research Region Background

Hangzhou is the capital and the largest city of Zhejiang Province, also is one of the two sub-center metropolises in the Yangtze River Delta Economic Rim. Since China's reform and opening-up, the market economy and township enterprises have boomed in Zhejiang Province. The urbanization level has increased rapidly. In 2001, with the adjustment of administrative area, the district of Hangzhou expanded from 683 square kilometers to 3068 square kilometers; the population increased from 1.79 million to 3.73 million, becoming the second largest city in Yangtze River Delta Economic Rim, only inferior to Shanghai. In 2010, the urbanization level of Hangzhou reached 73.25%; and the per capita GDP reached 12,698 dollars, reaching an average standard of developed countries.

During the process of rapid urbanization in Hangzhou, many small towns have participated energetically and developed with a high-speed. But every coin has two sides. The poor quality of rapid development of small towns also begins to be a severe impediment to improve the comprehensive competitive ability of regional economy. How to deal with this dilemma is most important issue to Zhejiang Province.

B. Sandun Town

Sandun Town is located in the northwestern suburbs of Hangzhou, 10.5 kilometers away from the city center. There are 18 communities and 6 administrative villages in the Sandun, with a total population of 113 thousands. The administrative area of Sandun is 37.93 square kilometers. It is planned as the core of the northwest area of Hangzhou. (Fig. 2 is the spatial structure of Sandun in 2020. The blue line is the scope of administrative district of Sandun).

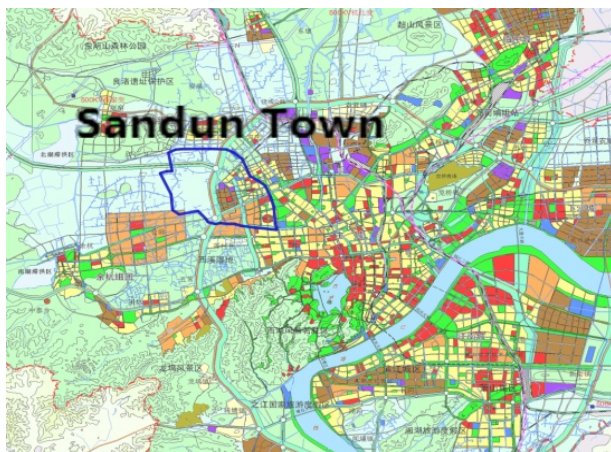


Fig. 2 The spatial structure of Sandun in 2010

- Choosing Sandun Town as the study case is based on the following considerations:
- Sandun is in the fringe area of Hangzhou, which belongs to the category of small towns, and has certain

representativeness among small towns in metropolitan fringe;

- The urbanization level of Sandun is much higher than most small towns in China. The study of Sandun could share a referential significance to those towns which will probably experience the same lines of development;
- The author has done a lot of researches of Sandun and gathered a large amount of information and statistics, which is the foundation of the study.

III. MOTIVE MECHANISM OF DEVELOPMENT AND SPACE EXPANSION

Because of its special properties, the growth of small towns in metropolitan fringe is not only affected by inner environment like its own development and spatial expansion, but also promoted by outer environment as Metropolitan expansion, industrial evolution and transport factors. Under the analysis of both inner and outer environments of Sandun Town, the motive mechanism of development and space expansion can be concluded as follows.

A. Force from Outer Environment

1. Metropolis expansion

In the evolution of urban spatial structure, there always exists polarized effect and proliferation effect. During the initial stage of the economic growth of a region, the polarized effect is stronger than the proliferation effect, thus the overflow effect is negative.

With the further development of the regional economy, proliferation effect begins to grow and polarized effect start to fall. After the two effects offset against each other at t_1 (Fig. 3), the proliferation effect begins dominant by a gradually increasing trend [4].

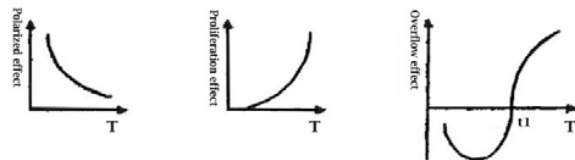


Fig. 3 Polarized, proliferation and overflow effect time variation characteristic

With the increase of the urbanization level in Hangzhou, the urban land price rises gradually; the proliferation effect begins to exceed the polarized effect in the past decade. In recent years, the government invested billions of money to perfect the public facilities such as the metro lines, business center, sports center and other large public buildings in Sandun Town.

Since the per capita GDP in Hangzhou has already surpasses the level of \$ 10,000, the new residents who have money and those original ones who are willing to improve the living conditions will purchase house property in the fringe area, this directly arouse the suburbanization.

2. Industrial evolution

The urbanization process is always accompanied with the concentration and structural evolution of the industry. The development of the small towns in fringe area also follows this rule. The aggregation of industry in spatial level brings production factors like capital, manpower, resources and

technology, helping the formation and growth of small towns.

The deepening of the urbanization contributes to the evolution of industrial structure, in turn; the adjustment and promotion of industrial structure promote the process of urbanization. To pursue profit maximization, production factors will obviously flow from primary industry to secondary industry, at last to tertiary industry. Industrial structure affects the employment structure, while the employment structure affects the process of the concentration of the population of the towns. The secondary industry and the tertiary industry can not only bring a lot of work opportunities, but also enhance the town vitality, improving the residents' income to a higher level.

In the past decade, the farmland in Sandun Town has reduced by 56.7%. In this process, housing and industry development play the two most prominent leading roles. The using type of non-agricultural land in Sandun Town has a common evolution process, from suburban agricultural land to industrial land, then to residential land, at last to land of commercial facilities. Sandun Town is becoming of a part of the metropolis step by step.

3. Metro Effect

After nearly a decade of large-scale development, there is little land available for construction of residential land in central city, for high price of land has restricted the development of real estate. A series of affections of limited land directly promote population and industry moving to outside area, but the single mode of transportation has already been an obstacle to the expansion of the central city [5].

In 2008, Hangzhou began to construct of rail transport network (see Fig 4), which will promote the overcrowded central city to spread to outskirts. The planned Metro-Line 2 passes Sandun Town, which will increase the value of the land in Sandun, also change the land use pattern, especially those lands along the railway. With the construction of metro lines, there will form a multi-dimensional public transport structure, which will shorten the distance between Sandun Town and the central city, greatly improving the ability to evacuate population from inner city to fringe area. To some degrees, the metro effect has brought Sandun which, spatially speaking belongs to Metropolitan fringe, into the central city. While the residents start to pay more attention on the quality of living environment, the concept of living space will extend to outside area without doubt. The trend of population suburbanization will make further efforts to promote industrial suburbanization.



Fig. 4 The metro structure of Hangzhou

B. Force from Inner Environment

1. Umbrella project

In 2003, the well-known Zhejiang University chose to settle its new school campus which covers 4 square kilometers in Sandun, which almost took 10.5% of the whole administrative area. The new campus has a capacity of 25 thousands students. This umbrella project greatly promoted the urbanization of Sandun. Between 2000 and 2005, the population of Sandun increased from 37,894 to 63,300. The non-agricultural population increased from 10,456 to 48,914. The structure of population has changed greatly. (See Table I)

TABLE I
SIX YEARS OF BASIC SITUATION OF SANDUN FROM 2000 TO 2005

Year	Administrative villages	Area of farmland(ha.)	The whole population	Non agricultural population	Level of urbanization(%)
2000	29	1,657.27	37,894	10,456	27.6
2001	29	1,434.00	38,649	13,130	33.9
2002	7	1,368.07	45,861	28,911	63.1
2003	7	1,367.87	51,955	34,881	67.1
2004	7	1,291.07	57,557	40,554	70.5
2005	7	/	63,300	48,914	77.3

With the construction of Zhejiang University, the land price of surrounding region rises swiftly, thus the estate industry boom is in full swing. The public infrastructures and information facilities are gradually improved. Commercial facilities oriented by student service are also built up. The average price of property experienced a qualitative leap, rising from 1,300 RMB per square meter in 2000 to 19000 RMB per square meter in 2010.

2. Urban renewal and growth

The growth of urban itself is an inherent driving factor, as well as to the towns in Metropolitan fringe. Comparing with the influence of metropolis, the growth of small towns in fringe is so inconspicuous to observe [6]. But as a matter of fact, the self-organized growth of Sandun contributes a steady force to promote development. The urban renewal also promotes small towns to develop largely. The urban renewal of Sandun has been activated, plans to renew a total area of 10.9 million square meters of old buildings.

3. Location effect

The land use of metropolitan fringe area has a unique characteristics of developing and spatial structure evolution. This phenomenon has a close relationship with the distinctive location of the marginal zone. The ideal position between urban and rural area catches the favor of city residents, peasants, land developer and entrepreneurs.

Sandun has a common advantage as a town in metropolitan fringe, which can be named as location effect:

- Portal effect. Small towns in metropolitan fringe are the gateway to the proliferation of urban civilization. It is also the threshold toward modernization and a magnet for the countries.
- Because the space of the small towns in the fringe area has a

characteristic of high dynamic and a broader switching condition of land use, the towns can change their structure with a high flexibility, thus to stimulate to improve the potential of structural optimization

- Viewing from the traffic, Sandun is in the conjugation site of regional traffic lines and the urban roads; this makes it possible to provide a two-way radiation of transportation.
- The inhabitants in marginal towns desire to improve their social state, which make them to have a strong sense of innovation.

4. Commercial development

In 2004, Sandun becomes one of the 12 commercial sub-centers according to the new round planning of Hangzhou. As a new emerging commercial centre, Sandun begins to play a part in relieving the overcrowded population in the central city. The regional commercial center and leisure facilities are consummate gradually. With a series of brands and individual business operators enter and be stationed in the area, the whole region of commerce is booming to steady.

With the rapid development of the commercial environment in the whole region, the commerce will further be stimulated in residential communities. Some residential communities will be integrated into a three-level commercial system as community commercial, regional commercial and urban commercial [7]. The governments of both Sandun and Hangzhou planned and invested many commercial facilities in this area, which will greatly enhance the radiation of its commerce.

IV. FURTHER THINK ABOUT DEVELOPMENT IN FRINGE ZONE

A. Industrial View

The generation and propulsion of urbanization cannot happen without the agricultural development, as well as the force which is contributed by the development of industrialization and the tertiary industry. The only difference between different urbanization stages is the three forces change as time goes on.

Set the industrial and revenue structure of Sandun as an example, we can find some common problems among towns in metropolitan fringe like 'urbanization lags far behind of industrialization'; 'the proportion of land use is irrational'. The output value of industry takes an absolute leading position in Sandun, while the primary industry and the tertiary industry are so weak. This drives to a conclusion that the urbanization quality of Sandun is poor. In order to make the industrial structure to a reasonable state, the governors should focus on reducing the proportion of the primary and the secondary industry, meanwhile, trying best to cultivate the tertiary industry.

B. Spatial view

Small towns in metropolitan fringe can be regarded as a dynamic geographical entity. The change of the spatial structure is not only depending on its own socio-economic situation, but also affecting greatly by the expansion of the central city. In handling properly of the relationship between town and city, the governors should cultivate a good spatial pattern, and connect effectively to the central city, into which to build a healthy supporter for economy, society and eco-system.

The urban disease could also be a positive factor for the small towns to develop, if plan could be made properly.

Based on the negation of the spread-style development and a profound understanding of sustainable development for the small towns in metropolitan fringe, there has some popular points of view to the spatial exploration among the academic circle, for example, 'low intensity development mode', 'ecological development mode' and 'intensive efficiency development mode'. These develop modes share a common value that protect the ecosystem and use the spatial resource by a higher efficiency during the development process.

In the metropolitan fringe, a reasonable spatial structure of a town must have some key points:

- Link up to the central city initiatively;
- Have a strict control of non-construction land focus on the construction of ecological landscape;
- Ensure the spatial units have an organic fusion and relative independence;
- Have an orderly development according to time;
- A high flexibility to the future changes;
- A comprehensive spatial relationship to the surrounding towns as well as with the central city.

C. Sustainable of Ecosystem

As a universal agreement, economic growth should not lead to environmental deterioration. In this paper, maintaining sustainable of ecosystem means that the environment value should be much accounted in the whole process, thus to achieve a coordinated and balanced program of development of society, economy and environment. In the development of the small towns, the governors could set a comprehensive control consisting by short-term and long-term environmental protection. On one hand, it will promote the beneficial cycle and rapid economic development of the town virtuous. On the other hand, the better ecosystem will promote the sustainable development of towns conversely

D. Planning View

In the rapid urbanization process, planning shows its significance. The government should focus on relevant policy guidance, controlling the built-up area to expand irrationally and leading the industrial land use, to achieve a rapid development by a natural pattern.

- A clear function of the town and unique development characteristics; adjust to the up-level planning, make the towns in fringe easier to accept the radiation from the central city;
- Consummate the appraisal system of development for towns; change the industry-oriented evaluation system;
- Focus on building harmonious community; cultivate local community culture;
- Consummate the management system, strengthen the consciousness of policy.

V. CONCLUSION

Due to the uniqueness in aspects as industry, population, spatial structure and motive mechanism of small towns in metropolitan fringe compared with other towns, the development pattern will not completely follow the traditional

rule. This paper analyzed the basic characteristics of towns in fringe area and the multiple motive mechanisms, then discussed how to lead them to a further development according to industrial growth, spatial structure and policy guidance. But as a matter of fact, guiding small towns in metropolitan fringe to develop healthily and steadily needs further research and practice.

REFERENCES

- [1] Zhang Jing, Wei Chunyu, "A review on new towns development research on the basis of smart growth concept", in *Journal of Hunan University (Social Sciences)*, Vol. 21, No. 3, May, 2007, pp 77-80.
- [2] Li Shifeng, "A study on decision method of characteristic and property of urban fringe areas", in *Economic geography*, Vol. 26, No. 3, May, 2006, pp 478-486.
- [3] He Jie, Huang Chengfen, Yan Liang, Liu Dong, "The planning philosophy of new urbanism and sustainable development of edge cities in the western part of China", in *Urban Planning*, No. 11, 2007, pp 16-24.
- [4] Meng, Jijun, Yan Fen, "Temporal and Spatial Variation of LUCC Driving Forces on the Edge of Metropolis: A Case Study of Changping District", in *Journal of Peking University*, No. 3, Sept. 2008, pp 137-144.
- [5] Zhao Lei, "Discussion about the developmental orientation of small towns on the fringe of cities in developed southeast littoral area", in *Journal of Zhejiang University (Science Edition)*, Vol. 32, No. 5, Sep. 2005, pp 588-593.
- [6] Xing Zhong, Wei Haoyan, "Rational phrasal move at city fringe area", in *Urban Studies*, Vol. 10, No. 6, 2003, pp 53-59.
- [7] Huang Huiming, Wei Qingquan, "Research on the problem of recreational tourism development with towns close to metropolis", in *Areal research and development*, Vol. 20, No. 3, Sep. 2001, pp 79-83.