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# The Study of Urban Fringe Development in the Risk Perspective

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## Abstract

At present, China is in the rapid growth period of urbanization and urban scale. Since 2000, the level of urbanization in China has made tremendous progress. The urbanization rate increased from 36.2% in 2000 to 49.68% in 2010, and China's urban population is nearly 666 million.

With the accelerating pace of urbanization, urban fringe, with its space and land resources, has become the most concentrated and rapid area of city's project development.

Urban fringe is constantly expanding outward extension, showing a dynamic process of development, and its space is filled with a lot of kinds of projects. However, due to the urban fringe is located in the urban and rural transition zone, it features economic development lag, complicated social structure, fragile ecological environment and so on. In the process of urban development, those problems need to be solved.

Based on the study of most of China's cities' development, the article make a conclusion of urban fringe development features in the perspective of functions, space sprawl, land structure and develop mode. In this paper, shanghai is used as a study case. Three decades of urban development and data are selected to analyze the process and characteristics and research the features of current project development in urban fringe.

With the productivity and the continuous development of science and technology, risk management has been accepted and developed by the economic, financial and other businesses. And with the accelerating pace of urban development, urban management aware of the importance of risk management. Urban development risk management is with the risk manage techniques to make the response of the risk influence during the urban develop process. Based on the previous paper study,

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through the urban develop risk management system, take account of the features of urban fringe development, the article analysis its risk mechanism, identify the main risk subjects and their characteristics, then build the risk assessment system. In the last part of the paper, several risk response strategies of the urban fringe develop are suggested to the government, in order to make an explore of the risk management in the future, and Rich content of urban planning education.

## **1 The introduction of urban fringe**

### **1.1 Urbanization and urban fringe**

At present, China is in rapid urbanization growth period, and the urban scale is expanding very quickly. Since 2000, the urbanization of China has made great progress, urbanization rate rising from 36.2% in 2000 to 49.68% in 2010, with an average annual increase 1.13%. Now, China's urban population is nearly 666 million. At the same time, domestic urban constructed land is expanded by 50%. According to relevant statistics, China's urban constructed land from 21524.54 km<sup>2</sup> in 1999, has grew to 39140.46 km<sup>2</sup> in 2008.

Urban land is the foundation of city's social and economic development. Urban fringe is gradient integration region of city constructed area and the surrounding agricultural land. Urban fringe is closer to the city than suburbs, easily to continue the characteristics of urban space context. And it's richer in land resources than city, with the convenient traffic. As a result, urbanization in urban fringe is very active.

### **1.2 The features of urban fringe**

#### **(1) Diversity in land type**

Because of geographic features, there are city land and rural land in urban fringe. At present, land in China can be divided into two categories by the land's ownership-urban land, which owned by the state and the rural land and suburban land which is collectively owned. At the same time, urban fringe is often used as urban prepared development land. And there are also some other types of land, such as approved land and undeveloped land, etc.

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## **(2) Unstable in land structure**

Land development in urban fringe is more rapid than central city or rural areas. It presents the unstable characteristics in land-use structure. The “unstable” refers to the land structure changes very quickly, which reflects urban fringe land development rapidly.

## **(3) Dynamic in land use**

As the first choice of urban expansion, the land in urban fringe is often developed in a very short time. It means that the land-use structure changes very quickly, the city constructions are activity. As the words said “ Today’s fringe is tomorrow’s city”.

## **2 The risk research of Shanghai urban fringe development**

Shanghai is located in mainland China central coast of the Yangtze estuary, which is the center city of Yangtze River Delta area. As China's first big city, Shanghai is China's economy, science and technology, industrial, financial, trade, exhibition and shipping center. It is famous of Shanghai’s style culture and international metropolis scene, and it succeeded to host the EXPO in 2010.

### **2.1 The definition of Shanghai urban fringe**

#### **(1) Idea definition**

Urban fringe is gradient integration region of city constructed area and the surrounding agricultural land. It refers to the periphery of the concentrated constructed area. In this paper, the constructed area means the area which has been constructed is more than or equal to 50% in elemental area. And the urban fringe is the periphery of this area.

#### **(2) Space definition**

Based on the collection and processing of Shanghai historical urban construction

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land use status maps and the figures, 1988-1997-2009 these three years are chosen as the research time node. According to the maps and figures, the article analyzes the urban fringe dynamic development process.

- ① The development of constructed area: automatic generating 1 km grid, the unit area ratio are classified into three categories: 80%-100%, 50%-80%, < 50%. According to the above definition, the unit whose constructed ratio no less than 50% is constructed area.
- ② The development of urban fringe: the people's square used as the center point, for 2 km radius to form the concentric circles which can cover the city range. Urban fringe is the periphery of the concentrated constructed area.
- ③ Urban fringe features analysis: the people's square used as the center point, selecting proper radius, 16 equal angle and area are divided. Then, it is superimposed with the 2km concentric circles, in order to easily get the urban fringe development features.

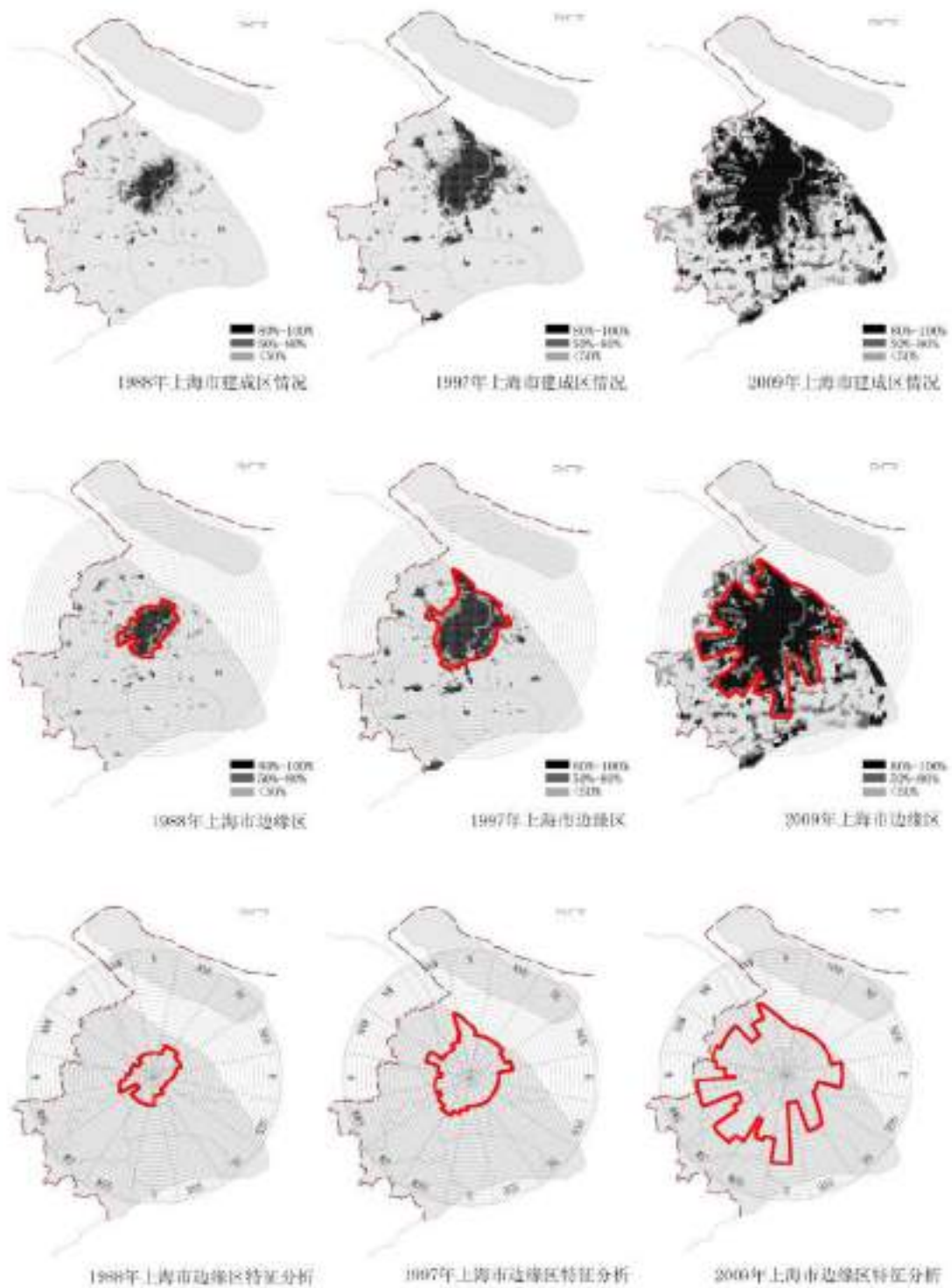


Figure 1. Shanghai urban fringe analysis

## 2.2 Research of Shanghai urban fringe features

### (1) Space features

According to the three time nodes of urban fringe, making comparative analysis from distance to central city, length, space development direction and so on perspectives. Specific data is as the form below.

Table 1. Shanghai urban fringe space features

Time	Distance to central city (km)	Length (km)	Involved district	space development direction	Expanding style
1988	12	100	Putuo District, Zhabei District, Yangpu District, Pudong District, Xuhui District, Minhang District, Changning District	-	-
1997	20	155	Jiading District, Baoshan District, Pudong District, Minhang District, Songjiang District	N/SW/NW	Sprawl Style
2009	30	340	Jiading District, Baoshan District, Pudong District, Nanhui District, Minhang District, Fengxian District, Songjiang District, Qingpu District	NW/NNW/W/SW/S/SSE/E	Axial-group style

The space features of urban fringe can be summarized up from distance, range, expanding style these three characteristics.

- ① Distance to central city is increasing year by year.
- ② The length of urban fringe is growing fast.
- ③ The urban fringe expanding style is different. 1988-1997, it's urban sprawl without distinct directions. 1997-2009, urban fringe expands in axial directions. It's related to Shanghai "One city and nine towns" policy, promoting city track traffic construction.

**(2) Land-use structure feature**

Compared with 1997 and 2009 Shanghai urban land-use status map, to analyze land-use structure feature. Through all kinds of land figures study, making a summary of its feature. Specific data is as the form below.

Table 2. Shanghai urban fringe land-use features

Type	Time	Residential area	Public facilities area	Industry area	Warehouse area	Urban outdoor traffic area	Roads and Squares area	public utility area	Green area	Special area	Constructing area
Administrative city	1997	251.08	98.72	345.09	43.99	113.74	52.58	26.82	18.24	32.19	82.62
	2009	449.28	158.08	634.4	66.56	49.92	247.52	49.92	145.6	20.8	262.08
central city	1997	145.65	39.53	108.75	14.82	37.02	39.35	7.04	13.10	5.37	35.64
	2009	185.85	56.53	100.05	26.22	6.22	69.85	15.64	34.00	9.97	39.24

The urban fringe land-use features can be summarized up into two parts.

- ① Overall land trend fast growth . Urban fringe land increased by 900km<sup>2</sup>, with an

average annual growth rate of about 7.5%

②land-use structure changed a lot. Constructing area increased by 175 km<sup>2</sup>, reflecting fast and intensive of urban fringe development. In all kinds of urban land use type growth, the fastest growing is industrial land, followed by residential land and public facilities land

### (3)Develop projects style feature

In 1997-2009 comparing urban constructed map, as the dynamic urban fringe, analyzing the develop project style features. According to the above analysis result, industrial land, residential land and public facilities land are the three increase fastest land style. So, in this part, the article will study industry park, residential district and public service facilities these three kinds of develop projects. Specific data is as the form below.

Table 3. Shanghai urban fringe projects features

	NO	Project Name	Develop Squar(km2)	Administrate district
Industry park	1	Baoshan Industry park	29.09	Baoshan district
	2	Jiading Industry park	62.55	Jiading district
	3	Jiading Auto Industry park	22.66	Jiading district
	4	Xinzhuang Industry park	16.45	Minhang district

	5	West-suburb Industry park	16.73	Qingpu district
	6	Songjiang Industry park	63.73	Songjiang district
	7	Songjiang technology Industry park	4.09	Songjiang district
Residential district	1	Jiading New Town residential district	18	Jiading district
	2	Anting New Town residential district	8	Jiading district
	3	Qingpu New Town residential district	6	Qingpu district
	4	Xujing residential district	7	Qingpu district
	5	Songjiang New Town residential district	20	Songjiang district
	6	Minhang New Town residential district	12	Minhang district
	7	Chuansha New Town residential district	5	Pudong district
	8	Baoshan New Town residential district	8	Baoshan district
public service facilities	Campus	Songjiang college town	5.33	Songjiang district
		Tongji jiading campus	1.67	Jiading district
		Jiaotong minghang campus	3.33	Minhang district
		movie artistic college	0.27	Pudong district
	Commercial	Auto trade center	0.2	Jiading

				district
		Outlets	0.40	Qingpu district
	Entertainment	Meilan Lake golf club	2.25	Baoshan district
		Yingyi golf club	1.2	Jiading district
		Yintao golf club	1.33	Qingpu district
		Sheshan golf club	1.47	Songjiang district
		Zhongqi golf club	1.09	Minhang district
	Physical	F1 circuit	27.1	Jiading district

The urban fringe develop project features can be summarized up into two parts.

① Function feature

Shanghai urban fringe development project type mainly focus on industrial park, large residential area and city level public service facilities these three project function types. The city level public service facilities can be divided into college town, commercial facilities, entertainment facilities, sports facilities.

These city development project functions not only have large scale, but also strong functional characteristic. Its located in urban fringe area because of it has more abundant land resources, to improve the economic efficiency of the project; On the other hand, these functional project will build up large popularity in a certain time , easily to promote the whole urban fringe area develop.

② Traffic feature

Urban fringe expanding is relying on the urban transportation system. Different project’s major transportation type is different. Industrial park is facility with workers’ accommodation, in order to reduce commuting. Its main traffic type is freight and public transportation, and low dependency on public transportation. City large scale residential districts have to satisfy residents commuting requirements. Its main traffic type is public transport and private cars, high dependency on public transportation. Large public service facilities service wide scope area. The users income and traffic choice are very different. Its main traffic types for private cars and public transportation, relatively high dependency on public transportation.

Table 4. Shanghai urban fringe traffic features

Project function	scale	Main transportation	dependency on public transportation
Industry Park	large	freight and public transportation	low
Large scale residential district	large	public transport and private cars	high
city level public service facilities	medium	private cars and public transportation	relatively high

**2.3 Risk research of shanghai urban fringe development**

**(1) Risk research framework**

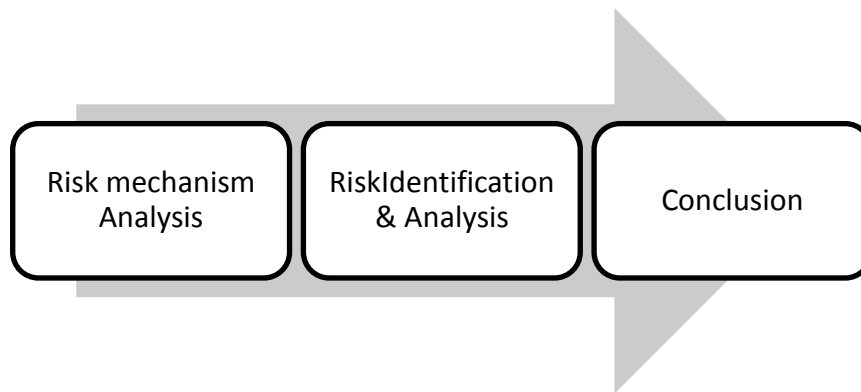


Figure 2. The risk study framework

The risk study framework can be divided into three parts:

① Risk mechanism analysis

The article analyzes the development mechanism of urban fringe area, based on urban development risk research framework, identified risk subject and risk type, in order to set urban fringe development risk management study idea.

② Risk identification & Analysis

Risk identification & analysis is a particularly important part in risk research framework. According to the risk subjects, from different perspectives to identify and analyze the impact of the risk.

③ Conclusion

According to risk identification and analysis results, combined with the Shanghai urban fringe area feature, the article made the summary.

**(2) The risk mechanism of urban fringe development**

Urban development projects often involves many interest groups, the effect mechanism is also very complex. Identifying the risk subject and risk mechanism is important to making scientific risk assessment and proposing management strategies.

Urban development project risk can be divided into the original risk and consequential risk. Original risk is the risk or problem which is caused by un-considerable thought or improper disposal. Consequential risk is the harmful influences and consequences to the surrounding areas because of the project development and construction. Different types of risk, the risk subjects are different. According to the urban development risk theory, urban development risk can be divided into economic risk, social risk and ecological risk these three categories. Based on the characteristics, they belong to original risk and consequential risk in different stages of urban fringe project development. Because the involved interest groups are different, the risk subjects are urban government, project developer, urban residents, etc.

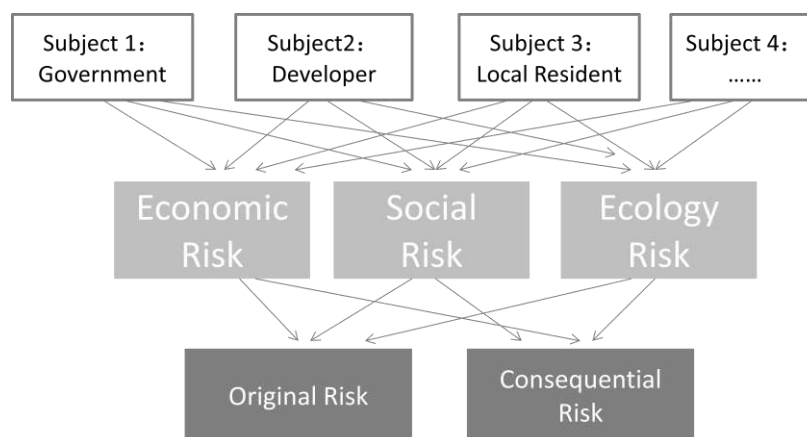


Figure 3. The risk mechanism

### 3 Risk Identify of Shanghai urban fringe area develop

Based on Shanghai urban fringe area development research, the article makes the risk identification of urban fringe develop projects features. The list of indicators are shown below :

Table 5. Shanghai urban fringe risk identification

Risk type	Risk categories
Economic Risk	Local Economic Standards
	Local Living Standards
Social Risk	Social safety and Harmony
	Social Culture
	Traffic Influence
	Service facilities impact
Ecological Risk	Landscape Standards

#### 3.1 Economic Risk

The edge of the city economic structure and internal has a big difference between cities, because in agriculture to non-agricultural change, its own economy structure is relatively single, and the level of economy are weak.

##### (1) Local Economic Standards

With the guidance of “Shanghai Comprehensive Planning”, the projects in urban fringe area are often good to local develop. The projects construction in urban fringe area will increase the popularity and influence in short time, promoting the whole

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area to develop, effects the local economic standards.

## **(2) Local Living Standards**

Projects in urban fringe area construction and operation will provide jobs, leading the improvement of regional income. Or, it will cause negative influence to local living stands.

### **3.2 Social Risk**

Project in urban fringe area development may lead the regional infrastructure, service facilities construction, and improve the social living quality. Because the residents living in urban fringe area is relatively complex, social sensitivity is high, and new projects will attract different kinds of people, which is very easily influent local social stability.

#### **(1) Social safety and harmonious**

City safety and harmonious is mainly evaluated from the following two aspects. Firstly, the new projects construction and operation will bring more traffic and complicated population structure, effecting regional security. Then is whether the projects cause conflict to resident. If the project safety is good and communication with local residents is well, it will promote regional security and harmonious

#### **(2) Social Culture**

Social culture is an important characteristic of city recognition, is also the key issue

in present city construction. Due to the geographical reasons, urban fringe area has both urban and rural culture features. And it formatted its own characteristics in the long time evolution process. The project construction attitude is determine the influence of social culture.

### **(3) Traffic Influence**

Urban fringe is located in the edge area of central city and rural. It's a certain distance to central city. With the construction and operation, the projects will attract many people distribution, leading much traffic dependency. It may ascend regional road traffic conditions, enhancing public transportation.

### **(4) Service facilities impact**

Urban fringe area project construction will promote the surrounding region as a whole to develop, complete the district public service facilities level. And the projects in urban fringe are often have a large scale, influencing local primary public service facilities system.

## **3.3 Ecological risk**

The project in urban fringe area often marks area landscape features, become the symbol image. As the transition zone from inner city to rural area, urban fringe has the relative rich natural ecological resources. In the project construction and operation process, a great quantity people gathering will threat the ecological environment in a certain degree.

### **(1) Landscape Standards**

Urban fringe area urbanization development will expand to the whole rural areas.



Therefore, how to manage them as a whole region to integrity development, make the image logo and driving regional landscape construction, not mechanization isolated-island effect, influence the fringe area ecosystem harmony and stability.

## **(2) Ecological Environment**

Urban fringe area is adjacent to the vast rural areas. It has the rural ecological landscape, such as large scale greenbelt, river system and undeveloped land resource. With the construction and operation of new projects, it may generate pollution, such as: noise, waste gas, waste, etc, cause negative influence. Meanwhile, projects operation will attract abundant people, threaten local ecological environment.

## **4 Conclusions**

As one of the most rapid urbanization area, urban fringe area has many obvious characteristics in land-use and project perspective. Through the research of Shanghai fringe area, analysis the features of space evolution, land-use structure and projects types. Combined with urban development risk research framework, making risk identification, and illustrates the economic, social and ecological three aspects risk.

Taking risk identification of urban fringe projects is good for local government to facilitate the related risk management measures, such as: risk aversion, risk and so on, in order to ensure the urban fringe healthy development.

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