Edge City's Formation and Growth Mechanism in China: Case Study of Yizhuang New Town, Beijing

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1 Introduction

The occurrence of rapid urbanization threatens sustainable urban form in all countries in the world, without exception, and it is a serious problem for China. In China, according to the rapid economic development, the issues of urbanization, industrial restructuring, and people's living standards are affecting the national, regional and local spatial structure. In particular, the urban pattern in mega-cities is being reshaped, and dramatic changes are happening in the suburbs.

As compared, Yizhuang is much like an 'edge city' which concept has been raised in the U.S. as Table 1 and Table 2 shows (Zhang, 2010). This paper will focus on the driving forces that have stimulated Yizhuang New Town's formation and growth will be analyzed in depth. This research focuses on three key driving forces i.e. government's development strategy, operation of market mechanism with Chinese characteristics, and upgrading transport modes, in order to explain the why and how such kind of city could be formed and developed.

Edge City		**Yizhuang New Town**	
Housing ⇩ Retail ⇩ Job	464,500 square meter leasable office spaces	No exact data available	Job ⇩ Housing ⇩ Retail
	56,000 square meter leasable Retail spaces	No exact data available	
	Job > Bedroom	√	
	perceived by the population	√	
	Was nothing like 'city' as recently as thirty years ago	√	
Mixed-use City		**Mixed-use City**	

Table 1: Results of Edge City Application

Technoburb		Yizhuang New Town	
Establishment of 'high tech' growth corridor ⇩ Movement of Office Bureaucracies ⇩ Movement of production -service employment	Peripheral Zone	√	Establishment of 'high tech' growth corridor ⇩ Movement of polluted industries ⇩ Polluted industries replaced by hi-tech industries
	Spread out along highway corridor	√	
	Metropolitan Shopping Mall and other facilities	√	
	All Housing Types	√	
Hi-tech Centre		**Hi-tech Centre**	

Table 2: Results of Technoburb Application

2 Introduction to Yizhuang New Town, Beijing

2.1 Basic Information

Yizhuang New Town is part of Yizhuang New Town Area , located in the south-east inner suburb of Beijing (see Figure 1), and one of the three major appointed new towns in the Beijing City Comprehensive Plan 2004-2020. The population of Yizhuang New Town was 260,000 in 2004, and it is estimated to grow up to 700,000 by 2020. The rapid growth is largely based on the migrants who move out from the city centre.

As Figure 2 shows, the total area of Yizhuang New Town is 212.7 square kilometers which includes 81 square kilometer in Daxing District and 131.7 square meters in Tongzhou District. Commonly, Yizhuang New Town is known as 'Yizhuang New Town Development Area', since it is within the Economic and Technological Development Zone (ETDZ) and plays a key role within this area, also the ETDZ gives Yizhuang a particular focus.

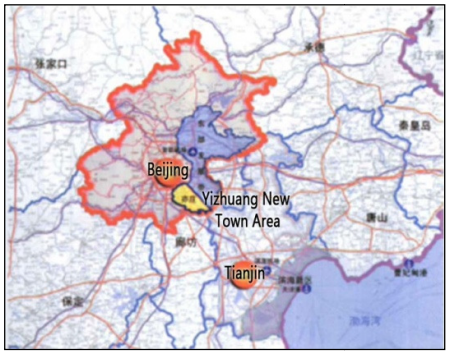


Figure 1: Location of Yizhuang New Town

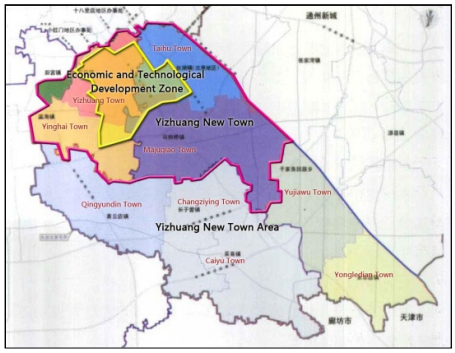


Figure 2: Identified area of Yizhuang New Town Area, Yizhuang New Town and ETDZ

As planned, the total area of the ETDZ is 46.8 square kilometers, which includes 30.6 square kilometers in Daxing District and 16.2 square kilometers in Tongzhou District. The ETDZ has been designated as a national level industrial park since 1991. The construction of the ETDZ was started in 1992, the first phase with 15.8 square kilometers (Hexin District) being completed in 2007. Based on this, it is planned to expand towards the east of Beijing-Tianjin highway with an area of 14 square kilometers (Ludong District) and towards the west of

Liangshui River with a planned area of 10 square kilometers (Hexi District) (see Figure 3).

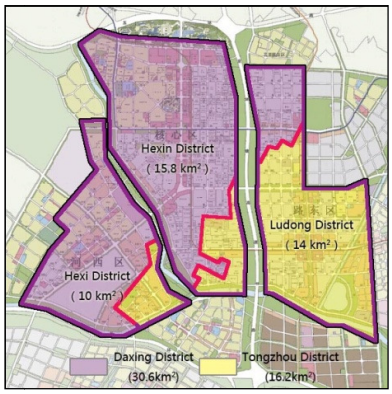


Figure 3 Economic and Technological Development Zone (ETDZ)

2.2 Land Use

The largest proportion of the land is currently for industrial land use, even occupying the core of Yizhuang New Town (the ETDZ). A growth of nearly 3.5 times in land being dramatically put into construction. Within this, the industrial land use increased percentage of 478.2%. Also, the proportion of land for residential, green space and public facilities had increased by 187%, 312.4% and 268.3% relatively. Until 2005, the land use distribution was about 44% of land for industrial use and concentrated in the ETDZ (BDA, 2007). In comparison, there is much less residential land use in the area, and the villages are dispersed.

2.3 Transport

Yizhuang New Town has a great advantage in accessing the key transport nodes. As Figure 4 outlined, Yizhuang is located between Fifth Ring Road and Sixth Ring Road at the south-east of the city center, which is only 25km and 4km from the Beijing Capital International Airport and Nanyuan Airport, and 12km and 7km from the Beijing Railway Station and Beijing Cargo Railway Station. From a regional perspective (Beijing, Tianjin and cities along Bohai Bay), Yizhuang New Town connects to Tianjin Port, which is a distance of 140km away.

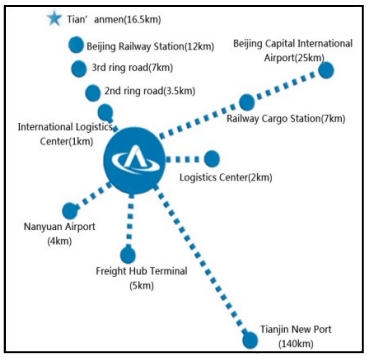


Figure 4: Yizhuang New Town's Accessibility

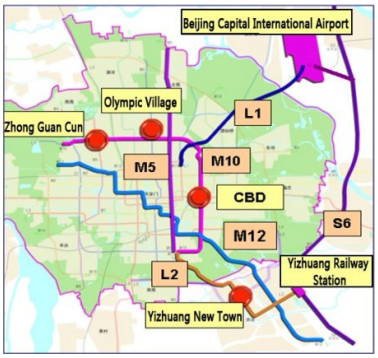


Figure 5: Transport Network Plan

Furthermore, as planned, Yizhuang New Town connects to the Beijing metro network (see Figure 5). A new metro line called Yizhuang New Town Light Rail has completed.

3 The Driving Forces of Yizhuang New Town's Formation and Growth

According to this research, the author believes that there are three key driving forces: first, the government's development strategy to stimulate growth in such areas; second, market mechanism in a Chinese context; third, the upgrading of transport modes brings significant physical support to stimulate the Yizhuang New Town's formation and growth.

3.1 Government's Development Strategy

Until 1980, the 'Chinese City Planning Minutes of Meeting' promoted a strategy to 'control development in big cities, develop medium and small cities and towns' which had been approved by the State Council of People's Republic of China. This was in order to effectively accommodate people moving out from the city centre and migrants from rural to urban areas. With the promotion of contract reform (chengbaozhi), loan system (bogaidai) and tax system formed up (ligaishui), a large number of small cities and towns have dramatically developed, and most of them close to big cities. To some extent, this means substantial progress for decentralization. Statistically, the number of new cities increased from 300 to 517, new towns increased from 6,211 to 11,985 between 1984 and 1992. Most of the industrial parks are allocated at the edge of the cities because of a plentiful supply of cheap land for purchasing, which contributes to the implementation of decentralization.

The city of Beijing has been suffered 'overcrowding' for a long time, and the concept of decentralization could not be effectively implemented until the 1980s. Following the strategy to 'control development in big cities, develop medium and small cities and towns' and the boom of industrial parks, the Beijing City Comprehensive Plan 1991—2010 approved new towns to encourage the dispersal concept.

In a view of such a background, with Yizhuang New Town's great location (along Jingjintang industrial corridor linking Beijing, Tianjin and Tanggu) and physical condition (suitable for developing a built-up area), Yizhuang New Town is a place which is perceived to have begun as an industrial park and has undergone a few stages of development during its growth. In the Yizhuang New Town Functional Positioning, Development Aims and Comprehensive Development Strategy Research (2003) document, Yizhuang New Town's development history is summarized, pointing to the government's willingness to invest and plan at an early stage. As such the author has summarized the up-to-date situation from the recent major plans. There are five steps:

First of all, in 1992, Beijing Municipal Commission of Urban Planning originally appointed and approved Yizhuang as an industrial park with a first phase of 15 square kilometres. More than 75% of land was set aside for industrial use, and it would accommodate 150,000 people. In the next year, Beijing City Comprehensive Plan 1991 – 2020 identified the east and south part of Beijing as the strategic development area. Yizhuang was appointed to develop as one of

the 14 satellite towns to accommodate those industries moving out as well as people, though there was nothing physically and economically valuable in Yizhuang at that time. From then on, it was named Yizhuang New Town. Most importantly, a hi-tech corridor has developed between Beijing and Tianjin – this implies the trend of industrial agglomeration development, which will bring huge development opportunities to Yizhuang New Town.

Second, in 2002, Beijing Municipal Government pointed out that Yizhuzhang New Town is a hi-tech centre of Beijing, and it was important to stimulate its growth in terms of its great physical environment, strategic location and preferential policies. It was hoped that expanding Yizhuang New Town as a growth engine would stimulate development in the surrounding area.

Third, in 2003, the Beijing Urban Spatial Development Strategy Study pointed out that Yizhuang New Town needed a development branch of the municipal government to ensure a high quality of coincident management in the area. Since the rapid economic development in Yizhuang New Town, the conflict of interest among the different political administration becomes critical. This currently creates huge management difficulties in the area. The Study proposed setting up Yizhuang New Town District with an administrative area of 500 square kilometers. As the area covers the ETDZ, this creates huge difficulties for management in the area.

Fourth, in 2005, Beijing's 11th Five-Year Plan proposed to develop Yizhuang New Town into Beijing's 'major area of high-value-added' manufacturing and headquarter economy'. The aim is to create a high-tech zone that links the global market and further build an industrial belt in the southeast of Beijing.

Fifth, in 2006, the Beijing City Comprehensive Plan (two axes, two belts and multiple centres) proposed to develop three main new towns on the east belt. Besides its relatively mature development and great location advantages, Yizhuang New Town was the most suitable one to be appointed as a hi-tech centre for the car industry, electronic industries, medicine industries, logistics and so on

3.2 Market Mechanisms in a Chinese Context

3.2.1 Land Dynamic

As known, before market economy reform, government played the most important role in any field, and government-led development was the driving force for all economic activities. Without exception, urban growth depended upon the government's willingness to invest. At the time, since land was a public property, there was no land market (i.e. no market forces), and any land use changes or transfers were all administrative decisions (Zhang, 2000). Therefore, the government organized all planning activities such as industrial relocation and rehabilitation.

Since the introduction of market reform, the economic value of land has been fully recognized. Until today, although land in China still belongs to the state, a land market has been created

and land use rights have entered the market, under the policy of separation of use rights from ownership (Yeh and Wu, 1996). In order to deal with land use rights legally, the land leasing system, which means 'paid transfer of land-use rights' (tudi youchang zhuanrang), was made official by an amendment to the Constitution of the People's Republic of China in 1988 as a tool for changing and transferring land use. Government is no longer a ‘leader’ in the age of marketization, and land has begun to make profits not only for government, but also for real estate developers as well as individuals. The profit for such different interest groups enables land market forces to influence building location choices and construction activities.

Relatively, in government’s decision-making structure, a measure of devolution has been introduced in China, which means central government passes more decision power to local governments and enterprises. In this sense, local governments and enterprises have more concerns about local land use regulations and individual financial decisions (Zhang, 2000). This means that central government will largely reduce the financial provision to local government, as well as interfere much less in the land use issues. Therefore, the local developments are forced to seek resources and are largely concerned with economic action for ensuring their own finance. More than this, many local governments are ambitious to achieve a GDP growth rate that can be recognized as a political achievement. Under such conditions, a strategy of economic-oriented development has been adopted by many local governments, but with little consideration of long-term consequences.

Land leasing fee, much rather than land tax, is becoming the key tool for local governments to generate revenue. Once the system has been formulized, it brings huge profit for local governments while areas experience an exponential growth in development and construction activities (Xue and Zhou, 2007). Now, the profit from land leasing has rapidly grown and is continuing to grow. Realizing the huge profits from land leasing, with construction activity being necessary for the urban growth, local government plays a very active role in land leasing to generate revenue.

As discussed, in the economic transition, government’s role has been transformed from a ‘leader’ to one of the most important key players, together with real estate developers and individuals, in urban growth. Due to land market forces, greater entrepreneurial edge in attracting investment, raising revenue and stimulating economic activities has been introduced in the Chinese context, in which the state and municipalities have already proven to be highly entrepreneurial (Wu et al., 2007). Government becomes a means to provide indirect support for land development, rather than provide capital directly. Therefore, how the government could attract investment for development is a key issue, particular foreign investment in China. Eventually, land leasing has become the main ‘income’ for government.

In the case of Yizhuang New Town, before the 1990s, the development was constrained by the complex boundaries. Since the government appointed Yizhuang as an industrial park at the beginning of the 1990s, and stimulated by the land leasing system, Yizhuang has boomed, having experienced industrial suburbanization, housing suburbanization and retail suburbanization.

3.2.2 Industrial Dynamic

Industrial suburbanization begins with industrial relocation led by government plan, in order to improve the environmental quality in the core. Therefore, particular polluting enterprises were forced to move out from the centre to the suburbs. Coming into the market-oriented era, the rate of industrial suburbanization has accelerated rapidly. It is different from government-led factory relocation. Under the land leasing system, many enterprises are more willing to relocate in the suburbs by themselves. Because the land leasing system significantly increases the compensatory payment to the enterprises, this can help the relocated enterprises to obtain more money from the land transfer to support their moving and redevelopment (Feng et al, 2008).

At the beginning of 1990s, some polluting and labour-intensive industries have been planned to move into Yizhuang (appointed as an industrial park at the time). Such enterprises were happy to move out from the core, as they were getting less profitable and unable to afford the expense in the core anymore. More importantly, the relocated enterprises could obtain the support for their moving and redevelopment from the government financially. There was a large amount of compensatory payments for those companies according to land leasing system, but it is difficult to figure out the exact amount, as most of the factories closed down a few years ago.

In fact, the upgrading position of Yizhuang in the government's growth expectations does help the replacement of industries. The policy of economic development zones and high-tech industrial parks in the suburbs makes industrial location more attractive (Feng et al, 2008). The newly settled industries are required to be less polluting and high value-added hi-tech industries. Both those enterprises moving out and new settled enterprises could obtain more money for improving the production through technical innovation. In order to attract foreign investment, one of the most important preferential policies is that of providing cheap land for preferred uses, which is greatly welcomed by Yizhuang New Town Government. There are two reasons for hi-tech industries wishing to settle here. First, the land in Yizhuang is much cheaper than the core; second, the great location alongside Jingjintang hi-tech growth corridor.

In order to generate high revenue from the enterprises, Yizhuang New Town government is very active in attracting foreign investment through strengthening the land leasing to offer cheaper price for the land, even providing land free of charge. Until the end of 2004, there were 45 world top enterprises that had entered the ETDZ, with foreign investment of 11 million US dollars for each project. This had created up to 300 million US dollars foreign investment for each square kilometer. For a typical example, Zhang disclosed that in order to attract the manufacturing of world famous car Mercedes Benz to settle in the ETDZ, the government offered land nearly free of charge to the enterprise, then Beijing Benz-DaimlerChrysler Automotive Co., Ltd established in 2005, with up to 2 square kilometre in Hexi District at the southwest corner of the ETDZ.

3.2.3Housing Dynamic

In Yizhuang New Town case, construction of affordable housing was the start point of housing development, which aimed to relocate low-income households and low-end workers. At the beginning of the 1990s, due to the number of factories relocated in the industrial park, accommodation for workers was urgently needed. At that time, work state unit was the solution to unify working and living (Gu et al., 2005), this means factories were responsible for providing accommodation for workers. Later in the 1990s, factories have been replaced by hi-tech enterprises, meanwhile, low-end workers have been trained in vocational school to improve their skills, then upgraded to be technical workers. However, relatively, there is large number of such technical workers, who still belong to 'low-income' groups.

In Yizhuang New Town, as the affordable housing is much less profitable, the government has relied on cooperation with real estate developers to provide public rental housing, as additional conditions to the developer who is purchasing land for high-end housing development. The government provides the land nearly for free to real estate developers to build affordable housing with great subsidies. In truth, real estate developers have to accept this, otherwise, they can not purchase land for high-end housing development. For instance, Beijing BDX Investment and Development CO. LTD, purchased land in the northeast corner of the ETDZ (Ludong District of the ETDZ) for mixed-types housing (including villa, town house etc), which has been included as a last element in the urban design process. Before this, the company had to agree to provide a Youth Hostel area (in Hexi District) for more than 10,000 people, occupying 110,000 square kilometres, of which construction finished in 2003.

On the other hand, high quality housing is getting more and more popular in the suburbs. Since the 1990s, Beijing's GDP massively increased with GDP per capita rising from 194.5RMB in 1990 to 4761.8RMB in 2005 (Beijing Statistics Bureau, 2007). People were getting much richer and seeking a better environment in which to live. In particular, the upper middle class prefers to live in higher standard houses rather than basic accommodation. In this context, the villa projects, which target affluent people, are very popular in the housing market. In terms of the increasing demand and widening price difference between the core and the suburbs, real estate developers promoted high quality living in the suburbs in competition with the crowded, noisy and polluted core area, which involved minimized land cost and maximized profit

3.2.4 Retail Dynamic

Following the suburbanization of industries and housing, retail sectors have appeared in the suburbs since the 1990s. In the early 1990s, the evolution of retailing systems in Beijing showed that the distribution of retailing centers began to expand to suburban areas (Chai, Shen and Long, 2007). This significantly marks out increasing self-containment in the suburbs, as retail is a key factor in local residents' daily lives. Since the appearance of residential and industrial suburbanization, the demand of retail sectors for land in the suburbs has eventually increased, simply because people prefer convenient life rather than frequently commuting to the core.

In Yizhuang New Town, it is seen that there are some retail shops are located together with the housing at the northwest of the ETDZ, but there is lack of detail to prove exactly when and why such shops appear here. Zhang explained that since the housing development came here, retail shops also emerged. Following the growing number of housing units, the number of shops also increased, then bigger shopping centres also emerged. However, it is only possible for the retail sectors here to satisfy local residents' daily need, with commuting to the core for some goods and more choice still being necessary, according to Zhang.

3.3 Upgrading Transport Modes

The upgrading of transport modes has continued, meaning a much larger commuting area in different periods. As Figure 6 shows, different transport modes can, to a large extent, have an effect on the commuting area. As the upgrading of transport modes in different ages ha progressed i.e. walking and carriage, electric bus, car and highway, the commuting areas have expanded relative to the new centre. Meanwhile, it also provides a great opportunity to readjust the relationship to the adjacent core cities. This provides the physical base for the government's decisions and real estate developers' choices as well as enterprises' location choices. Achieving one step forward in transport modes can cause two main changes, one is people's travel behaviour; the other is the urban form.

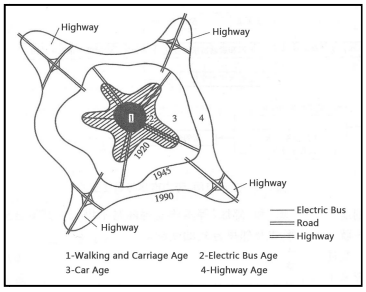


Figure 6: Transport Mode Effects Urban Form

3.3.1 Change of people's travel behavior

In Beijing's case, there are three aspects of transport reform which deeply reflect on people's travel behaviour i.e. improvement of accessibility, increasing car ownership, and appearance of high-speed vehicles. Such improvements to transport modes largely contribute to suburbanization, particularly in relation to nodes with great transport facilities.

Figure 7: Beijing City Centre Transport Network Plan

Improvement of accessibility, particularly road construction, between the core and suburbs has been enormous. The enhanced accessibility from the suburbs to the core has been achieved by the comprehensive ring roads and arterial roads that have been gradually completed since the 1990s. In detail, by 1990, the second and third ring roads had been completed, and by 2004 the fourth and fifth ring roads had been completed, with the sixth ring road under construction. Since the 1990s, more than ten arterial roads radiating from the core to the suburbs in Beijing have greatly increased the accessibility of the suburbs (Feng, et al., 2008), see the comprehensive transport network in Figure 7.

The boom of car ownership fundamentally changed the behaviour of more prosperous social groups' travel. The number of private motor vehicles rapidly increased from 7,148 to 1,798,407 between 1987 and 2005. The indicates that at the end of 1980s, the number of private car ownership was low, which implies that car travel did not play an important role in commuting to the core and suburbs. Since the continuous and rapid increase of car ownership, commuting by private car is becoming a major factor in journeys between the core and suburbs. In fact, to some extent, the preference of car travel stimulates the high-end housing projects, such as villa developments in the suburbs.

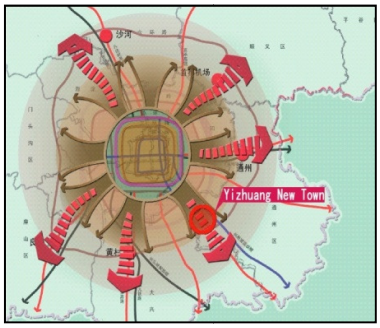
Furthermore, with the completion of construction at the end of 2007, the Jing-jin inter-city rail only takes 30 minutes from Beijing (North Station) to Tianjin (Tianjin Station), with stops at Yizhuang New Town, Yongle, Yangcun (see Figure 8). The improvement of accessibility between the two major cities, has largely stimulated real estate development at Yizhuang New Town, and such a node becomes more and more convenient to commute for work, living and entertainment. Therefore, more and more people are willing to live and work in Yizhuang New Town.

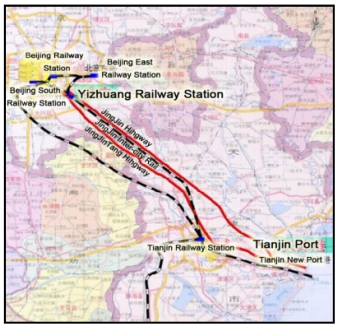
Figure 8: Jing-jin inter-city rail

3.3.2 Change of Urban Form

From a city point of view, upgrading transport modes is constantly reshaping the urban form. Indeed, the scale of commuting area is extremely dependent on the transport mode. Furthermore, it is now the highway age which is resolving the connection problem between the centre and the suburbs. Meanwhile, this will stimulate development for the nodes that lie alongside the highway. The relationship between centre and suburbs is getting more decentralized and compact in terms of the transport linkage, which is one of the most important elements to implement the polycentric urban form.

The Beijing City Comprehensive Plan 2004 - 2020 states the 'two axes, two belts and multiple centers', which is overwhelmingly based on the transport condition of internal and external links (Figure 9). In the case of Yizhuang New Town, one of the multiple centers, this has great transport infrastructure, with particularly efficient links to the city of Tianjin. There are three routes connecting Beijing and Tianjin, with direct access into Yizhuang New Town (Figure 10). In a word, such excellent transport conditions have enabled Yizhuang New Town to become one of the most competitive places for location of economic activity, which concerns the issue of location patterns influenced by location choice (Beckmann, 1968).





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3.4 Summary

Overall, the formation of Yizhuang New Town started with industrial relocation organized by the government's strategies, and its growth has boomed with real estate development under market forces. As found, Yizhuang New Town enjoys the advantage of government strategies and market forces that work towards the same direction, with the huge support of upgraded

transport modes. Concretely, under the growth of market mechanism, local government's role is becoming that of a 'steal leader', cooperating with developers through land leasing in order to ensure their own financial receipts and to stabilize local economic growth (Figure 1). In Yizhuang New Town, local government is proactive in attracting real estate developers and hi-tech enterprises by offering cheap land and preferable policies, while real estate developers and hi-tech enterprises are keen to locate here in order to maximize profit.

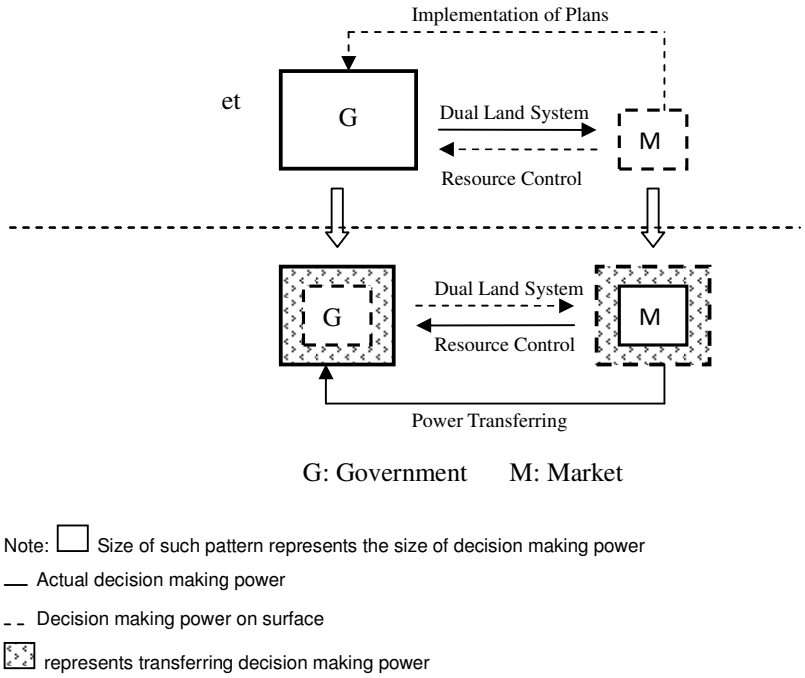

Figure 11: Relation between Government and Market for Yizhuang New Town's Formulation

4 Conclusion

In the era of fast forward, edge city is an important and potential place to release the center's pressure, so detecting its formation and growth mechanism is very important.

For the key driving forces of Yizhuang New Town's formation and growth, government development strategies, operation of market mechanisms with Chinese characteristics and upgrading of transport modes have been analyzed in depth. This is helpful to understand the emergence and growth of edge city in China, which also helps to explore the real function of such city that will be able to serve the center in the fast growth.

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