Research on Industry & City Coherence in Planning and Development of New Generation Hi-tech Park

PARALLEL 1

Parks and cities - Intelligent systems and infrastructures

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Abstract：In May 1988, the first State Hi-tech Park in China was founded under the permission of the State Council of China. By far, there are 105 state Hi-tech Parks in China, which contribute a lot to the successful development of hi-tech industry. But due to the industry selection statics, and economic development conditions of the Hi-tech parks in the early stage, industry is only emphasized in the planning and development, which causes a lot of problems. The thesis is about to review and examine the history of planning and developing schemes of Hi-tech Parks and to explore and study, by analyzing a specific case, the necessity and importance to adopt industry & city coherence concept in planning and developing Hi-tech Parks in China.

There are 105 state Hi-tech parks in China and Shenzhen Hi-tech Industrial Park is one of the best among them. Shenzhen Hi-tech Industry Park occupies 11.5 square kilometers but its output was RMB 470 billion Yuan last year. Shenzhen city has been attaching great importance to Hi-tech industry and Hi-tech parks. This year, Shenzhen city is going to plan and build a new Hi-tech park, namely, Liuxianddong Hi-tech Park. The thesis, based on the development experience of old Hi-tech Parks and the updated concept of the new Hi-tech parks, explores and study the necessity and importance to adopt industry & city coherence concept in planning and developing Hi-tech Parks in China.

1. History review of industry & city relation of Hi-tech Parks in China
    1.1 History review
Hi-tech Parks in China are special zones, demarcated by the Chinese government on the verge or suburb of economically developed cities or cities with abundant science, technology and education resources, for the purpose of developing hi-tech industry. Generally speaking, the development of Hi-tech Parks can be divided into two phases, according to the difference of development notion and scheme. The first phase is approximately from 1988 to 2000, during which Hi-tech Parks authorities considered the development of hi-tech industry as a priority in the planning and developing Hi-tech Parks. To focus mainly on industry development and ignore, to a great extent, those services a city should provide, such as: education, inhabitation, entertainment, etc. is referred to as Industry & City Incoherence. The second phase is from 2000 to today. The planner and decision-maker of Hi-tech Parks realized the Industry & City Incoherence scheme could not satisfy the needs of further development of Hi-tech Parks. Thus, a new development scheme, namely, Industry& City Coherence, which emphasizes the integration of industry development and human needs, and the integration of park, campus and community, was taken into consideration and enforced in the development and construction of Hi-tech Parks.

    1.2 Industry and City relation in the first phase

The first phase of Hi-tech Parks development is characterized by Industry & City Incoherence. The Hi-tech Parks in their first phase, targeting at international industry transition of primarily hi-tech manufacturing industry, were congregated by low & medium-end labor. The Hi-tech Parks in that phase focused mainly on industry land supplication and adopted single-functioned and industry-oriented planning and development schemes so the economic scale of the said Hi-tech Parks can be rapidly expanded and construction cost can be considerably reduced. Due to great industry land occupation and low & medium-end labor congregation, the Hi-tech Parks planners tended to utilize a little land for some affiliated living facilities or took advantage of the facilities in the urban area connected by public transportation systems to satisfy the living and inhabitation needs of labor working in the parks. Therefore, the land for developing industry occupied the majority area in Hi-tech Parks, with a little land for some affiliated apartments and canteens. Other services common in urban areas, like medical care, education, and entertainment etc. are basically unconsidered.

1.3 Impact of the second phase of Hi-tech Park development on Industry & city relation

After more than ten years of hard work and effort, some advanced Hi-tech Parks in China set off to forsake low-end hi-tech manufacturing industry, while taking the use of global IT industry transition, to promote industrial upgrading and restructuring. At the turn of the 20th century, six advanced Hi-tech Parks in China announced to build internationally first-class Hi-tech Parks, which symbolized the second phase of Hi-tech Park development with a key word of "innovation". In this phase, Hi-tech Parks in China highlight the following properties:

1.3.1 Industrial upgrading and restructuring

Ten years of development of Hi-tech Parks witnesses higher general cost, stricter environment policy, less land and fewer natural resources. Apparently, low-end hi-tech manufacturing industry in some advanced Hi-tech Parks is no longer able to survive in the parks and has to, on its own will or with the guidance of the Chinese government, transfer to other parks or inner land, which leaves room for the development of high value added, and high growth industry[1]. The new industry, require high innovation ability, is known as Knowledge Industry.

1.3.2 Better structure of human resource

Knowledge Industry is highly innovation-driven. Its product is intellectual property. Knowledge Industry, rather than traditional manufacturing one, needs much less heavy equipment and space but attach much importance to attracting and sustaining a large group of professional, high-end and talented people. In 2011, in all the state Hi-tech Parks, there are about 46 million people who hold master degree, 5.4 million people who hold doctorate degree and 5.3 million who are overseas scholars returning to China to set up their career, 12% people working in the State Hi-tech Parks hold senior or mid-level professional titles and more than half people working in the State Hi-tech Parks graduated from college. Blue-collar workers decreased rapidly, golden-collar, while golden-collar, white-collar workers are the

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[1] Shenzhen Hi-tech Industrial Parks, one of the most famous State Hi-tech Parks in China, established as early as in 1996, issued its Optimization and Upgrade Plan last year. By improving the innovation ability, optimizing industry structure, enlarging room for industry development and providing better environment and facilities in the park, the relation between industry and city can be more harmonious and the park may march into a higher development level.

main human power in Hi-tech Parks, especially in those advanced H-tech Parks.[2]

1.3.3 Pleasant environment

A pleasant environment is a key factor for attracting high-end talented people and producing valuable knowledge and idea. The advanced parks in China have taken many measure to improve its environment, for example, workshops are demolished; beautiful office buildings are constructed; bars, coffee houses, luxury restaurants are provided, convenient traffic system within the park is accomplished, more green land are available. The management of the advanced Hi-tech Parks spares no effort to take every measure to allow the talented experts and their families to work, study, live in the parks.

1.4 Industry & city coherence is a must for sustainable development of advanced Hi-tech Parks in China

Industry & City incoherence planning and development scheme caused a lot of problems for the Hi-tech Parks that marching to the second phase of development, one of them is a phenomenon called "ebb and flow": the park is energetic in the daytime while empty in the night, traffic jam is constant in rush hours, restaurants are unwilling to serve in the park because the demand for lunch exceeds supply but there is no demand for supper, no social services and no living facilities. This development scheme can no longer satisfy the needs for upgrading the industry structure and fostering the innovation ability of the enterprises in the parks. Furthermore, the traditional mode is criticized for being inefficient in land using, poor in public space providing, single in construction mode (investment and construction is solely made by the government).

Referring to the experience of globally famous Hi-tech Parks such as: One-north in Singapore, the success of advanced Hi-tech Parks lies in attracting people of innovation ability, who have very high requirement of living conditions, medical care, education, entertainment, and other public services and facilities, which traditionally can only be found in the downtown of a city. Only can those Hi-tech Parks both suitable for hi-tech industry development and pleasant for talented people's staying survive the fierce competition.

2. Analysis of Industry & City Coherence

2.1 Concept of Industry & City Coherence

In this thesis, industry refers to industry development and land for industry use. City means services that a city can provide, like living, public services, public facilities, etc. Industry and City Coherence refers to the combination of the development of industry and provision of city services in the planning and construction of hi-tech parks, which are aiming at new industry such as Knowledge Industry, namely, the treatment of industry development and city services as an interactive, organic integrity. The principle of industry & city coherence is the coherent development of human, industry and city; mutual promotion of industry development and city services; harmonious coexistence of social, humanity and ecology.

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[2] In order to recruit more overseas Chinese experts, who are strategic scientists, leading experts in science and technology, or internationalized innovative teams capable of achieving critical technological breakthroughs, advancing the high-tech industries and promoting new disciplines, to come back to work in China, **Recruitment Program of Global Experts** has been implemented for several years. Many of the experts recruited are working in Hi-tech Parks.

2.2 Features of industry & city coherence

Generally, a Hi-tech Park, if it is an industry & city coherence one, tends to shift from merely industry development to both industry development and human's development, from cluster layout to compound layout, from a relatively close system to an open system, from single-functioned industrial park to multi-function park.

2.2.1 Human-oriented

Human is of top priority because human resource is the most prominent asset of industry & city coherence parks. The idea of harmonious coexistence of human and nature, human and society, human and human is embedded in the planning, construction, running and management of parks. Human needs of every kind are taken good care of in the parks.

2.2.2 New Industry

Industry development is the ground and basis for Hi-tech Parks. According to the resource endowment and previous industry foundation, one or two environment-friendly, high-end, high value-added and hi-tech industries or namely knowledge industry can be selected as the leading industries. According to the special requirement of the selected industry, the authorities of the Hi-tech Park tend to actively establish a robust growth ecology system for attracting or fostering leading enterprises, together with some other supporting enterprises, which forms an enterprise cluster. The core competence of this kind of industry is innovation, knowledge, and patent, rather than machines, land, factories.

2.2.3 Multi-function

Hi-tech Parks of industry & city coherence are not merely an industrial zone, which traditionally believed to be so. They are neighborhoods and communities with mixed function, in which people can work, research, live, shop, and entertain. Research & development offices, headquarters office plus apartments, shopping malls, libraries, schools, hotels, culture centers, trainings centers, sports cents, entertainment facilities, and so on are available in the park.

2.2.4 Completeness and openness

In the park, the public service and facilities are complete and a self-support system is established so it is convenient to live in the park. But the park is not a close one. With a good infrastructure, the park is open to all the information flow, material flow, and capital flow in and out of the park.

2.2.5 Economic and intensive land use

The new hi-tech industry represented by Knowledge Industry makes it possible to use less land or space to create more value for the Hi-tech Parks of industry and city coherence. At the meantime, the new hi-tech industry needs less heavy equipment installed so the workshops of enterprises in the park is not restricted to the first floor, which make it very likely to build more high office buildings and save more land.

2.2.6 Beautiful environment

The Hi-tech Parks of industry & city coherence appear to be garden-like, with large coverage of green land. The natural beauty is reserved and no pollution is allowed. People living in the park can enjoy fresh air, clear water and blue sky.

2.3 Measures for promoting industry & city coherence
2.3.1 Planning

The industry planning, urban planning and land use planning of the Hi-tech Park are compiled under the guidance of industry & city coherence concept. The above said planning is interdependent and interactive for the purpose of directing and coordinating landing allocation and using, construction, development scale, function, objective, and so on. Once the planning is ready, all the development and construction of the park should be strictly in accordance with the planning so that all the expected objectives can be fulfilled.

2.3.2 Efficient administrative organ

An efficient and simple administrative organ is one of the outstanding labels of Hi-tech Parks who are aiming at industry & city coherence. It is responsible for providing necessary public service, such as: planning, industry selection, preferences, investment in public sector, etc. and making sure all the enterprises are equally enjoy the service. Usually, one-stop administration centers are set up to provide the majority of public services, saving a lot of time and effort for enterprises of the parks. The organizational structure of the administrative organs is prominently flat so the decision-making is quick and the needs of enterprise can be responded timely.

2.3.3 Market orientation

Traditionally in China, the construction and investment of infrastructure in Hi-tech Parks were made by government. While in the industry & city coherence Hi-tech Parks, the majority of construction and investment of facilities is made by enterprises of all kinds by means of BT or BOT. So the facilities of the Hi-tech Parks can be built in full scale and at full speed. Market plays the decisive role in capital raising, land distribution, construction, etc.

2.3.4 Enforcement and inspection

The planning, policy, regulation and law are enacted and compiled. Every participator of the Hi-tech Parks can easily reach the said planning, policy, regulation and law. The government and nongovernment organizations are taking full responsibility to make sure all the planning, policy, regulation and law are efficiently enforced. The park is under inspection of the government, media and public opinion, etc. so no unlawful activities are tolerated in the park.

3. Case study – Liuxiandong Park, an industry & city coherence park

3.1 Location and geological conditions

Liuxiandong Park is located in Nanshan District, Shenzhen City, Guangdong Province, China, with a land area of 285 hectares. It lies 5 kilometers to the north of the state hi-tech park – Shenzhen Bay Park.
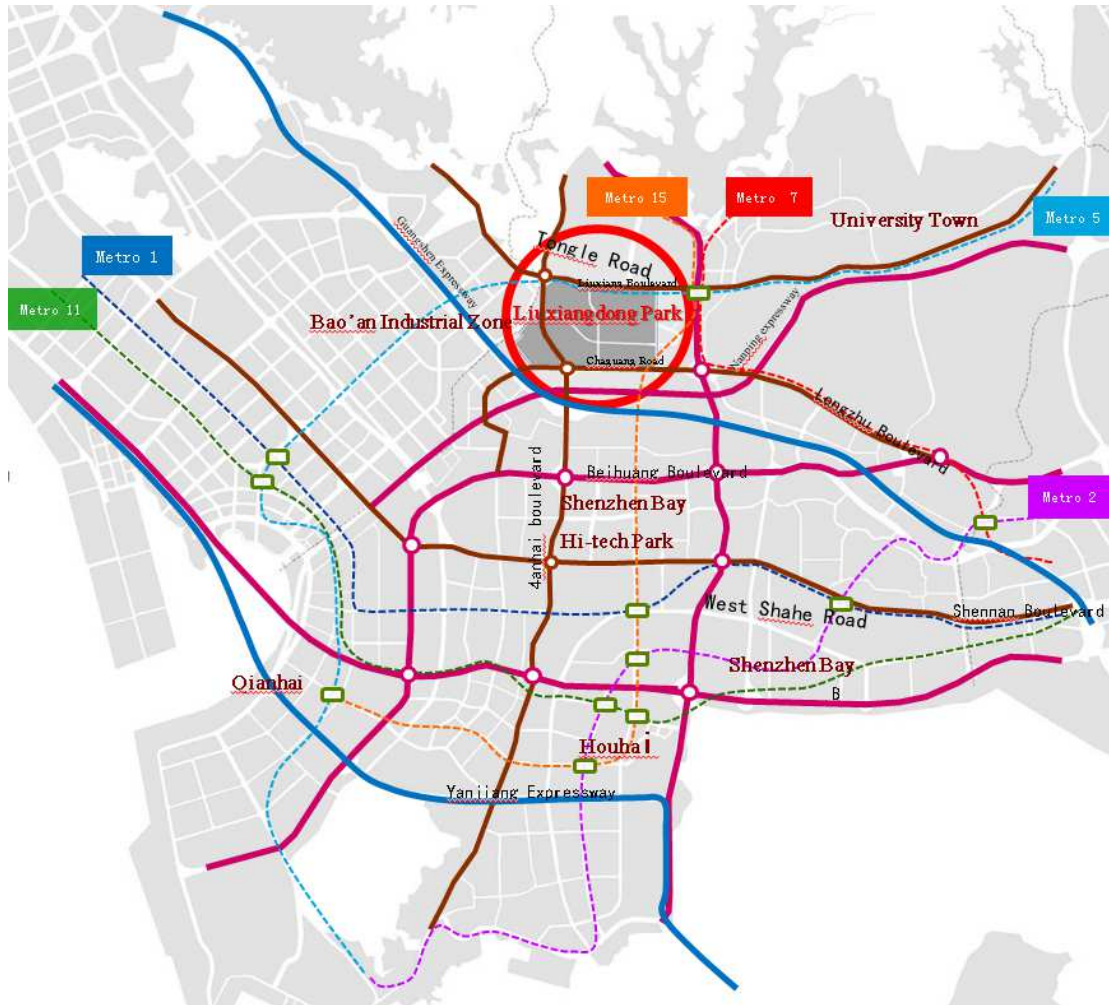
Fig.1 Location of Liuxiandong Park

3.2 Industry Selection

Shenzhen is known for her strong IT industry, which has high prestige of the most complete industry chain and the most active innovation. Leading enterprises like Huawei, ZTE, and Tencent, just to name a few, are all based in Shenzhen. Therefore, IC design, Internet, Cloud computing and hi-end software are selected as leading industries of the park.

3.3 Objective

The objective is to build Liuxiandong Park into a new generation park in accordance with the concept of industry & city coherence, which is an integration of humanity ecology, industry ecology, and environment ecology; an integration of park, campus, and community; an integration of intelligence, intellect and talent; an integration of land capital, industry capital and finance capital.

3.4 Detailed Schemes

The realization of industry & city coherence in Liuxiandong Park lies in the scheme of "one axis, three boulevards, and six neighborhoods":
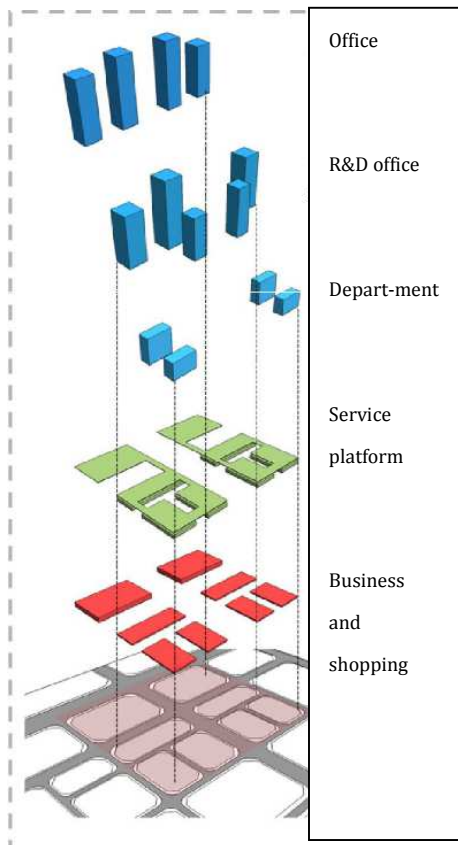
3.4.1 Six neighborhoods

The park is divided into six separate neighborhoods. The six intensively built neighborhoods are the highlights of the park. Each independent neighborhood provides business offices and R&D space, together with some shopping stores, garden and entertainment facilities. At the
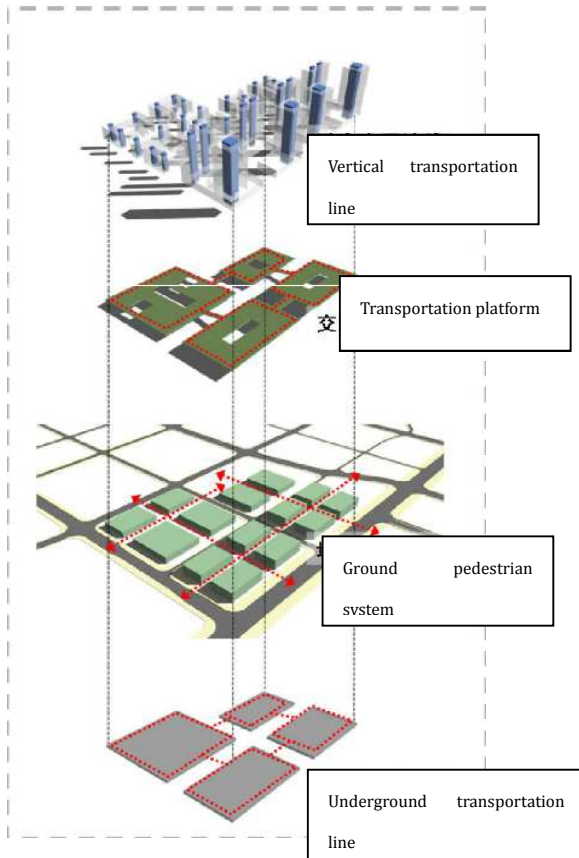
meantime, the basement, the ground floor and the roof platform of each building in the neighborhood are in one way or other linked on its own level. Therefore, the neighborhood becomes a multi-level, multi-function, compound, three-dimensional block.

Fig2. Neighborhoods

Office

R&D office

Depart-ment

Service platform

Business and shopping

Multi-function, vibrate and mixed neighborhood

Vertical transportation line

Transportation platform

Ground pedestrian system

Underground transportation line

A neighborhood with levels of tower, underground ground, and platform

3.4.2 Three boulevards

There are three high-quality boulevards in the park, linking the six neighborhoods like three ribbons. Along the three boulevards, green, ecological and leisure service and entertainment facilities are provided. Only 5-minute walk, people from anywhere of each neighborhood can reach the boulevard to enjoy the services provided there. And it takes only 10 minutes to walk from the boulevard to the nearby mountain park or sports center.

Fig2. Boulevards

3.4.3 One axis

Along the middle line of the park, libraries, hotels, restaurants, culture centers, training centers, shopping malls are ready to serve the needs of the people living in the park.

3.4.4 Distribution of space

The total floor area of the park is 4500-5000 thousand square meters. It is planned that there are 350 thousand square meters for offices (making up 68-71% of the total), 500 thousand square meters for apartments (making up 10-11.1% of the total), and 450 thousand square meters for service complexes (making up 9-10% of the total) and 130 thousand square meters for living facilities (making up 2.6-2.9% of the total).

Fig3. Distribution of space in Liuxiandong Park

3.5 Characteristics

The outstanding characteristics of Liuxiandong Park are as follows:

3.5.1 Highly intensive development and multifunction

The park is multifunction, because it is not only an industrial zone but also a city. And the land use is efficient because of highly intensive development.

3.5.2 High quality, green and slow

Quality and environment protection is highly emphasized when building the park, for the purpose of attracting high-end talented people to work in the park.

3.5.3 Overall service provision

Overall service is provided to satisfy the needs of enterprises and their employees.

3.5.4 New construction mode

The land in the park is allocated by unit. A unit is a neighborhood with full facilities.

4、Conclusion

Human-oriented, sustainable and harmonious development is more and more valued not only in the developed countries but in developing countries. As the analysis and the case study show, those Hi-tech Parks, if don't switch its development schemes from solely focusing on industry development to coherent development of human and industry, will eventually lag behind. New generation of Hi-tech Parks industry & city coherence, which is an integration of humanity ecology, industry ecology, and environment ecology; an integration of park, campus, and community; an integration of intelligence, intellect and talent; an integration of land capital, industry capital and finance capital, are the trend of future development of Hi-tech Parks.