Research on Development of Urban Space Layout in Yangtze River Delta in Information Age

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Abstract

At present, with the continuous development of the Internet, influence on the city's economic and social development is increasing and the importance and urgency of optimizing urban space layout has become increasingly prominent. Like the beginning of the last century, the Industrial Revolution brought a major change to the world, the information revolution also profoundly changed the world. Information technologies such as internet of things and transducers become mature gradually and provide new opportunities of urban development, and also have a significant impact on urban spatial structure. This article is from the perspective of development of the Internet to research the development trend of urban space layout, emphasizing the need to optimize the layout of urban space, analyzing the current situation of urban space layout of the Yangtze River Delta, and make some suggestions for optimizing the layout of urban space of the Yangtze River Delta.

Keywords: information age, urban space layout, the Yangtze River Delta city group

1. Introduction

Information needs, technology development and user experience on the pursuing business continuously are the main driving force of the development the evolution of the Internet. In recent years, the integration of industrialization and information as well as the rise of applications such as video services, cloud computing, networking and other technology, especially the rapidly growing popularity of mobile Internet, have triggered a new round of development of the Internet boom. The pace of city development continues to accelerate in recent years, and also the scale of development increases. In the process of urban development, good planning and adjustment of urban space layout plans and arrangements are related to the city's various constructions and related to the prospects for the development of various undertakings in the city.

Information development of cities is an inevitable trend in the worldwide, information technology not only changes people's way of life and production, but also has a huge impact on the economic structure and social structure of the city. In order to adapt to urban economy and changes in the social structure in the information age, urban land distribution, settlement patterns, transportation and other changes accordingly, and result in development and evolution of the spatial structure of the city as a whole. Unreasonable layout of urban space reduces city's functions, making the expansion of urban areas and suburban areas be limited, access inconvenience influence the population, business, and social activities seriously. Urban planning is the basis for urban construction and management. A scientific, rational and predictable construction of urban planning can guide the direction, development priorities and scale of the city, then predict the spatial layout and good urban planning, make countermeasures ahead of problems that may arise during city construction and urban development, organize and coordinate relations well in all aspects in advance, to create a harmonious and comfortable living environment for residents.

2. The Future Development Trend of Urban Space Layout in Information Age

Changes that information technology makes to the way of life and production will directly change the social and economic structures of the city. In order to adapt to changes of city's economic and social structure in information age, regional structure, land use, housing, transportation, industrial and other urban space will make a corresponding change.

Information and Internet technologies affect the layout of urban form on the following areas:

● Development Trend of Urban Outside Space

In information age, the network reduces the time space away from the city and the region, city and cities, enterprises distribution can be spread and miniaturized, so that it can make urban development decentralized, small and medium, and form an open, web-based and multi-centered, competition between cities, complementary and synergistic relationship will replace the traditional hierarchical relationships. Future regional spatial structure of the city is toward the development trend of group city clusters, coexistence and mutual control effect between cities should be strengthened gradually, the divisions of city functions are increasingly clear. Group city clusters base on the area space, including both the well wealth-accumulated city and relatively low-level country. Group city clusters are on the basis of a regional city gathering, considering more personalized value of urban agglomeration, or develop from the overall positioning of the era of economic globalization. This trend is more emphasized on top-level design, focusing on the integration of overall function between urban agglomeration and urban within the groups. In this huge urban agglomerations network system, the highest-level city is the growth pole of city clusters, has a strong radiation function for the entire region, including gathering place of senior industry and place of new industries, it is responsible for the dominant function of entire regional economy development, but it is also the core node to communicate with the outside world, it is the intersection of culture, economy, technology. However, other cities also bears the supplemental features for the central city, not only bears support roles on central city in manufacturing industries, but also the backing that central city attracts a variety of favorable factors.

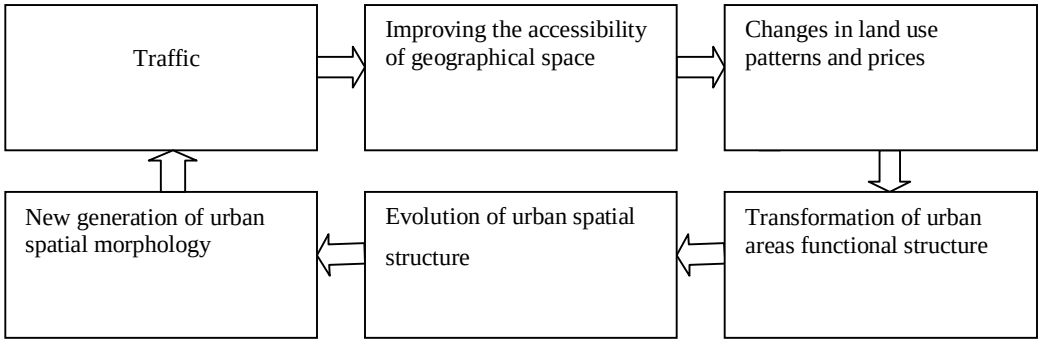
● Development Trend of Urban Interior Space

(1)Structure of urban land is the combination way and state of various functions within the city, and it is the space performance of urban social structure and industrial structure. Urban space constitutes the change of various elements, it will inevitably bring about the evolution of urban land spatial structure. In information age, social division becomes more and more serious, companies appear scattered and miniaturization trend, enterprise management sectors are in centralized areas, the production sectors are decentralized to the outer suburbs. The development of big cities, make conflicts of shortage of land increasingly acute, and lead rents and land prices rise rapidly. In the downtown area, not just building is dense, space is limited, and environmental quality is very poor, but land price is ten times higher than the suburbs'. This force urban development to find a way outside the area, outskirts which have lower land prices and better environment quality are the ideal place for urban residents and industries proliferation. Development of computers and new electronic communications technologies, increase the flexibility of location and other functions of modern industrial activities, favorable conditions of outlying areas attract government investment and private investment and form a new trend of suburbanization. Suburban and central areas of the city become the city's active zone in information age, urban spatial development is in the state of whole dispersion and local gathering. Emphasize spatial agglomeration --- change decentralized state, to form a reasonable urban system and powerful urban centers; emphasis on coordination division --- implement a rational allocation of resources and functions; emphasizes resource sharing --- take advantage of information technology to build public platform, implement infrastructure and public service facilities sharing, to achieve maximum efficiency of financial resources; emphasis on environmental quality --- improve the quality of life and ecological, take advantage of technology-related information such as the big data and internet of things and to enrich and improve the facilities, create a good living and production environment and realize sustainable development of cities.

(2) Economic globalization and information technology lead the emergence of a new multi-center city within the city group: network city, they are two or more independent but complementary (even if the spatial distance is far) city in the support of high-speed traffic and communication networks, fight for economic and social cooperation. Network city opens up new urban space-- city cyberspace, it is different from the living space, commercial space, physical space in real life, but two kinds of virtual and physical space can interact, people can use cyberspace to engage in material and spiritual cultural activities that engaged in physical space before. The layout of interior space of the city develops from a single center to a multi-center. Since information networks can transfer any text information, including statistical data and images between network users easily, make remote economic activity of the city and working life possible, achieve network employment through information highway, the community of outskirts is not only a traditional living center, but also the commercial centers and employment centers, these communities have a typical urban functions: housing, employment, transportation and recreation and so on.

The biggest difference between multi-functional complex communities and traditional communities is not only living function, but also a variety of other complex function at the community space. The residential development model rely on the information highway and rapid transit route to exchange material and information, focus on creating a fully function internal, pleasant environment and living environment, commerce, parks, public facilities should be designed inside appropriate walking distance, enhance the vitality and diversity of the community. Apart from the city center, the other more remote areas can also form small community centers that have more perfect functions, which can ease the pressure of city centers.

(3) The most important factor that restricts urban expansion is the spatial distance, one important result of urban transportation development is enhancing the accessibility of the space which is far away from the downtown area. Progress of information technology and extension of transportation facilities, greatly weakened the urbanization friction of spatial diffusion process caused by distance, and drive single urban space develop toward the regional level, and promote the development of satellite towns. Continuous development of the Internet, the next 30 years there will be intelligent transportation. Intelligent transportation system will improve the information capacity of the road system, including sensing, information gathering and information dissemination firstly. Secondly, enhance configuration ability of public transport resources significantly, including configuration of roads, buses and taxis that Traffic Management Bureau does, traditional intelligent traffic has made significant progress in this area. Thirdly, that traditional intelligent transportation do not cover completely is that user feedback of traffic information. For example, users can not only receive traffic signals, they can also send traffic demand via mobile phones. If a train in the field of urban transit is demanded more, the system can configure more buses, even it can be achieved that when I stand on the bus station, the system will automatically identify the needs, so that we can achieve that the supply side and demand-side integrate into transport information system, make information interaction possible, and realize information transparency.



Mechanism Figure of Transportation and Urban Spatial Structure

3. Status and Necessary Analysis of Urban Space Layout of the Yangtze River Delta

3.1 Status of Urban Space Layout of the Yangtze River Delta

1. Administrative division between cities result in the lack of effective coordination mechanisms in function, fragmented and local protectionism still exist. When they faced with choice between local interests and overall interests, local governments rarely put themselves in a overall consideration, often get more places at the expense of global interests, result in decreased coordination between urban functions. Suburbs of Shanghai and some neighboring towns of Jiangsu and Zhejiang become "economic blind spot" due to weak economy. Complementary functions between other cities and Shanghai between do not play the role fully, group-type mesh function is not maximized, mainly reflect on unreasonable area industry specialization and seriously redundant construction, economic ties between Jiangsu and Zhejiang are too weak. Despite each city only considers their own sake, rarely put themselves into the whole city group of Yangtze River Delta, so resources between cities can not be shared, rates of resource allocation are relatively low.

2. Shanghai as the core city and future world city plays a dominant function in this region, the function should be further improved. Division of administrative regions and the special performance weakened Shanghai's radiation function; relative to the city core of the rest of the world's five largest cities, Shanghai's own economic strength is still weak, the industrial structure should be further improved, the proportion of tertiary industry in Shanghai is low, modern service industry does not developed well, and therefore radiation function is very limited.

Two vice-grade central city of Nanjing and Hangzhou, although they position in the secondary service centers, the radiation function to city around is limited, city status develop to downward trend. Industrial gradient transfer space has not yet formed, limits radiation function of the urban agglomeration on the surrounding region's economic. Insufficient gradient transfer in surrounding areas not only limits the contribution to China's economic development through the region, but also limits the space for industrial development and upgrade within the region.

3. Too much low-level development of traditional industries result in environmental resources pressure increased, air pollution, water pollution and solid waste pollution has become more serious, with the process of industrialization, rapid urban development, a large number of reinforced concrete buildings erected. Behind the prosperity of economic development, our environment is under tremendous pressure: a large number of mineral resources have been excavated, "three wastes" emissions exceeded, the sustainability of economic development faces enormous challenges.

Shanghai in city group of the Yangtze River Delta urban environment pollution data sheet in recent years

	The amount of waste generated(Ten thousand tons)	The total amount of waste water discharge (million tons)	Total industrial emissions (million standard cubic meters)
2008	841	22.60	10436
2009	870	23.05	10059
2010	890	24.82	12969
2011	1142	19.86	13692
2012	11728	22.05	13361

Source:《 Shanghai Statistical Yearbook》

3.2 Necessity of Optimization of City Group Space Layout of Yangtze River Delta

1. City Group Space Layout Optimization of Yangtze River Delta is Chinese Urbanization Need

Yangtze River Delta is located in China's coastal areas, developed areas along the intersection of the Ministry, it has an obvious location advantage and economic strength, Shanghai which is the core city is one of the world's largest cities. The population of Yangtze River Delta city group is close to the number of world-class cities in North America, Western Europe and Japan. Yangtze River Delta state is one of our country's fastest growing economy and the fastest growing urbanization areas, have basic conditions of becoming world-class city group. Space layout optimization of Yangtze River Delta city group can accumulate experience for exploring space optimization of china, providing demonstrations for the construction of China's urban group.

2. Urban space Optimization of Yangtze River Delta is the need for China to Promote Industrialization

Yangtze River Delta, as China's largest manufacturing base, if take advantage of geographical advantages of neighboring Japan and Korea fully, attract Japanese, Korean and international industrial transfer, it is possible to move to a world-class manufacturing base. Modern cities are the products of industrialization, in manufacturing center of the world, often appear dense urban areas as the main form of urban group. If Yangtze River Delta wants to build a world-class manufacturing base, it must have world-class giant urban agglomerations as a carrier. Optimization of industrial space layout of Yangtze River Delta city group is a necessary step to for building a world-class manufacturing base.

3. Space Layout Optimization of Yangtze River Delta City Group is the Need of Promoting International

Core competitiveness the contemporary world focus on cities, complexity of urban spatial structure, relative stability, change and concealment, warn us that optimizing the structure of urban space is very important. Optimization of urban form will change the city's image and status in the world and country, attract tourists, residents and business investment.

4. Optimization Strategy of city Group Space Layout of Yangtze River Delta in Information Age

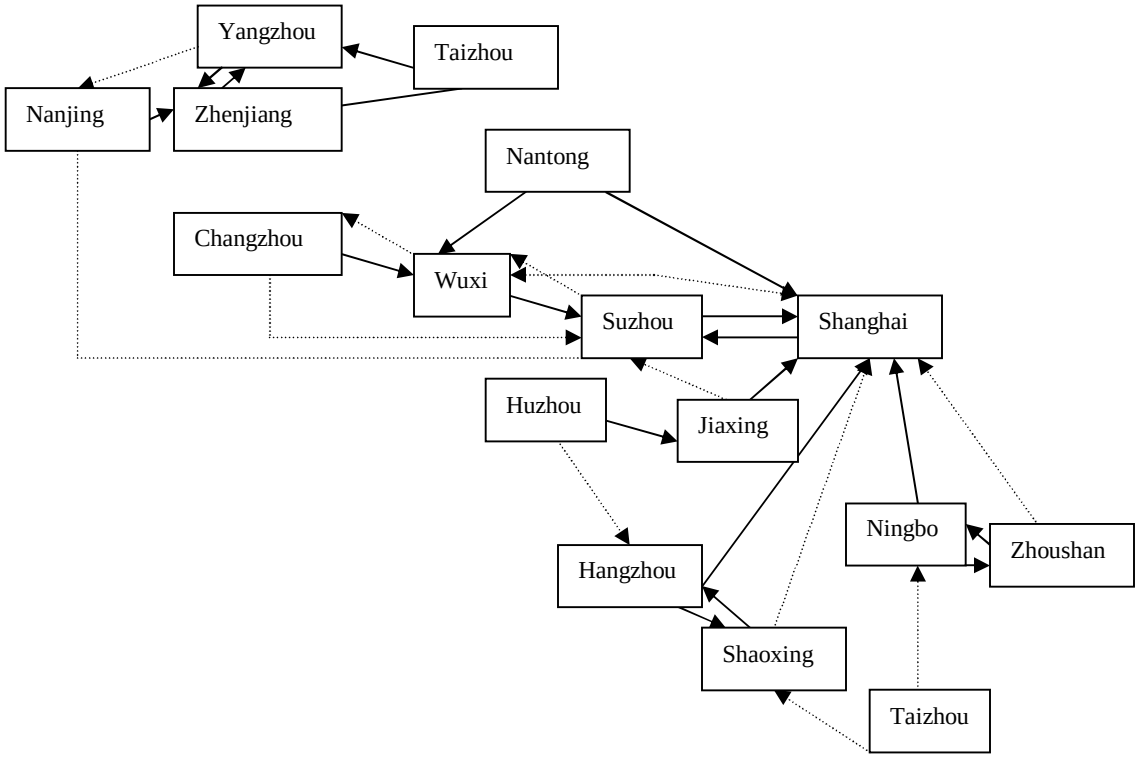
4.1 Industrial Space Optimization of city Group of Yangtze River Delta

In Yangtze River Delta city group, Shanghai is the core of the city cluster, so it bears the mission of coming into the international market, participating in international competition and leading the regional economy to achieve leapfrog development.

From the outside space of industry, the coordination of industrial structure between Shanghai and other cities in the Yangtze River Delta city group should be further improved. In addition, as the core of the Yangtze River Delta cities and foreign trade port, Shanghai also bears the responsibility of meeting the global industrial chain transfer and leading the Yangtze River Delta industry to integrate into the global value chains better. In 2012, Shanghai's GDP accounted for only 3.9% of the country, plus Jiangsu and Zhejiang only accounted for more than 20% of the country, so Shanghai must coordinated Jiangsu and Zhejiang provinces to play a leading role in China's economic development.

In recent years, Shanghai appears that modern service industry develops worse than advanced manufacturing, services' supporting role in the manufacturing sector is relatively weak, while resulting in Shanghai and surrounding areas compete for manufacturing, and also resulting in duplication of competition, affecting the coordination of entire industrial structure of Yangtze River Delta urban agglomerations. Jiangsu and Zhejiang has always been strong in manufacturing, they have more advantages than Shanghai in many ways. so as a whole, Shanghai should be located in the service industry and high-tech industries, Jiangsu and Zhejiang generally act as manufacturing role as back-up force of Shanghai, to achieve the optimal allocation of resources.

Spatial Structure of the Yangtze River Delta City Group



Source: 《Study of Spatial Economic Structure of Yangtze River Delta》

As can be seen from the space diagram of Yangtze River Delta city group, Shanghai, Jiangsu and Zhejiang region have formed a good momentum rolling, especially between Shanghai, Suzhou, and Wuxi. Some scholars define by measuring the intensity of the Yangtze River Delta cities, and point out that Nanjing, Hangzhou, Wuxi, Changzhou, Suzhou and Ningbo can develop to the central city of regional economic integration in addition to Shanghai. It can promote the development of the surrounding towns through the central city, then stimulate economic development of the region.

4.2 Accelerate the Transition from a Nuclear to Multi-Core Inside the Yangtze River Delta City Group

Layout of single-core city cause many environmental and social problems. For example cars are large and increasing, factories are intensive, resulting in more serious air pollution and noise. Cities have the problems of land tensions, land prices, the lack of various types of land for expansion, small green area, vehicle congestion, traffic jams and so on. Cities should focus on the development and move toward multi-core mode in the future. The so-called multi-core refers to the formation of multiple centers in the inner city, changing the previous urban layout of single-core.

Since information networks can transmit statistical data and images, including any information easily between network users, make remote economic activity of the city and working life possible, some sectors of the city's service move out from the center of large cities, migrate to the urban fringe areas or low-cost metropolitan areas. Strengthen the multi-purpose community building, which covers the community shopping, employment, health care and large playgrounds and other features, it can make people meet their basic living needs in their communities. Take advantage of advanced information technology of internet of things and big data to build paperless medical system, realize electronic medical records, so they can see a doctor when patients are at home. So, building many multi-purpose communities, forming many sub-centers, we can ease the pressure of downtown, ease road congestion and traffic jams further.

4.3 Strengthening New Urbanization Road Construction of the Yangtze River Delta City Group

In recent years, under the guidance of the scientific concept of development, small towns of Yangtze River Delta region regard urban and rural development as their goal, innovate the ideas of development, early entry into the connotative urbanization development stage and have accumulated invaluable experience. However, under the context of significant changes of the international economic environment and domestic macroeconomic policies, there is still a gap from small towns of Yangtze River Delta region to the new urbanization standards. Therefore, facing the objective reality, exploring science road of new urbanization deeply, will have a special significance for sustainable and healthy development of small towns in the Yangtze River Delta. Small towns of Yangtze River Delta region should speed up the process of efficient large-scale agricultural development, improve agricultural productivity. On this basis, adhere to the guidance of the concept of industrialization, boost the industrialization of agriculture, change agricultural disadvantage and low income status, achieve purposes "wealthy farmers". Establish a sharing network platform of information resources of Yangtze River Delta region for the integration of resources, towns of Yangtze River Delta can make use of this platform to communicate with other towns to learn advanced strategies, policies and implement measures of other towns. Strengthen coordination mechanisms of Yangtze River Delta city group, technology. Macroeconomic development problems of talent and capital of cities, including resource allocation, major infrastructure, urban segregation of duties and industrial layout should be unified to plan and manage.

4.4 Yangtze River Delta City Group Stick to the Road of Sustainable Development

Yangtze River Delta is the scarcity area of China's energy and resource, relying on external resources for a long time, there are many people but few land in the region. In recent years, rapid economic development, and extensive development mode of high input, high pollution and low output result in the lack of energy and resource supply. We should improve emission standards, deepen resource and prices reform, establish and improve the eco-industrial development mechanism in the city group of Yangtze River Delta continuously; guide the main industry to adopt green development model, promote clean production, improve resource recycling, minimize waste discharge and gradually form a first-class green industrial economy; strengthen environmental regulation with the help of Internet technology, make use of a variety of water quality sensors, gas sensors, cameras to form the whole surveillance equipment such as solar panels and battery power, take advantage of CDMA wireless communications network to transfer data, monitor air pollution, water pollution and solid waste pollution all the time to protect people living in a healthy environment; Take reasonable measures of sewage compensation, try to reduce energy consumption and pollution from the source. In addition, we should implement the environmental infrastructure, strengthen the comprehensive treatment of industrial pollution; should follow the principle of "overall planning, scientific development", consider the production and infrastructure of living environment, construct environmental infrastructure facilities at a high standard. Make use of renewable energy and other advanced energy-saving technology to protect ecological environment of the Yangtze River Delta city group and realize sustainable development.

Epilogue

Long-term plans of urban development and the direction of urban development are inseparable from urban planning. Under the guidance of sustainable development path, the development of urban should integrate industrial layout, functional layout, infrastructure and sustainable economic to ensure harmonious urban and orderly development. This article points out the outstanding issues of spatial layout of the Yangtze River Delta city group during the development process, and makes corresponding optimization strategies. These strategies showed important guiding significance in urban science planning, economic development, human settlements and urban energy conservation and other aspects.

References

Pan Shiwei. The Construction of Innovation Driven World City——Research on Shanghai "Twelfth Five-year" Development Planning [M]. Shanghai：Shanghai People's Publishing House，2011.

Wang Chuncai Zhao Jian. The Study on the Interaction Mechanism between Urban Transportation and Urban Spatial Evolution [J].Urban Problems，2007（6）:15-19.

Shanghai Urban Planning and Design Research Institute. The Land Use Spatial Development Strategy Study on Shanghai[R]. 2009.

Shanghai Urban Planning and Design Research Institute. Study on the Relationship between Shanghai Spatial Form and Traffic Development[R].2012.1.

Shanghai Urban Planning and Design Research Institute. Research on Shanghai Population Development Forecast Based on the Land Use[R].2011.

Shanghai Urban Planning and Design Research Institute. Shanghai Overall Planning of Land Use Planning[R]. 2009.

Shanghai City Comprehensive Transportation Planning Institute. Annual Report on Shanghai Comprehensive Transportation[R].2010.

Shanghai Urban Planning and Design Research Institute. The Modification Argumentation of Shanghai Overall Planning[R].2010.