

Research and Prospects of Urban Morphology Evolution in the Information Age

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Abstract

The evolution of urban morphology was usually seen as a response of human science and technology in different periods. Firstly, as a crucial area in future, information technology would be closely associated with the evolution of urban morphology. Then, based on six aspects: relationship between urban and rural, regional differences, city scale, the central area, spatial relationships and inhabitation form, the article was discussed about the possible changes of urban morphology in the information age – the decline of metropolis, the desalination of regional differences, the enlargement of city's bearing scale, the contraction of the center area, the disappearance of space barriers and the mixed autonomous community. At last, the author prospected the future trend of urban planning discipline after a review on the development of modern urban planning since the middle of the 19th century.

Keywords: the information age; urban morphology; urban planning; evolution.

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Based on the advantage of capacity, speed and efficiency, computer has greatly enriched and changed human beings' lives during last 30 years. Considering the continuously popularity of computer throughout the world, a number of scientists, most of whom even called this century "the information age", predicted that information technology would bring a revolution in the way of human beings' production and living as what steam technology ever did in 18th century.

1. The coupling of urban morphology and information technology

The evolution of urban morphology was usually seen as a response of human science and technology in different periods. For example, Borchert(1991) divided the development of American cities into five periods: pre- railway era, "iron horse" era, trams era, auto/cheap oil era and jet/electronic communication era. As we see in China, Japan and other countries, although human beings' requirements for space retain a lot in physiology and psychology, the present morphology of city is completely different from the past.

(*1)



Figure 1: The historical map of Paris

The foundation for the formation of city is concentration, through which human beings can take all kinds of public activities, such as communication, security and trade. Carmona(2002) divided the revolution of city into 3 steps: 1. as the place where market located; 2. as a center of industry; 3. as a center of modern service and consumption. Now, the significance of city is its provision of public space, to satisfy people's requirement – "appearing in the same place at the same time"(Oldenburg, 1999). Generally, the scale of old cities was small for walking before the mechanized traffic tools appeared. After the industrial revolution, the city's scale increased sharply and the space distance got shortened mentally as a result of widespread use for train and bus.

However, the most obvious difference is that physical concentration is not necessary for internet any more. Just as William Mitchell(1994) said "information technology would make people liberated from the limit of space and time". It seems no matter where you are, the distance with anybody was the same. If we realize the importance of information technology in future, its effects on the urban morphology would be inevitable. Unlike those visual inventions, it may bring a more radical change. As computer is getting prosperous all over the world, any hesitation could cause a huge loss just like our past ignorance for environmental issue in many regions. So, it is necessary to research with discretion in response to the information age.

2. The characteristics of urban morphology in the information age

The information technology's influence on urban morphology would vary a lot, such as the changes of city's size, height, density and so on. Manuel Castells (1989) put forward that the computer network would become the basis of city life as the streets and screen space would be valuable as the real estate. In the next section, these changes were divided into six aspects:

2.1 The decline of metropolis

German economist Alfred Weber established an urban planning theory in his famous book – *Theory of The Location of Industries* in 1909, with an emphasis on industrial agglomeration can bring effective industry competition and resource sharing, thus resulting in an economic benefits increase. The theory partly explained why metropolis could get a rapid prosperity and why people migrated from rural area to city in China (China's urbanization rate increased almost 30% in past 30 years).

(*2)

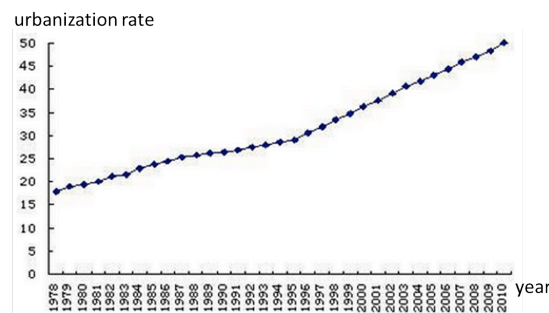


Figure 2: The change of China's urbanization rate from 1978 to 2010

However, this phenomenon is likely to reverse because of the development of information technology. The requirement for spatial concentration would be replaced by network platform without time and space restriction, while small cities obtain development opportunities due to the advantages of land, environment and labor price. There are two things happening worthy of attention in China: the industrial transfer from east to west and the development of electronic commerce and logistics industry (The transaction amount of e-commerce increased by four times from 2010 to 2015), which would be impacts to big cities.

(*3)

Based on the experience of Beijing and Shanghai, after a rapid development in last several years, environment and housing problems began to burst, and the advantage of education, health, employment got weakened either. What we did only in metropolis previously can take place on internet now, such as purchasing luxury goods, joining clubs, listening to the concert and so on. When small cities rich in living space and healthy environment are contrasted with the blocked and polluted metropolis, the difference is apparent.

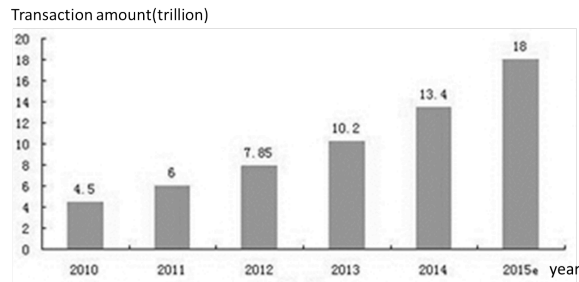


Figure 3: China's e-commerce market size from 2010 to 2015

2.2 The fade of regional differences

Regional culture suffers from the information globalization. At first, most of local features would be exhibited without concealing in internet database. If you want, any feature can be found in a few seconds, and it's hard to image what kind of culture wouldn't be known in future. Then, pioneer designers and academic authorities would have led the trend that others follow, and architects begin to search for "standard answer" via digital technique instead of referring to the regional culture. Finally, cities are likely to become a mixture of international culture created by designers from all over the world. In fact, it is what we called "world culture" that no longer belongs to a single country.

(*4)

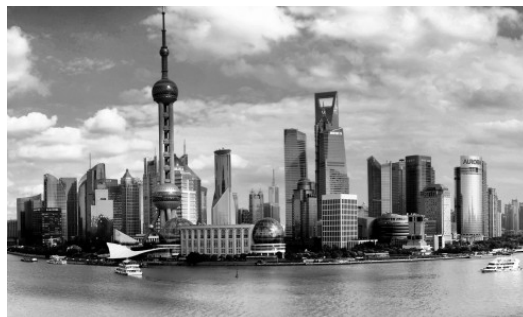


Figure 4: The image of Shanghai, China

It is certain that some architecture samples would appear in the information age just like we met the box building with modernism technique in 1920s. Those old forms in response to local climate and landform would be replaced by new technology and symbolization. For example, in Incheon, Korea, where the 2014 Asian games were just held, architects are designing "the information architecture" which meets the needs for the integration of lives. However, while virtual space becomes increasingly important, it also would be a question – "how much passion do people have for physical space?", which urges us to consider what we need from culture indeed.

(*5)



Figure 5: Modernism architecture designed by Le Corbusier

2.3 The enlargement of city's bearing scale

Generally, city's bearing scale was related to the means of transportation. But in the information age, something might be different. On the one hand, the demands for concentration are reduced by network. People no longer need to choose their residence considering the distance with CBD or factory. By contrast, living environment seems more practical. When "the tall building competition", occurred in Dubai, Shanghai and any other places, is ended as the result of the economic factors in one day, cities might expand outward in 2d space instead. Just as what happened in Mexico City recently, the value of city was reflected in providing equal living conditions.

(*6)



Figure 6: The expansion of Mexico City in 2d space

On the other hand, it is possible to take instant communication via Electronic equipment, thus helping people to work at home (what we called "SOHO") ignoring the commuter factors. Compared with face-to-face communication on transportation cost and pollution, network communication seems more cheap and low carbon. The more digital technology progresses, the less the advantages of face-to-face communication would be. It is indicated that the proportion of online communication in people's life is increasing. If the existing communication space is less attractive and urban population remains constant, the suburb would be a potential growth area.

2.4 The contraction of the center area

Accordingly, information technology reduces people's reliance to the city center. Unlike the suburbanization of American cities, European and Chinese cities kept relatively concentrated for plenty of relics and customs. A large number of commercial service facilities and business offices been provided, people preferred to live in the center area emotionally. Then, the population agglomeration and high land

prices prompted to vertical development of construction activities. For example of Xinjiekou district, Nanjing, as the most active district in the city, its construction is 3 to 4 times size of the around.

With the development of e-commerce industry, the traditional commercial space especially in the center area was severely squeezed. According to the statistics of PwC, China had hit the top of online shopping proportion in the world during 2008 to 2013, which made traditional bricks-and-mortar grocery stores suffer a serious defeat. At the same time, the administrative, health, and education departments also reduced their demands for space, and some of them even began to handle official business on the internet. The failure of Aggregation Theory would lead to the contraction of the center area, and three changes in terms of urban form are predictable: flattening of the downtown skyline, new construction instead of original open space, disappearance of the border between core and around.

2.5 The disappearance of space barriers

Once upon a time, city was divided into several isolated units by all kinds of entity borders, from which citizens could get a sense of security. In a way, the flow of urban space only occurred in the public space, such as streets, squares and parks, which hindered the communication of people. However, some space with fences, like university campus, was not used adequately. Compared to the fence, the electronic monitoring and face recognition systems can fight crime more effectively. Then, the information technology would make all pieces of urban space as a whole, and the broken and negative places would be replaced by flowing space.

(*7)



Figure 7: The split to city caused by fence

As a widely accepted method in modern urban design, functional partition is that designers give land a certain property, so as to organize and manage the construction activities. From a traditional view, a clear functional partition was conducive to strengthening citizens' communication and saving the cost of transportation. However, it is ignoring the complexity of city and imposing barriers in space that makes the method in question. On the contrary, the necessity of functional partition is denied in the information age. What information technology encourages are the mix of various functions and the diversity of urban space. With more random process for space choosing, people's daily life begins to face more possibilities.

2.6 The mixed autonomous community

In the information age, it is no doubt that more information would be received via

network media in people's daily life, but at the sacrifice of face-to-face contacts. Due to the greatly reduction of unnecessary transportation, the urban road network would have some changes: At first, people are unlikely to visit the territory of others unless necessary, so the branch roads get reduced as a result of the convenient underground transmit system. Secondly, in order to maintain the normal operation of community, the main roads would be the channels for goods supply.

The city consist of mixed autonomous communities might be adopted as the resident manner to reduce the energy cost in future. Similar to the prototype of early settlements, the new living unit composed of families or communities, is kept within walking distance. The disappearance of the locational factors makes space mixed indiscriminately, so the community can keep autonomous at a reasonable and balanced level. In addition to physiological health maintaining, people can almost do study, work and entertain in it. The amount of requiered facilities would be calculated by the computer software, which avoids energy waste necessarily. Further more people could reform their communities moderately according to individual willingness. (Fishman, 1987)

(*8)

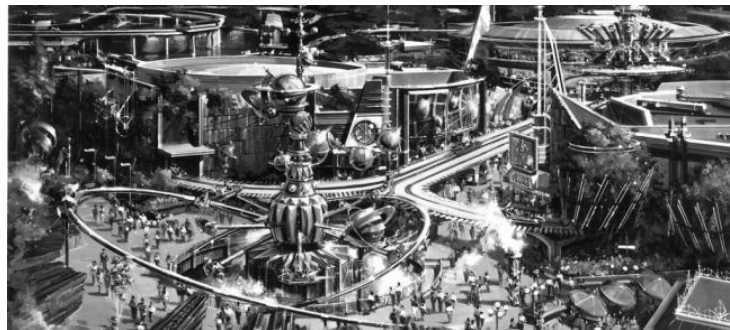


Figure 8: The imagine of future city in the information age

3. Prospects and thinking

With arranging land rapidly, the discipline of modern urban planning originating in the west, met people's needs for modern economic activities. Its vigorous development within hundred years confirmed that urban planning could not only create comfortable and beautiful space, but also realize economic value. As known, reasonable spatial layout and land consolidation were the precondition of enterprise operation, and scientific public facility mating and construction control, as important marketing manners, could even protect the citizens' rights and interests. In china, when land economy flourished was also the golden age for urban planning, so the three factors – “planning”, “space” and “economy” were inseparable.

However, as the importance of land use is falling, information technology looks to break the original order someday. On the one hand, the information age will no doubt bring new opportunities to cities, such as the improvement of production efficiency and the evolution of the space pattern. On the other hand, it also inevitably brings new problems, such as the impacts on the traditional commerce and communication means. In a word, every country will confront the challenge in similar situations – “How to deal with the advantages or disadvantages of information technology correctly?” and “How to build our cities in response to the development of information technology?”

How much demand does economic activity have on space in the information age? How much promotion does reasonable land use have to information industry? Does locational condition still drive the development of enterprise? Is living in urban or village still bothering people? These questions make us worry about the future of the urban planning discipline: in a day that robots act as labor and people turn to virtual space, planners need more creativity to make their value judged. Now, Incheon and Shanghai have started the plan for “future information city”, our answers are approaching step by step...

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