Research Paper

Technical rationality or public value

Rethinking China's urban renewal and urban design under the background of post-industrialization

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Abstract

The urban form is the material carrier of regional culture and social characteristics. And diversified form characteristics are exactly the important foundation for the sustainable development of the world's human settlement environments. With the development of cities, the urban science based on rational technology has gradually become a popular subject for humans to get in-depth and objective understandings of the laws of urban operation. Nevertheless, different from the common phenomena and laws in nature, the evolution of urban forms is subject to many non-material factors. Universal rational technology shows certain limitations in the construction of urban forms with distinct regional characteristics. Due to lags in the process of urbanization as well as the immaturity of planning technology, cities in developing countries have drawn a lot of experiences from their counterparts in developed countries, especially in the study of rational technology. Over recent years, as problems with urban development have become increasingly prominent, the standardized cities as delivered by rational technology are gradually weakening the diversity and authenticity of urban forms and their spatial cultures. In the process of learning and applying the rational technology, the public value of cities is neglected. Taking Chinese cities as examples, this study will explore the application of Western street networks and block systems in Chinese cities as well as the urban problems so incurred, while proposing the conflict between technological rationality and public value based on the traditional form characteristics and social cultures of Chinese cities. Some researchers maintain that with the termination of the industrialization era, the developing countries in the post-industrial times should build their cultural self-confidence to deeply integrate technological rationality and public values by making full use of their own characteristics and advantages in regimes, space and cultures. Technological rationality shall not only serve the renewal of physical space, but shall also facilitate the realization of regional public values as well as the establishment of urban space development strategies with more innovative, inclusive and regional features, so as to break through the current development bottlenecks. This is of great significance for China and many other developing countries.

1. Introduction

Just as the development process the developed countries have experienced, during the globalization and rapid economic development, a large number of developing countries have gradually transited from

agricultural society to industrial society and then to post-industrial society. However, while experiencing rapid and significant urbanization, many cities in developing countries, especially in those with huge population and better economy, have gradually encountered a large number of urban problems both in material and non-material aspects, some similar to what happened in developed countries, while showing their own unique and special characteristics. Under the influence of COVID-19 and the uncertainty of global development, such problems become further worsened and urgently need to be addressed and adjusted through urban renewal, so as to promote sustainable development. Recently, urban renewal plans have been put forward by the Chinese government as an important national policy, demonstrating the development pressure faced by cities in developing countries represented by China.

Facilitated by the current trend of interdisciplinary research, urban science and modern urban planning technology have made great progress, with outstanding advantages achieved in dealing with such complex problems as multi-level and multi-dimensional urban space. These achievements promote the urban spatial development and renewal design scientifically and prospectively. However, with the rapid development of technological rationality, regional differences and spatial characteristics of cities are assimilated by the abstract and regular planning technology. For example, regional culture, social network and residents' preferences have not been fully explored. In particular, quite a few developing countries have failed to adopt and apply modern planning theories and technologies based on their own regional culture characteristics, politics-economy systems, ecological environments and demographic characteristics. As a result, not only the effectiveness of cutting-edge planning technology is not well delivered, but also the problems with urban development have not been properly solved, some even becoming intensified.

2. Technical rationality and public value

2.1.Technical rationality

Technical rationality refers to the rule-based technical tools utilized by planners and governmental administrative agencies in the process of urban planning and management. These tools convert most of the rules into understandable and controllable data, so as to offer basic development principles for cities. Along the path from Howard's garden city to the research of the complexity of contemporary urban space, technological rationality has gradually moved urban studies from a research category about humanities and arts to the field of natural science research. Thus, cities have become a spatial system that can be analyzed scientifically; and in addition to shape, color and order, data have become an effective carrier for objectively describing humans' living environment, in order to help people recognize and understand certain motivations of urban evolution, make rational planning and manage the sustainable development of future cities in a scientific manner.

The internal motivation for the development of technological rationality comes from the fact the spatial scale and form complexity of cities are growing so rapidly that the rationality of spatial planning is difficult to be effectively verified. Once the spatial planning misses sufficient rationalities, cities may pay a price difficult to measure. Before the birth of urban science, urban space planning and design used to be based on the qualitative judgments of designers; because of the lack of necessary data support, such planning and design were classified as humanities and arts. However, the complexity of cities keeps driving scholars to painstakingly explore the internal laws that may exist behind, thus giving birth to the emerging direction of urban science. However, unlike the mechanical functionalism of the modernism in the past, the contemporary urban scientific research is purposed to learn from history and cities themselves, so as to guide the scientific development of cities by finding the internal laws. Especially, over recent years, with the rise of quantitative analysis, cities have been deconstructed into a hierarchical structure represented by massive data. And the complexity of their space system is described with a large

quantity of mathematical formulae, which are then operated by computers. In this process, the internal laws of urban space are translated into mathematical relationships that can be rationally cognized, and researchers try to predict and simulate such relationships and further intervene in the development of urban space.

2.2. Public Value

The particularity of cities, as a research object, lies in the social and cultural attributes behind its forms as well as the pursuit of maximizing the public value in the process of balancing the rights to and interests in space. Here, the public value would not only include the fairness in terms of basic living elements, such as sunshine, air and water, but shall also be embodied in the protection and inheritance of non-material elements, such as social culture, space justice and venue authenticity. The biggest difference between public value and technical rationality lies in that many of the former's elements and contents are difficult to be quantified, so its perceptual components is far more than its rational ones. Therefore, the concern for urban public value originated from those sociologists with keen observation abilities at the first place.

The embodiment of public value is not to meet the space needs of a few people, but to maximize the holistic interests of society. When researchers transform cities by using the modern rational technology, a lot of social problems appear. For example, social inclusiveness and diversity have not been fully understood and paid attention to in the process of corporate-styled standardized city construction. The uniform spatial forms delivered by rational planning have not only created many conflicts with local customs and habits accumulated across local history, but in many cases, they sacrifice the overall interests to meet the requirements of a few people, thus greatly reducing the benefits from urban public value. The rights and interests of low-income groups, the stratification of the middle class, the closed residential areas, and the chain reactions resulting from them have not been alleviated in the repeated urban upgrading and transformation; rather, a large number of social conflicts have been intensified, and the urban public affairs expenditures have also been soaring.
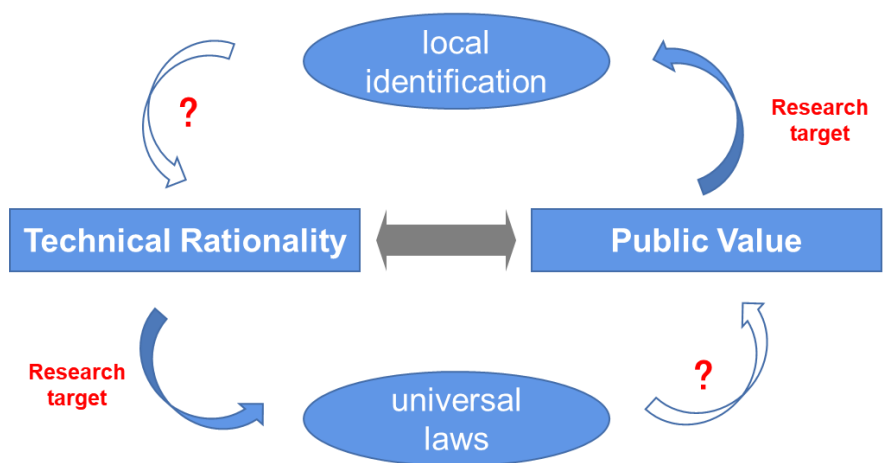

Figure 1. Contradictions Between Technical Rationality and public value.

2.3. Contradictions between technical rationality and public value

In fact, although urban science has developed rapidly over recent years, its objectivity and rigor have long been questioned. These doubts come both from within the discipline and from other disciplines. Compared with the research objects of other scientific fields, those of urban research have two

prominent features: First, the non-experimental feature of cities. In other words, it is difficult for urban research to make repeated experiments on cities in a variable-controlled manner by obtaining exactly identical real-word samples, so as to acquire real experimental data to verify theoretical hypotheses. Second, most importantly, the non-material elements of cities play the key role in the establishment of their forms. For these non-material elements, their foremost core characteristics are the public's participation and their subjectivity. This has congenital contradictions with scientific research, which is committed to exploring the objective laws of the material world.

The purpose of technological rationality is to seek universal laws, which is also the ultimate goal of all scientific research. For cities, however, this kind of universality is often difficult to function, because distinct geographical environments, climatic characteristics, social cultures, economic levels and population compositions, as well as many other factors, will lead to the diversification of urban spatial forms. In contrast, the characteristics of universal laws can only be applied to cities or local areas with similar conditions. In addition, public value involves the sense of value identity, but different regions or urban areas hold heterogeneous value concepts in themselves. For example, there are differences between the East and West, or between coastal and inland areas, or between native residents and new immigrants, or between classes of different incomes. Therefore, the biggest contradiction between technological rationality and public value can be summarized as the contradiction between the universality pursued by technological rationality and the localization sought by public value **(Figure 1)**.

The development and evolution of urban spatial forms is a process of "one result from multiple causes". Social, economic, political, cultural, historical, climate and other factors have delivered special form characteristics to different cities. However, it is must admitted that the emerging urban sciences and the analytical techniques derived therefrom stem mostly from Europe and North America with relatively mature urbanization characteristics. The qualitative and quantitative research methods, data sources and result verification that are relied on by these technical tools are also based mostly on the socio-economic background and urban form characteristics of Europe and North America. In contrast, in most of the developing countries, due to the relative lag in urban research, they have not derived any spatial form theory that reflects their own regional characteristics according to their own features. Rather, they often borrow the theoretical research and technology tools of European and North American scholars to understand and guide the process of urban development. As a result, in the process of globalization, the form characteristics and regional cultural characteristics of cities are greatly threatened, especially in the analytics and reconstruction of urban space mechanism.

3. Chinese practice

China has been one of the developing countries with the fastest urbanization in the world in the past 20 years. With the rapid urban development, China's urban research and planning management have to rely on the planning tools and management experience of developed countries. It is worth affirming that in the rapid development of cities in China, great changes have taken place in the urban appearance, and the urban quality and residents' living conditions have been greatly improved. However, over reliance on planning management technology in developed countries not only makes their own urban theoretical research westernized, but also makes their own regional characteristics constantly threatened. Next, this paper will briefly explain the impact of rational planning technology in western countries on China's urban spatial planning and the reduction of public value from the most basic constituent elements of two cities: blocks and streets, in order to play a role in attracting more attention.

3.1. Chinese "block"

In 2016, the Chinese government put forward the concept of block system, hoping to break the original large-scale residential areas, learn the block texture of Europe and North America, and advocate

the principle of land unit division of "small blocks and dense road network". Since then, the issue of block scale has been widely concerned by Chinese scholars. The homogeneous and grid block form in western countries has become the research object of Chinese scholars. The block scale of Barcelona, Paris and New York has gradually been applied to the planning and renewal of a large number of new urban areas in China (**Figure 2**).

Figure 2. Scale change of Chinese blocks.

The block is not a spatial unit contained in China's urban spatial form, but a kind of land division model originated in Europe, which is closely related to its deeper land ownership division and the building types attached to it. However, in China, influenced by the ideology of land public ownership and collectivism, the division scale of spatial units is often between blocks and communities (**Figure 3**). Within the space unit, the property right plots are divided through detailed streets and alleys. Different from western countries, these property right plots are not subordinate to individuals, but belong to public ownership units. Groups of residential units are usually built inside each plot. Since most residents in the same plot belong to the same work unit, each plot is not only a simple residential unit, but also a micro society. A number of land units with similar scales together constitute the spatial unit of Chinese traditional urban center. In addition, most space units are equipped with basic public facilities that meet the daily life of residents. After nearly half a century of development, most traditional urban residents have also formed a daily life, communication mode and special sense of spatial belonging suitable for such spatial units.

Figure 3. Spatial structure of a typical Chinese block.

However, the spatial unit of the Chinese model also brings a special problem, that is, the road density is low, especially the motor traffic road density is too low, which leads to the traffic problems becoming more and more prominent in the process of urban development. In this regard, China began to learn from the spatial unit division mode of the western block system, regarded the block planning of Barcelona, New York and Paris as the most rational spatial mode, and then formulated the planning principle of "small block and dense road network". Relevant scholars and management institutions believe that reducing the scale of spatial units is not only conducive to improving the density of road network, but also conducive to improving the intensity of land use and promoting land intensive use. Since then, many cities in China have mostly controlled the block grid below 200 * 200, while the traditional spatial unit scale is about 400 * 400m **(Figure 4)**. It can be seen that the transition from traditional space unit to block is the result of technical rationality.
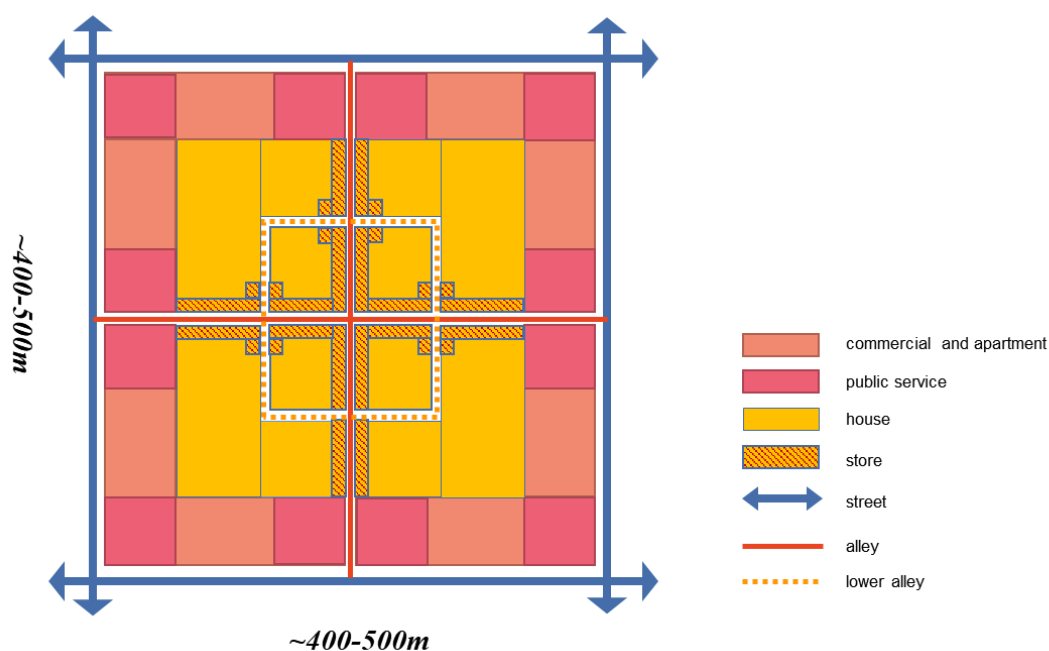

Figure 4. The basic model of Chinese blocks.

The approaching rational block system has not brought about the improvement of public value. First of all, the seemingly simple land division model brings a homogeneous street pattern. The increased road density does not improve the urban walking experience, but services and motor transport. Secondly, the introduction of block system has not changed the traditional residential building mode. While increasing the intensity of land use, the per capita supporting service facilities and open space are declining. Third, the closed residential area with the block as the unit makes a large number of urban public spaces privatized, which reduces the opportunities of social communication to a great extent, and the social fragmentation is also increasing. Fourth, the neat urban interface formed by standardized block units has not brought the vitality of prosperous streets in Europe and America. On the contrary, the street space of the original old city still maintains vigorous Street vitality. The low-cost space contained in the block has become an important foundation for breeding all kinds of creative shops, maintaining social relations, including people at all levels and preserving the authenticity of the city. What is worth mentioning is that the traditional China block mode has become an effective management and control unit for epidemic spreading in the COVID-19 epidemic. Due to the relatively large unit scale and embedded public service facilities, it can effectively maintain the during the epidemic period, effectively support the living needs of internal residents, reduce the cross flow of people between different regions and block the spread of the

epidemic; In sharp contrast, a large number of newly-built block settlements need to invest more management and service personnel in the process of epidemic prevention (**Figure 5**).
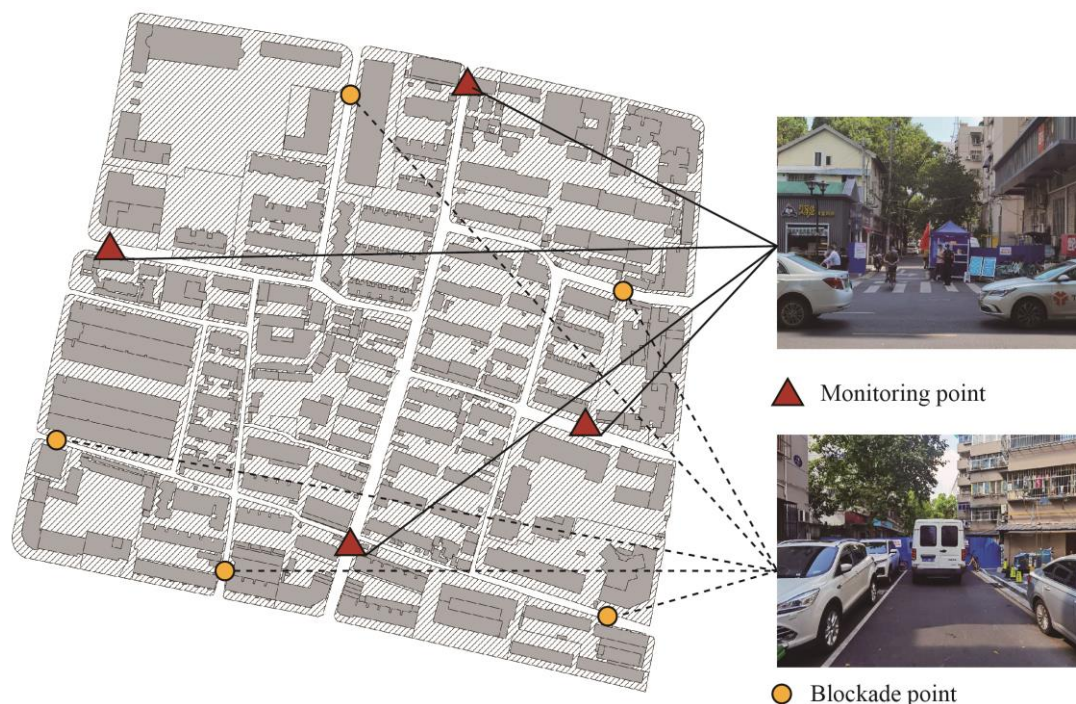

Figure 5. Control methods of Chinese block during the epidemic.

3.2 Chinese alley with spatial syntax

Since the birth of spatial syntax theory and its technical tools, it has played an important role in many fields such as urban scientific research, urban spatial analysis, urban spatial planning and urban public facilities planning. Up to now, a large number of research results closely related to it can still be seen in many journal documents. Spatial syntax creatively solves the quantitative analysis of urban traffic network structure, and organically combines it with urban functional structure and spatial operation law. Among the few urban scientific research tools, spatial syntax has been widely recognized and popularized because of its readability and operability. Based on a large number of research and practical applications, the success of spatial syntax mainly focuses on the close relationship between traffic accessibility and urban pedestrian flow guidance. Spatial planning designers can test the rationality of planning and design according to their analysis conclusions, as well as many discussions on social problems.

However, although the application of spatial syntax is very strong, its theoretical and empirical basis mostly comes from the observation of some European cities. The corresponding relationship between spatial form characteristics and residents' lifestyle has not been fully considered and revised when applied to cities in other regions. However, in many research and planning practice, due to the lack of dialectical analysis conclusion of spatial syntax, planners will inertia apply spatial syntax to spatial planning and design at all levels, resulting in contradiction between rational analysis conclusion and residents' daily life needs. There is a Chinese slang saying, "the smell of wine is not afraid of the depth of the alley", which means that the success of a store mainly depends on the quality of the goods sold. Even if it is located in an area with relatively low accessibility, it can still attract a large number of customers. This slang also reflects that there is not always a positive correlation between some regional lifestyles and spatial choice consciousness in China and accessibility. Therefore, spatial syntax can be used to analyze the distribution of universal urban public facilities on the urban macro scale, but it is still difficult to take into account the spatial utilization with regional cultural characteristics on the meso and micro scale.

In fact, compared with the homogeneous grid street system in Europe, America and other countries, most of China's traditional urban streets have relatively more significant classification, of which the most special is the street and lane system (a path structure lower than the street) which carries a large number of daily life functions and is dominated by walking. The existence of this street and lane system is inseparable from the above-mentioned division model of urban spatial units in China. As a service-oriented road inside the space unit, streets and lanes belong to a semi private path connecting the urban public space outside the space unit and the internal residential unit. Due to its functional introversion, streets and lanes often show relatively low accessibility in the spatial syntax calculation of the overall urban street network, but they are the path level closest to life for the residents in the spatial unit.
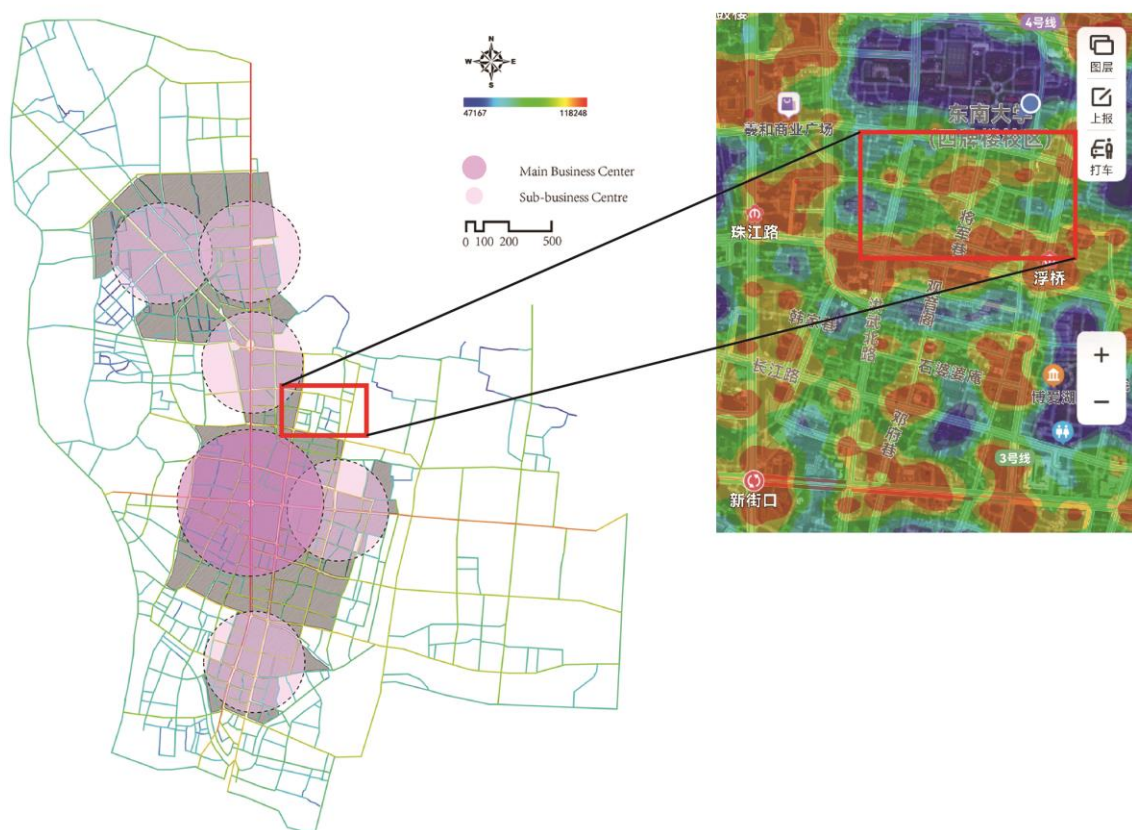

Figure 6. The analysis of space syntax compared with the thermodynamic map of urban vitality.

Streets and alleys are like human capillaries in China's urban form, but their public value is not only the most terminal transportation carrier, but a kind of public places full of diversity, inclusiveness and authenticity. Compared with urban streets with high accessibility, the relatively low accessibility of streets and lanes not only avoids the competition for space by a large number of motor traffic, but also provides a more pleasant spatial scale and shops with affordable rent (**Figure 6**). This makes a large number of highly attractive authentic shops grow in them, and attracts a large number of external residents to come, changing from an original commercial capital to a special social capital, constantly improving the public value of streets and lanes. At the same time, the diversified population composition and business types reflect the most inclusive life scenes, and organize the most terminal and real social

relations. This is a regional path structure and spatial model completely different from European and American cities. However, in the process of introducing western modern planning technology, street space is gradually disappearing (**Figure 7**).

Figure 7. Authentic shops and life scenes in the alley.

4. Conclusion

Under the influence of globalization, cities in the industrial age tend to go after a standardized urban development trajectory. In the principle of the priority of economic efficiency, both developed and developing countries have all implemented rapid urbanization development. And technical rationality has become a planning principle required to assist the development of standardization in the industrial age. Due to the relatively backward urbanization process and immature planning and design methodologies, it is with certain inevitability for developing countries to fully learn the design concepts and technical approaches from western developed countries. In addition, the positive role of technical rationality is undeniable. However, a city is an evolving process of "one result from multiple causes", rather than a formation under the guidance of a universal law. In fact, the idea of "multiple results from multiple causes" is the most fundamentally inherent law for the development of cities across the world. Currently, there are still many research gaps between the diversified public values and the technical rationality for pursuing universality. With the termination of the industrialization era, developing countries in the post-industrial times should build up their cultural self-confidence and make full use of their own characteristics and advantages in system, space and culture. They do not only need to give full consideration to the degree of matching the drawn-in rational foreign technology and their local culture, but should also create the rational technology that conform to their own regional culture and public values, so as to deeply integrate technical rationality and public value, establish a more innovative, inclusive and regional urban space development strategy, and break through the current development bottlenecks. This is of great significance for China and other developing countries.

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