

Discussion on Urban Renewal Strategy Based on Urban Catalyst Theory

Yao Yu^{1,2}, Maoyin Sheng^{1,3*}, Suili Zhang^{1,2}

¹ Institute of Karst Research, Guizhou Normal University, Guiyang, China

² National Engineering Research Centre for Karst Rocky Desertification Control, Guiyang, China

³ Guizhou Engineering Laboratory for Karst Rocky Desertification Control and Derivative Industry, Guiyang, China

Email Address

Yaoyaoyu0615@163.com (Yao Yu), shmoy@163.com (Maoyin Sheng)

*Correspondence: shmoy@163.com

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Abstract:

With the continuous development of social economy, the corresponding city scale is gradually expanding, so a reasonable and instructive planning and design for the future development of the city is particularly important. By introducing the theory of urban catalyst and combining with the basic status of urban planning in China, this paper analyzes the chain reaction between the catalyst elements and the urban renewal process. For example, this paper analyzes how urban designers use catalyst theory scientifically in various urban spaces.

Keywords:

Urban Renewal, Catalysts Theory, Urban Planning and Design, Protection and Development

1. Introduction

While China's urban construction is developing at a high speed, the old buildings, streets, neighbourhoods and industrial areas are still coexisting with the modern urban structure, as they have a strong geographic and humanistic attribute as a point of memory of the city, and they are a spiritual link between the city and the people. In the past, there have been many examples of direct demolition and reconstruction of new buildings, and a large part of the reason for such radical changes is just to increase the value of the land, but in fact, it is destroying the diverse forms, characteristics and intrinsic qualities of the urban elements. However, if these "urban memories" are allowed to continue to develop in the same way as before, they will only lead to the emergence of a number of urban problems, such as loss of employment opportunities, traffic congestion, degradation of the quality of the environment, and ageing of the infrastructure [1]. As a result, the difference between them and the surrounding newly modernised areas will gradually increase, which will make the people living in this area feel even more lost in their hearts.

Therefore, it is reasonable to introduce the role of catalysts to describe urban planning and design, because in the future development of the city, not only the

introduction of new elements, but also the preservation and reorganisation of existing elements in the process of urban operation. Based on the basic status quo of urban planning and design in China, this paper looks at how the catalyst elements in the city can participate in and influence the rejuvenation of the city in an innovative way from the point of view of urban regeneration.

2. Conceptual Explanation of Urban Catalyst Theory

“Catalyst”, also known as a catalyst, is a term used to describe a chemical reaction in which a small amount of a substance is added to place the chemical process in a catalytic environment, thereby increasing its rate and achieving the desired result. At the end of the chemical process, the catalyst usually disappears or is converted during the reaction. However, this concept cannot be fully applied to the urban catalysing phenomenon, although they are both controlled and use new elements to make the desired reaction occur. Catalysts in the urban context are more often used to describe an individual building or project that revitalises the city, not only has a positive impact, but also guides and regulates the subsequent urban programme. These new elements will be preserved in the urban form for a certain period of time and will remain as the city's unique character. This is different from a catalyst in a chemical reaction.

Furthermore, in the book *American Urban Architecture - Catalysts of Urban Design*, in which the concept of urban catalysts was first systematically articulated, architects Wayne Attoe and Donn Logan mention in the introduction that. “Catalyst” is often misused to describe the total amount of investment in a city and the changes that come with new construction. It is difficult to understand this phrase in the context of urban development alone, as any change in the real world will have an impact on the area around it, but unfortunately these impacts are not entirely reliable, and speculative change is a paradoxical combination of positive and negative impacts. Therefore, it is important to know from the outset that the elements that can become catalysts in urban design are dynamic beings that can continue to function and have an impact in urban development [2]. In this process, the urban catalyst does not remain unchanged, it is constantly repairing itself to grow with the changing environment.

3. Introducing Catalyst Theory in Urban Planning

If the city wants to achieve the expected development goals within a certain period of time, it needs an urban plan designed according to the current situation of the city, and this plan actually contains many contents, social structure, economic operation, space use, etc., which is a reasonable allocation of resources to the city in a large scale. Design contributes to the three goals of sustainability, and technology contributes mostly to the environmental and economic goals of sustainability [3]. In contrast, urban catalysts are used as smaller elements to shape the city under this strategic plan, and to link existing elements as well as to guide new ones in both material and non-material (cultural, event) forms; when urban catalysts are introduced into urban planning, their role is limited to a certain extent.

Meanwhile, due to the systematic management and supervision mechanism of the ecological red line in China in recent years, the expansion of the city has been strictly controlled, so the urban planning and design has gradually changed from the incremental space to the stock space, and then we should optimise the used space of the city as the starting point to do the stock planning in order to achieve the purpose of

urban regeneration. From the domestic research on the theory of urban catalysis in recent years, it can be seen that the catalysis examples of material elements are mainly concentrated in three aspects: single buildings, such as museums, theatres, etc.; linear building groups, such as: historical and cultural districts, riverfront areas, etc.; area building groups, such as industrial heritage, urban villages, traditional communities, etc. [4]. These research results not only reflect the applicability of catalyst theory in Chinese urban planning, but also prove that, in terms of the current state of the urban infrastructure, urban planning and design are gradually focusing on refurbishing the existing elements of the city in order to rejuvenate the city.

Although this research approach of “point-line-plane” from the perspective of urban space coincides with the process of urban catalysis, I would like to remind the author that the purpose of discussing the catalysis elements in the city from the point, line and slice is to make the catalysis elements in the city more attractive. However, before proceeding to the next discussion, the author would like to make a reminder that, according to this path, the purpose of discussing the catalytic elements in the city from the point, line and piece of the catalytic elements is to make the catalytic effect simple and clear and easy to understand, but the reaction of the catalyst is not a simple collection of elements, and the goal is to integrate the urban style through the establishment of these catalytic elements. With this in mind, this paper will select a few typical representative research results to analyse and explore the various catalyst responses involved.

From the point of view of point-like tactile elements, Sun Yu (2020), “Research on the Design of Museums in Historical Neighbourhoods Based on Tactile Theory - Taking the Conceptual Design of the Museum of the Old Street on the Seaside in Hohhot as an Example”, applies the theory of tactile elements to the design scheme of the museum building, which is oriented to the development of the tourism of the old street of the city, and takes the museum as a “point”, combined with the old street as a historical environment background, continues the urban public space texture. In-depth analysis of the monolithic building when introduced as a catalyst element in urban planning, through changing the building volume and spatial design techniques, to highlight the regional characteristics of the building, to achieve the revitalisation of the old street of the road [5].

From the perspective of linear catalyst elements, Liu Xuefei (2011) systematically explored the conservation and renewal mode of urban historic districts under the urban catalyst theory [6]. Based on the urban catalyst theory, Zheng et al. (2021) studied the residential roads in Sanyi Village, a community in Tanhualin, Wuhan, in terms of catalyst introduction, spatial linkage, guidance and follow-up, and explored how to integrate the catalyst theory to improve the quality of the community within the limited road space of an aging community [7].

From the perspective of piecewise catalyst elements, Cui Liu (2020), “Experimental Research on the Design of Correlation between Urban Microspace Renewal and Urban Catalyst Effect” analyses the design of pocket park renewal in Nanqiao Town of Fengxian as a case study, and explores the disciplinary connection between urban catalysts and urban microspaces based on the basic status quo of the renewal of the urban stock of green space, and proposes that when the theory of catalysts is introduced into a small-scale public space in the city, the urban microspace renewal to construct a continuous adaptive design [8]. Therefore, under the theory of urban catalysis, the renewal strategy of historical industrial areas can be constructed by

increasing the different forms and levels of catalysis, and the nature of urban catalysis is summarised [9].

In urban planning, the catalytic elements in the stock of spaces can be activated to achieve renewal, because these built spaces have the inherent advantage of triggering a chain reaction between regions through the grasp of the catalytic qualities, so as to realise a dynamic connection with the city. First of all, the urban stock of spaces has a variety of catalyst elements, which come from various aspects such as economy, culture, architecture, and so on. The evolution of society gives them a deep historical nature, which not only enriches the urban form, but also makes them recognisable in the urban space after transformation [10]. Secondly, most of the stock spaces are located in the centre of the city, and the main reason for their renewal is that their form of existence is not compatible with the modern urban development. Its transformation can achieve the transformation of a certain range of elements and achieve a strategic impact on the future development of the city's form, in addition to the renewal of the stock of spatial projects will inevitably lead to the city in the face of the future development of all aspects of multi-level thinking. Finally, the spatial layout of the urban stock makes it easy to transform and renew, and its intrinsic structure gives it the ability to be quickly integrated into the urban system.

4. Urban Renewal Strategies Based on Catalyst Theory

The author believes that when deciding the regeneration strategy, the location conditions of the renovation site should be fully considered, and in terms of the current principles of urban development, the renovation of the stock space should meet the requirements of ecology and economy, and take the existing landscape style of the renovation site as the starting point to re-stimulate the vitality of the urban characteristics. In this regard, based on the previous literature review, the author summarises the urban regeneration strategies after the introduction of the catalyst theory.

4.1. Prerequisites

The concept of catalysing in the urban design process is very subtle and requires an explanation of the power of the interaction between urban design and the other elements involved. However, at the beginning of the catalysing process, several prerequisites for catalysing to take place are often overlooked: firstly, a long-term vision for the future of the city as a whole and a strategic and attractive transformation plan; secondly, a balance of public and private investment and financial resources to support the completion of the plan; and, thirdly, the willingness of the city's inhabitants to commit themselves to the process. While catalysts are most valuable for their catalytic power and ability to have a lasting impact on other development areas, the preconditions for triggering a catalyst are also essential.

4.2. Determination of catalytic elements

4.2.1. Tapping the original catalyst

The catalysts in the urban stock space are diverse, it may be a single building, open space, small-scale structures and so on. Therefore, when selecting the original catalysts, the current situation of the region should be taken into account as the background, and the location advantage, scale range and influence of the original catalysts should be analysed comprehensively, so as to achieve an all-round grasp of

the catalysts in the region by comparing the elements of the catalysts, and thus to carry out the expected simulation of the scope of the catalysts' effects.

4.2.2. Introduction of new catalysts

The work of transformation and renewal does not stop at preservation and reorganisation of old sites, but also requires the introduction of new elements with catalytic effects between points, lines and surfaces, thus creating new chain reactions. These new catalysts should be included in the plan and customised to meet the needs of new urban development, rather than being randomly set up within the scope of transformation.

4.3. Activation of catalytic elements

On the premise of not damaging the environmental connotation, the inner qualities of the catalyst elements are activated through renewal, and while forming a benign edge between the catalyst elements and each other, the spatial boundaries of points, lines, and surfaces are broken down, so as to make the renovation site more connected with the neighboring sites, and to complete the fusion of the old and new spaces. After the renewal, the renovation site that retains its own unique style is also a part of the city.

4.4. Inducing catalytic effects

The process of catalyzing is destructive, and the reason for eradicating old and small buildings is that the social cost of transforming them is not proportional to the subsequent effect they can have once the transformation is complete. Change has an impact on the surrounding area, and cause and effect, action and reaction are the main components of the catalyst concept. Therefore, after the activation of the catalyst at the point of transformation, these elements need to be guided and the side effects of the catalytic process need to be kept under control, and this is not only the responsibility of the current program leader, but it is also the responsibility of a series of important participants in the subsequent development [11]. With a good understanding of the catalytic process, existing catalytic elements need to be actively guided so that they can continue to deliver positive impacts on the city.

5. Conclusions

This paper combines the innovative thinking method of scientific and technological research in natural dialectics, introduces the wide application of catalyst theory in the field of urban planning research in China, and briefly explains the research content from the perspective of “point, line, surface”. From the perspective of “point, line and surface”, the research content is briefly explained. Catalyst theory provides a new way of thinking for the renewal and development of stock space in the city, and under systematic planning and design, it can have a sustainable impact on the transformation area and the adjacent areas. Although a summary of the renewal strategy is given in the paper, it is not yet perfect and is not applicable to all transformation projects, but it is also hoped that it can provide a useful reference for future urban planning projects and further deepen its content in subsequent studies.

Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this article.

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