Research on commercial Space Design of cold Region City under the background of Resilient Urban

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Abstract. First of all, a field survey is carried out on the commercial space in the cold region, and a comparative analysis is made on the spatial design contents of commercial blocks in terms of regional location plane layout, traffic organization, spatial form and other aspects. Secondly, this paper analyzes the existing problems in resilient urban construction in the four aspects of overall design, space handling, block shape and environment design in commercial space planning and design. Basis on this, the space design countermeasures are proposed to enhance the adaptability and diversity of the space environment, enhance the redundancy of design and regionalization, strengthen the robustness and resilience of commercial space, and strengthen the intelligence and the ability of learning and transformation of the space environment.

1. Introduction

Since the development of the city, people expect it that not only to provide a place for survival, but also to provide trust and dependence for people to live in. Such trust and recognition are largely affected by urban resilience. Resilient cities can withstand the impact, quickly respond to and recover from disasters, maintain the normal operation of urban functions, and better cope with future disaster risks through adaptation. This kind of resilience is reflected in all aspects of the city, and urban commercial space is its important embodiment. Therefore, the author takes the city in the cold region as the main research object and analyzes the existing problems, so as to provide valuable design countermeasures for the commercial space planning and design from the perspective of urban resilience development.

2. Analysis on the current situation of commercial space in cold region cities

2.1. Current situation of commercial space distribution

Take a typical cold city in the north as an example. At present, there are more than ten commercial centers in the city. With the impact of e-commerce sales mode in the Internet era and the arrival of new commercial investment subjects, the old urban commercial layout, which used to be deficient in single item of service in frigid cities, is undergoing great changes and has been replaced by the new and modern commercial general pattern. The urban commercial layout has entered the era of multiple business circles.[1] Large commercial buildings in the commercial district can supplement and
improve the resilient development of the city while meeting the basic living and shopping needs of citizens.

2.2. Investigation and analysis of the current situation of commercial space in cold cities

Regional position: The city is energy-oriented, the layout of the city is a typical group layout, divided into three main development areas, and the three main districts have their own main and sub-commercial centers and multiple commercial districts. Commercial districts of different sizes are mostly located in old densely populated areas or newly planned urban regional centers, with reasonable service scope and clear hierarchy. (Figure 1)

Plane layout: The overall layout of the commercial area of the city is relatively simple. The commercial area of the old city is usually in the form of a zigzag or tree branch, with the buildings arranged along a main street, or developed into a tree branch layout after many years. The building is arranged along a main street, and some of them develop into a dendritic layout after many years. The spatial form of the street is relatively simple, and there is no overall emergency planning. The layout of the new business district adopts the layout form that can deal with emergencies more actively, and the streamline organization is more reasonable. (Figure 2)

Traffic organization: The road around the commercial area is unimpeded, but the main commercial buildings in the area are adjacent to the main traffic arteries of the city, resulting in the formation of one-way traffic in many areas. Such arrangement leads to serious mixing of people and cars, poor shopping atmosphere, and greatly reduced emergency.

Space form: The organization of commercial space in cold areas mostly adopts the form of crisscrossing along the streets, while the larger commercial areas in big cities adopt the composite structure form. Modern commercial areas also pay more attention to the consideration of disaster prevention and reduction. Figure 3 shows the commercial plot of a big city in the cold region, which is a typical cold region city treatment method. In order to get a better feeling of using in winter and enable people to enjoy more winter sunshine, the proportion of enclosed street space in cold areas is significantly different from that in the south. However, due to insufficient consideration in design, the effective height and width of some commercial plots in Figure 4 are relatively large, and the streets are too empty. Such streets are more suitable for vehicles, but far exceed the needs of human use and pedestrian space shaping. As the sense of space definition is too weak, the sense of discrete space will naturally occur.
3. Problems existing in the design of commercial space in cold cities

3.1. The design lacks urgency and flexibility
In the planning and design of commercial space, insufficient consideration is given to the population development and future development of the whole service area. In the face of some emergencies, such as heavy snow in winter and heavy rain in summer, some sections of roads are prone to become high incidence of road obstructions. In the face of sudden infectious diseases, such as influenza, there is a lack of buffer sections in large commercial buildings for crowd diversion or temporary disposal. Due to the high density of buildings in commercial blocks, the road width between buildings is often narrow, especially the lack of space nodes that can be used in a variety of ways. As a result, in the section without traffic restrictions, the activities of pedestrians are seriously disturbed by motor vehicles, there is no place to rest in the shopping process, and the pedestrian road is seriously occupied by vehicle parking.

3.2. The spatial details lack adaptability and redundancy
The processing of commercial space details is the factor that most affects the use experience. The adaptability and redundancy of spatial detail processing, that is, whether it can be suitable for environmental characteristics, and whether it has the same function of replaceable environmental elements to increase the reliability of spatial system. These two characteristics will affect the quality of space environment and space toughness. In order to pursue smooth traffic, the road is designed into a four-lane form, and the shops along the street on both sides are separated by large-scale streets. Due to the influence of climatic factors, the landscape design is relatively monotonous. Due to the harsh winter climate, on the one hand, cities have less available green plants, so the greening cannot change with the seasons and it is single. On the other hand, the water body freezes or dries up in winter, and the utilization rate is extremely low, and water-related facilities such as fountains are prone to frost heaving.[2]

3.3. The robustness and diversity of block forms are insufficient
The layout of commercial blocks in small and medium-sized cities in cold regions is generally linear along the streets, and there are few curved or folded streets. The linear street allows people to have a clear view of the street space and can easily reach the destination. However, there are few changes in the street space, and the street-facing spatial form interface is monotonous, the non-uniform spatial distribution of nodes is not closely related to the surrounding buildings, and the square in front of the main building is not large enough and crowded. Such a layout would be less able to resist and respond to external threats and solve problems.

3.4. Inadequate recoverability and redundancy of environmental facilities
The typical problems are that the environmental facilities in commercial blocks cannot meet the needs of users, that all kinds of facilities are not complete, or that they cannot be used without considering
the climatic conditions in the design. These problems directly lead to insufficient redundancy and poor recoverability of commercial space environmental facilities.

4. Countermeasures of urban commercial space design in cold region

4.1. Enhance the adaptability and diversity of the space environment
In the design of commercial block space environment, it is necessary to strengthen the richness of its space level and the adaptability of environmental facilities to the surrounding environment of the area. In the design of spatial scale, in addition to the scale relation of indoor and outdoor space studied by scholars, for example, in the layout of outdoor facilities, the module with a stroke of 20-25 meters is used to control,[2] for example, one seat flowerbed is arranged every 20-25 meters. In addition, local usage habits should be fully investigated, and space plane size design should not be divorced from reality. The scale of the block node space and the street profile should be coordinated with the expected number of users.

4.2. Enhance redundancy and regionalization of design
In the space design of commercial blocks in cold areas, it is necessary to enhance the redundancy of environment substitutable elements with the same function and increase the reliability of the system through multiple backup if possible. At the same time, it should also reflect the climate characteristics of the cold region as well as the local architecture and cultural characteristics. For example, in the design of street length, considering the influence of cold climate in the long winter, the outdoor street length is usually shorter than that in other climatic zones, and the distance between main commercial buildings in the commercial zone is relatively shorter. In order to get more sunlight in winter, the streets should be wider than those in the south. Generally, the width of commercial streets is 10-20 meters, which is appropriate.[3] For cities in cold regions, this value should be increased appropriately.

4.3. Enhance the robustness and resilience of the commercial space
Strengthen the overall layout design and traffic flow organization of the commercial block to improve the robustness and resilience of the space. The ability of commercial space to resist and cope with external shocks, as well as the reversibility and reducibility of the original structure or function of the system after being impacted, affects the quality of life of citizens in the areas it serves, and also reflects the differences in the planning and management capabilities of the government.

4.4. Strengthen the intelligence of space environment and the ability of learning transformation
Through digital artificial intelligence and modern technological means of the Internet of things, the intelligence of space environment and the ability of learning and transformation can be enhanced. Modern technological means provide great support for improving the adaptability of people and environment. These technologies should be fully utilized in the design to make the commercial block a small smart city and fully guarantee the safety of citizens.

5. Conclusions
Urban resilience mainly includes the four dimensions of technical, organization, society and economy, which specifically covers various functions and Spaces of cities, among which the resilience of commercial space is an important one. Its resilience affects the quality of exhibition life during and after disasters. Therefore, the author studies the resilience of commercial space and hopes that the space design countermeasures proposed in this paper can play a role in the construction of resilient cities.

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