Study on Optimization of Urban Architectural Design Based on Public Demands

Chenyi Qiu*

College of Water Conservancy and Civil Engineering, South China Agricultural University, Guangdong, China

* Corresponding Author Email: qiuchenyi@stu.scau.edu.cn

Abstract. As the material standard of living continues to improve, people's needs at a higher level have triggered a new craze. The change of view on architecture has become an intuitive perception of this boom in people's lives, and the call for architectural design to respond to public demands is increasing. This paper compares the design and practical effects of the Amsterdam Library and the Tencent Building in Chengdu for public demands, combines the new demands of the public for modern architecture to conduct a literature analysis of relevant cases, and then explores the direction and strategy of modern architectural design and optimization oriented by public demands. It is found that the physiological, psychological, and health values provided by buildings are desired by the public but not fully satisfied, and that multifunctionality, aesthetic experience, green intelligence, and humanization are the mainstream of future buildings desired by people. Refining and grasping the information of public demands and using it as a reference is an important part of reaching the transformation of architectural design. In urban building construction, the use of the cycle is generally longer, the current reality is to minimize the misalignment of supply and demand, which means that must do a good job of mastering the information of public demands and have a certain prediction of its future direction, reserved for the transformation of the elastic space, with the times.

Keywords: Urban planning, public demands, building design.

1. Introduction

The long history of urban architecture as an important part of life has led to a growing interest in modern architectural design in the contemporary era of rapid development [1]. With the improvement of the social economy, people's quality of life has been significantly improved, and after their material needs are satisfied, they begin to pursue higher-level spiritual needs. This trend will be reflected in the relationship between public demands and architecture.

People are the users of buildings; the public makes the demand and the building needs to fulfill the demand. Public demands present a diversified and personalized trend, which is broadly expressed as the eager expectation of modern architecture in terms of physiology, psychology, and health while paying more attention to the aesthetic experience of the building and green environmental protection. However, the mismatch between supply and demand can be said to be the main problem faced by modern architecture, as buildings are lagging behind the rapidly escalating demand or are unable to take care of all of them with the current technological conditions. What design optimization should be used for current urban buildings to meet public demands in various aspects, and how to make a reasonable trade-off between meeting the needs and realistic design needs to be further explored. This study is of great significance to the future development direction of modern architecture and the design principles of high-quality buildings. This study focuses on the specific aspects of modern architecture to meet public demands, using the literature research method, aiming to explore the optimization direction of modern architectural design. To achieve this goal, this paper summarizes the relevant information and literature, and analyzes step by step the differences between public demands and the current situation of architectural design, the revelation of high-quality building examples, the implementation of optimization strategies, and summarizes the common points.

2. Literature Review

This study mainly collects existing literature, such as relevant academic journals, books, articles, etc., and integrates and analyzes them comprehensively to deeply understand and explore the issues of public demands and urban architectural design. For the theoretical development of urban architectural design, City Planning According to Artistic Principles and The Art of Building Cities: City Building According to Its Artistic Fundamentals by Carmilo Sitte are generally regarded as the earliest works of Western urban design theory. The authors believed that urban design should be guided by aesthetic principles, an idea that has been widely explored in the past century or so since. Over time, more and more specialized works on urban design have been produced, covering different fields and presenting relevant theories. Contemporarily, through some scholars' categorization and analysis of urban planning theories, they have summarized the research content of urban planning theories into seven fields: landscape-visual, cognition-imagery, environment-behavioral, social, functional, procedural-process, and type-morphology [1]. This paper reviews the development of urban design theory to use existing research as an aid to a better understanding of urban architectural design theory. Through a multidisciplinary research approach, a systematic system of urban architectural design theories has been formed and developed, which provides urban designers with the means to respond to complex urban problems and to create cities that are more livable, sustainable, and responsive to the needs of the public.

In terms of public demands theory, there are two well-known theories: Maslow's Hierarchy of Needs and Christopher Alexander’s A Pattern Language. In Maslow's theory, human needs are categorized into different levels, while Alexander's pattern language describes people's basic needs and preferences for the living environment. According to the theory of public demands, architectural design should be user-centered to meet the actual needs and comfort of users. The core of this theory is to understand and predict the behavioral patterns and preferences of users to guide the design process.

Architecture can reflect the relationship between the public and the state of society because it is a product of cultural attributes [2]. People's daily lives are inextricably linked to buildings, which can meet people's basic needs space, carries a large number of functions such as providing a place to live, work, socialize, and so on. The perception of function realization comes from the public. Therefore, architectural design needs to meet the various needs of people's lives and constantly improve the degree of humanization. In addition, architectural design needs to comprehensively consider all aspects of people's physiological and psychological needs to create a comfortable living space. Further, to meet social needs, it is necessary to consider the culture, aesthetics, functionality, and sustainability of buildings in various aspects, to improve people's quality of life and promote the sustainable development of society.

To summarize, the theory of urban architectural design and the theory of public demands have been developed over a long period and have helped to build a series of traditional buildings that can meet people's daily basic needs. However, as the economy continues to grow, material life is gradually enriched, and people's demand for a better life is growing, so people's demand for urban architectural design has also been elevated to a new level. This is also the current research gap: traditional architecture can no longer fully satisfy the public's higher level of demand, what are the emerging aspects of modern architecture that should be designed to meet public demands? This will be the direction of design optimization that urban architecture needs to explore urgently.

3. Public Demands Analysis

3.1. Classification of Public Needs

For the study of public demands, it is important to first categorize public demands. Scholars such as Lomov, Lederer, and Maslow have fully articulated the importance of needs research in their works. Although there have been several schools of thought that have theoretically explored the issue of

needs, they all lacked a scientific classification method, which led to the inability to effectively organize the division of labor within the discipline [3]. Therefore, public demands should first be categorized scientifically to solve the problem effectively. Through the theoretical analysis of several literatures, public demands are mainly categorized into material and spiritual needs. For material needs, people need to satisfy the basic material conditions required for daily life, such as clothing, food, housing, and travel, as well as other necessities of life, which are usually related to the level of social development. While spiritual needs are more abstract needs, mainly including physiological, psychological, and cultural needs, spiritual needs are more important for improving people's sense of happiness. In addition, the scholar Zhang Pulin pointed out that health is the most basic requirement for human survival, which is as important as food, clothing, housing, and transportation, so the demand for health is also the public attention of modern society [4].

3.2. Analysis of the Current State of Public Demands

In modern society, with the improvement of material living standards, people's material needs have been satisfied. Spiritual needs have a higher level than material needs, only after the basic material needs are satisfied, people will begin to pay attention to the needs of the spiritual level, but also more and more people begin to pay attention to environmental protection and the aesthetic value of the building. Currently, the needs of urban residents in China have shifted from satisfying survival needs to pursuing enjoyment and development [5]. The pursuit of enjoyment can be regarded as people's desire for more physical and psychological well-being, such as the pursuit of the release of physical and mental stress under the harmony and unity of the daily living environment and nature, the positive emotions brought about by the relaxation and comfort of the workplace, and the sensory enjoyment brought about by the collision of architectural design and art. The pursuit of development is a reflection of people's desire to keep pace with the times, such as the convenience and technology brought by "smart homes" and green buildings that respond to the concept of environmental protection without losing practicality. Public demands are diversified and personalized.

3.3. Difference between Public Demands and the Current State of Architectural Design

For a long time, the architectural profession has been trying to explain what the purpose of architecture "is" rather than what it "should be". The pursuit of modern architecture for its functionality inevitably ignores the objectivity of human spiritual needs in some aspects. For example, scholars Sajal Chowdhury, Masa Noguchi, and Hemanta Doloi have pointed out that the relationship between the user's spatial and psychological experience and the environment is not adequately addressed in today's architectural design [6]. The fast-paced modern urban life under the public's psychological state of the building can provide health and mental adjustment and other functions of the increasing demand, which contradicts the current situation of architectural design is not enough humanized, living contradiction has become a major problem that needs to be solved [7]. In the final analysis, architecture should ultimately return to human life, contemporary public demands have risen to the spiritual level, while architectural design is more stuck in the pursuit of a material level of practicality, this lag is in urgent need of change [8].

4. Case Study

4.1. Amsterdam Success

How high-quality modern architecture should adapt to changing times and needs. The Amsterdam Public Library, designed by Dutch architect Jo Coenen, provides inspiration for this. First of all, due to site constraints, the library is to be developed vertically. In order to meet public demands for diversified functional spaces, libraries are designed with clear zoning, with different zones assuming different functions, such as reading zones, rest and recreation zones, and public zones. At the same time, there is a clever connection between each partition, such as the escalator with a sense of movement at the bottom of the upward transition to the central area surrounded by delicate glass to

bring a sense of transparency and tranquility, from the sense of movement to a sense of tranquility, corresponding to the public area from the more noisy to the quiet reading area, the spatial function of the transition, and the harmonization of the transition of such areas to give a sense of spatial continuity. Each of these zones has a similar characteristic: the rationality of lighting. The architects combined natural light with artificial light through a unique design, creating a favorable light environment for the library and at the same time bridging the distance between indoors and outdoors. Secondly, the simple interior style of seating, desks and bookcases gives visual enjoyment and integrally provides the public with a healthy and enjoyable reading experience. While the whole has been perfected to fulfill the main function of the library, the introduction of a restaurant, an auditorium and a landscaped terrace on the top floor of the library, people can enjoy reading while enjoying the beautiful view of Amsterdam. Overall, the design of the Amsterdam Public Library demonstrates the versatility of a modern library, the openness of the space, the comfort of the environment, and the sustainability of the design, and is a successful, high-quality modern building.

4.2. China Success

There is also no shortage of excellent modern architectural design practices in China, with the Tencent Building in Chengdu being a prime example. The first is that its overall structure is adapted to the local conditions, again with limited sites, and built on two parcels of land that are diagonally close to each other and separated by a city road. In the upper middle part, the designer spreads the individual floors horizontally and combines them with a vertical step-by-step elevated terrace-backward layout, so that the two parcels of the building are diagonally high at the far end and diagonally low at the near end, which is just right to meet the lighting needs of each floor. At the bottom there is a large amount of elevated design that allows the city road to be integrated into this whole, facilitating public transportation and interacting with the building and the city at the same time. Then, the interior design practices green concepts and meets human needs: the architects realize the harmony between people and the environment through the design of open internal courtyard spaces, roof gardens, good natural lighting, and ventilation, as well as facilities to promote green travel, etc., so as to make the whole space more relaxing and pleasant, and to satisfy the staff's needs for a relaxing and pleasant working environment and team exchanges [9]. There are also comprehensive exercise halls, food and beverage halls, and elevator distribution that conforms to the retired platform, etc., which take into account the needs of employees in all aspects and make the whole space more relaxing and pleasant. At the same time, it also meets people's needs for artistic aesthetics, with a wave design for the longitudinal facade of the building's glass and the balconies of the inner courtyard facade, which strengthens the overall sense of the flow of the building and echoes the aesthetics of the digital age. In summary, the design of the Tencent Building in Chengdu emphasizes wholeness and comfort, while pursuing the harmony and unity of the daily working environment with nature, which is oriented to meet the needs of people in terms of health, psychology, and spirituality.

4.3. Comparison and Inspiration

The above two well-known buildings have similarities in design, with clear spatial zoning of the building, rich and diverse functions, and at the same time appropriate articulation of different areas. Both pay special attention to natural lighting, ventilation, the surrounding environment, and other factors on the impact on people. They are closely integrated with the concept of sustainable green, and both with the main function of the building, the urban style of the harmonization of the aesthetic experience, and so on. However, there are relevant differences: also constrained by the site, the main function of The Amsterdam Public Library considers the public, and the overall space is unfolded vertically with increased depth to create as much serenity as possible. The main function of the Tencent Building in Chengdu takes into account the employees, with single-floor spaces spreading out horizontally as much as possible, controlling the depth, accommodating more workstations per unit area to facilitate team exchanges, and so on.

Analyzing the two cases provides relevant insights for this study. Despite the similarities and differences between the two buildings, they are both designed to meet the diversified needs of the modern public, prompting modern buildings to optimize their main functions as much as possible, but also to appropriately enrich other ancillary functions. Consideration of the impact of the building's lighting, environmental landscape, and other factors on people is a top priority. At the same time, architectural design practicing the concept of green environmental protection and integrating into the city according to local conditions are all excellent aspects that can be referred to in creating high-quality modern buildings.

5. Principles of Urban Architectural Design for Public Demands

5.1. Versatility and Open Design

The Amsterdam Public Library and the Tencent Building in Chengdu, as typical modern architectural designs, meet the needs of the public in many ways, embodying the design concepts of multifunctionality and openness. Multifunctional design of architectural space mainly means, diversifying the form and structural elements of the space, getting rid of the traditional single element and making it replicate diversity [8]. By introducing elements such as movable partition walls and folding furniture, the space is extended to be customizable to a certain extent, so that it can be better adapted to different uses and meet changing needs. Open design, on the other hand, is to extend the building space as much as possible, such as the use of glass curtain walls, open balconies, etc., can realize the clever integration of indoor space and the surrounding environment, coupled with multi-level traffic, so that the different spaces are connected to each other to penetrate and improve the sense of freedom and flexibility of space. In this kind of open architecture, the interaction and communication between people and space, and between people and people will also be further promoted.

5.2. Cultural and Artistic Expression

Chinese and Western architectural designs map out different artistry and aesthetic spirit in terms of artistic characteristics and spatial layout. Different buildings in the design of its characteristic "artistic language" to express different ideas and emotions, carrying different cultures and people's beliefs [10]. Therefore, whether indoor or outdoor, the design of urban architecture applying the language of culture and art has an important value in meeting people's spiritual needs. Introducing artistic and cultural elements into the architectural design, such as special geometric design, using unconventional building materials such as wood, bamboo, etc., and integrating the architectural design with local history and culture or modern style according to local conditions. These artistic and cultural attributes can make the building present different forms of creativity, have different styles of collision, detach from stereotypical buildings, and comply with people's pursuit of all kinds of beauty, which can not only give people a strong visual sensory stimulation but also bring a deep feeling of spiritual emotion, so as to meet people's spiritual needs for artistic aesthetics.

5.3. Sustainable and Environmentally Friendly Design

With the growing need for a better life and the increasing status of health needs in people's minds, urban architectural design should also be centered on the concept of green sustainable development to construct urban buildings with environmentally friendly design [11]. A green building endowed with sustainable functions by the times aims at reducing energy consumption, realizing harmonious coexistence between people and the environment, and improving the comfort and health of people's living. It is necessary to comprehensively consider the local climate where the building is located, the building scale and other design parameters, the use of green building materials, solar energy, and other renewable energy systems, to optimize the appropriate natural lighting and ventilation design, and to improve the efficiency of the use of indoor space and functions. Excellent green sustainable design not only helps to improve the quality of the building and reduce its operating costs but also

creates a high-quality indoor environment with appropriate parameters such as temperature, humidity, air quality, etc., which further improves the public's living experience and protects the public's physical and mental health needs [12].

6. Suggestion

6.1. Implementation Strategy

Now that there is a theoretical basis for urban architectural design, it is correspondingly essential to discuss the realization of buildings that meet public demands. Combined with the case studies in this paper, the following feasible implementation strategies are designed:

Firstly, the role of public participation in urban planning and construction should be emphasized and optimized. Public participation can reflect public demands more generally and is directly related to the core of public demands and building design. Decision-makers in government or urban development can listen to the public on multiple platforms to optimise public participation in decision-making. And the government provides more support to facilitate the implementation of good design concepts. At this stage, with the integration of high-tech and modern construction, green building materials and environmental design, and other widely promising, but also mainstream trends of the future building, the government can provide support for some areas of the pilot, to promote the accumulation of experience and innovative development of these technologies, excellent design concepts.

Secondly, relying on big data, a dynamic data collection system is established in the urban planning system to improve the efficiency of urban information processing. In the previous section, it was mentioned that the public expresses its demands in urban planning, but -the general public has limitations in terms of professionalism compared to architects. As urban construction does not happen overnight, public demands may also change with different factors, often resulting in the actual function of the building "lagging ", which is also a major difficulty for the current urban planning to respond to public demands. Therefore, in addition to the subjective expression of public demands, there should also be objective data analyses as a basis, and big data analyses in the context of digitisation provide just the right facilitation. Comprehensively analysing real-time information such as urban traffic and population changes to make up for the "lag" in construction as much as possible and exploring the potential needs of the public while improving the existing ability to discover and solve problems [13].

Finally, there is also a need to reserve space for the city to develop and gradually carry out the transformation of modern buildings to a higher quality. The design of modern buildings should continue to progress, but at this stage, there are still a large number of ordinary buildings that cannot meet public demands at a higher level. Their renovation and renewal should be gradual, and for this reason, the early stages of urban building planning should have expectations for future development and allow for flexibility in renovation.

7. Conclusion

This study finds that high-quality urban architectural design is important for meeting public demands and helps to improve the value of buildings and the quality of public life and proposes a series of design principles and implementation strategies oriented to public demands. Therefore, urban architectural design should focus on the core of human beings, need to take into account the public's physiological, psychological aesthetic, and other aspects of the needs to take relevant optimization measures for urban architectural design, to achieve a harmonious symbiotic relationship between human beings and buildings, the environment and other aspects. Although relevant conclusions and certain results were obtained, this research methodology limited the scope and depth of the study to some extent. For example, how to integrate high technology more rationally in the design of urban buildings and use intelligent buildings to meet the needs of the general public. While

modern architecture meets the needs of the general public, there is a lack of in-depth discussion on how to incorporate appropriate designs that take into account the special needs of special populations such as children, the elderly, and people with disabilities. Future research can combine a variety of research methods such as surveys, observations, interviews, etc., to investigate different cultural backgrounds in a wider range of areas and at multiple levels, to obtain more information about the public demands for reference in architectural design. Modern high-tech has long shown great potential, and it is equally attractive to carry out in-depth research on its application in architectural design and supporting facilities, to pave the way for the birth of the desired intelligent buildings. In the current context of "peak carbon dioxide emissions" and "carbon neutrality" are looking forward to future research, including but not limited to, how high-quality modern buildings can replace traditional buildings in their functions.

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