Topic: Chinese Localization and Cultural Inheritance of Modular Architectural Design Method

Thesis Booklet

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Research Background and Significance

Research background

General Background

China is facing large-scale rural reconstruction. The Chinese government needs a fast, efficient and economical construction method to solve this situation. **Modular architectural design method** can meet the needs.

Economic support

China has issued many policies to support rural transformation. In 2020 alone, the government subsidized $3.8 billion, or $13,000 per household, to support rural renovation.

Policy support

2006 "Trial Measures for National Housing Industrialization Base"

2012 "Implementation Opinions on Accelerating the Development of Green Buildings in China"

2016 "the Guiding Opinions on Vigorously Developing Prefab Buildings"

Research significance

Times saving

The characteristics of modular architecture can reduce building construction time, rapid renovation.

Economies

Factory unified production can save the cost of building materials. Modular building installation procedures are simple, saving labor costs.

Flexibility

Modular buildings can choose the number of rooms and characteristics according to the number of family members, to meet different use needs.

Localization and Cultural Inheritance

Large-scale rural reconstruction should take into account both localization and cultural characteristics. This study proposes a method of integration of modular architecture and culture to improve the recognition of modular architecture.

Research contents and ideas

Architectural spatial scale

To create "box" Spaces with different volumes.

VS

Interior spatial scale

To establish the viewpoint and link of independent interior space.

Research contents and ideas

Research contents and ideas

01

Module Composition Mode

Different space modules can be assembled, inserted and decomposed to arrange, and the same module itself can be decomposed, deformed and moved.

02

Cultural Carrying Mode and Influence Factors

A. Subjective factors

B. Objective factors

03

Innovative Applications

A. Innovative application of space transformation
B. Innovative application of space separation
C. Innovative application of modular wall materials
D. Combined application of building energy saving technology

04

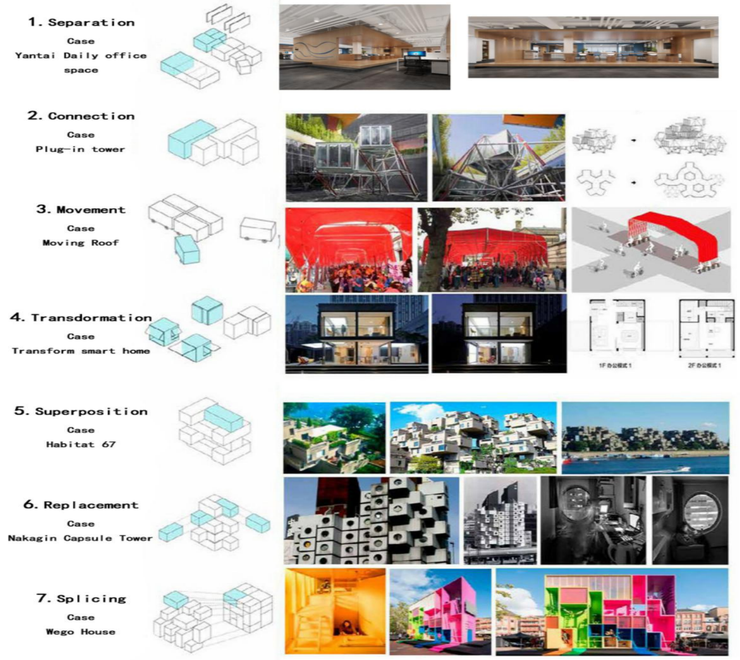
Connection mode

A. Between modules and space at different scales

B. Traffic streamline and viewpoint

01 Module Composition Mode

This research integrated the existing modular building technology, conducted a study on the module composition mode, through the famous modular building in history and my own design scheme for example demonstration, summed up seven ways of composition.



02 Cultural Carrying Mode and Influence Factors

2.1 Factors influencing the proportion of local cultural elements in modular architecture

2.1.1 Subjective factors

2.1.2 Objective factors

2.1.3 Design Artwork analysis

In the design process, architectural designers should consider both the future audience of the building and the design appeal of the client. Sometimes, the client's personal subjective factors will determine the final outcome of the project, not the architect. Therefore, the likes and dislikes of the client play a key role in the proportion of cultural elements, such as the design of personal homes, commercial spaces, etc. On the other hand, the likes and dislikes of architectural audience are also one of the main subjective factors affecting architectural design. Each individual has different degrees of acceptance of local culture.

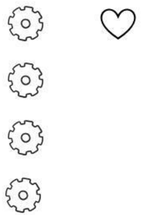
Table 1. Results statistics of questionnaire: The acceptability of traditional Chinese culture

	Below or equal to 30 years old	Above 30 years old	In Total
Accept	77.6%	83.9%	81.3%
Don't accept	22.4%	16.1%	18.7%
Total number of respondents	170	230	400

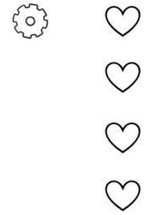
Table 2. Results statistics of questionnaire: favorite styles of architecture design

	Below or equal to 30 years old	Above 30 years old	In Total
Chinese traditional style	18%	46%	34%
European style	10%	8%	9%
Combination of Chinese and modern style	43%	42%	42.5%
Modern style	16%	4%	9%
Others	13%	0%	5.5%
Total number respondents	170	230	400

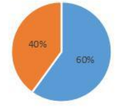
Chaoyang Road Museum

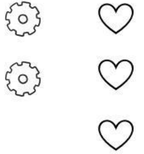


Space Transform Bookstore

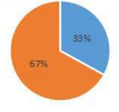


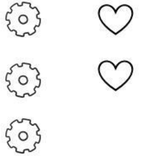
Yin House





Yantai Daily Newspaper Office





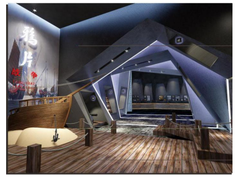
=Objective Factor =Subjective Factor

2.2 Cultural Carrying Mode of Modular Architectural Design Method

2.2.1 Masterwork: Yin House architectural design project：The whole building as a cultural carrier

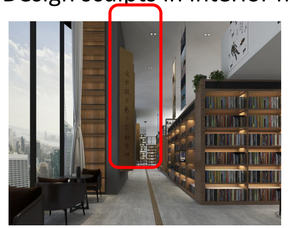

2.2.2 Design Scheme of Chaoyang Street Museum: timeline as the clues, whole interior space as cultural carrier





2.2.3 Commercial bookstore design project:

Design sculpts in interior modules as cultural carrier



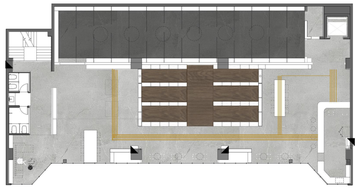

2.2.4 Yantai Daily Office Design Project: Box inserted in interior space


As the carrier of culture, modules are used in different ways to carry culture in the four design projects, which fully demonstrates the flexibility and diversity of module architecture design method. In the expression form of cultural bearing, modular architecture also has a richer way of bearing, from concrete to abstract to reflect the connotation of local culture. The flexibility and diversity of modular architectural design method is also reflected in the different performance effects of single culture bearing mode. Under the flexible and diverse cultural carrying modes, modular architectural design method can better adapt to the design needs of customers and designers. This design method can break away from the traditional rigid industrial building modules, and play its role in the inheritance and development of local culture.

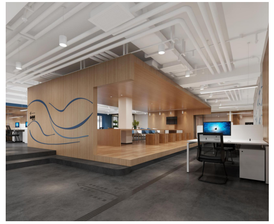
This part mainly summarizes the connection mode.
The first is the common module connecting module, which constitutes the whole module building.
The second is the connection between module and space at different scales. Take the office space of a daily newspaper as an example. As can be seen from the floor plan, the space is set up with 3 modules, which rearrange the space on the scale of the interior space.

03 Innovative Applications

3.1 Innovative application of space transformation



3.2 Innovative application of space separation



3.3 Innovative application of modular wall materials:

Green building materials - straw board

3.4 Combined application of building energy saving technology:

Solar photo-voltaic building integration

The third is the innovation of wall materials. Existing modular buildings mainly use steel plates as the main wall, while in Yin House project, I used straw board as the wall material to make modular buildings closer to green buildings.
The fourth is the combination of module and energy-saving technology. Including solar energy, ground source heat pump, etc.This proved to be feasible in the project.

04 Connection mode

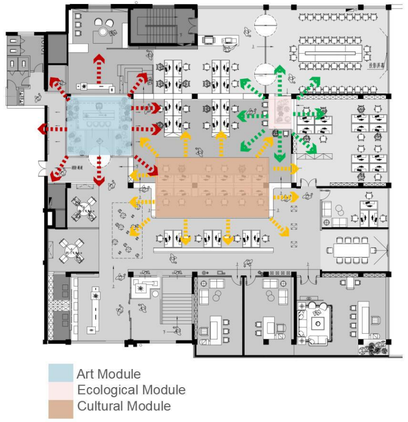
4.1 Connection mode of modules and modules




4.2 Connection mode between modules and space at different scales

A. Commercial bookstore design project：

B. Daily office space design project：



4.3 Connection mode of traffic streamline and viewpoint

4.3.1 Visual perception analysis

4.3.2 Visual field analysis

4.3.3 Viewpoint analysis


This part mainly summarizes the connection mode.
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The second is the connection between module and space at different scales. Take the office space of a daily newspaper as an example. As can be seen from the floor plan, the space is set up with 3 modules, which rearrange the space on the scale of the interior space.
The third is connected by traffic streamline and viewpoint. Through the analysis of people's visual field, the modeling is placed in the concentrated position of the visual field in each module for visual guidance. At the same time, the flow of traffic in the space can be designed to achieve the visual illusion of connecting all the modules together.

Conclusion

New modular buildings are developing rapidly in China under the background of the demand for rural renovation and government policy support. Since it is difficult for traditional modular building and design to cooperate, new modular building design methods need to be supported by theory and innovated by practical experience. Compared with the traditional modular building, the modular design method proposed in this research is a design method more in line with the current situation of China. In addition to meeting the different design needs of designers, it can also better integrate with the local culture.

This research mainly applied in the innovation of the modular construction, cultural load mode, module connection mode and influencing factors of the proportion of local cultural elements, the modular architecture design method discussed based on the theory of design practice project, hope to be able to increase a new design method that can be the design of the combination of native culture and contemporary architecture design method. The innovation points in it also can inspire new ideas and ideas for other architectural design methods. At the same time, modular building design method is not only applicable to China, for some other countries that have mastered the new modular building technology, this research is also of reference significance.

Lack of Research

However, the number of design cases in this research is insufficient, most of which are theoretical analysis and subjective description, and lack of sufficient research samples and quantitative analysis. In the future, evaluation studies on modular architectural design projects will gradually increase. The quantification of data will make the research results more accurate, and then compare them with this research results to verify and correct them.