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Optimization and Combination of Green Building Design in Architectural Design

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Abstract: ***With the advancement of urbanization in China, environmental pollution and resource and energy consumption are becoming increasingly serious. All sectors of society are beginning to realize the problems faced in developing a "green" economy and environmental protection, reasonably reflecting the design principles and goals of green buildings, and fully implementing the concept of green environmental protection. In order to maintain a good relationship between the construction site and design work, and better achieve the original goals, it is necessary to provide open and environmentally friendly facilities for the construction site, adhere to the concept of sustainable development, seek the internal driving force of change, coordinate design work, make more use of civil engineering, reduce resource and energy consumption, and reduce its adverse impact on the environment.***

Keywords: Architectural design; Green buildings; Optimization and integration.

1. INTRODUCTION

In the new era, with the rapid development of China's economy and continuous urbanization, construction has become the most important pillar industry in China, driving the rapid development of China's construction industry and directly affecting people's lives. The development of the Chinese economy has improved people's quality of life, and people's demand for the building environment is becoming increasingly prominent. At the same time, it also brings opportunities and challenges to the construction industry. The human demand for beautiful buildings is not only reflected in their appearance, but also in their high level of health, environmental protection, and energy efficiency. In addition to ensuring a high level of environmental comfort, it is also necessary to achieve plant health, energy conservation, and environmental protection. All of this indicates that China's construction industry is moving towards sustainable development, and "green" buildings are actively developing. Therefore, in order to achieve green and sustainable development in the construction industry, it is necessary to systematically integrate green building technology with the living environment, and design according to the high-quality requirements for the living environment.

Green is an architectural design concept that ensures the balanced development of ecosystems through the sustainable use of natural resources without damaging the environment. This type of building is also known as sustainable and environmentally friendly. Maximize resource conservation in the design and construction of buildings, including low consumption of solar energy, wind energy, water resources, engineering materials, etc., achieve harmony between humans and nature, and share current and future benefits. From the beginning of architectural design, green buildings must take into account all the benefits of construction, including energy consumption, lighting conditions, ventilation of building materials and lighting conditions. From the selection of construction materials to the introduction of advanced construction equipment and the application of scientific engineering management methods, from the initial stage of construction to the entire construction process, construction projects must be structurally improved with "green" development as the core.

2. THE IMPORTANCE OF APPLYING GREEN BUILDING TECHNOLOGY TO ARCHITECTURAL DESIGN

Maritime traffic safety has always been a concern of people. Due to the deepening of world economic integration, the closer communication between countries in the world, and the increasing volume of international trade, maritime transportation has become increasingly busy, but the related accident risk also increases. How to minimize the risk and avoid accidents has been the focus of scholars, the shipping industry, governments and international organizations. Maritime transport has a complex operational and safety system. Most accidents occur because of deficiencies in human, ship and environmental systems. With the increase in tonnage of ships, the density of ships passing through important waters and waterways is also increasing [1]. Coupled with the construction of large-scale ocean engineering, this inevitably leads to the increasingly complex maritime traffic environment. Various maritime traffic accidents such as ship collisions, grounding, fire, explosions and sinkings occur from time to time. This not only causes serious economic consequences but also pollutes the Marine environment. With the increasing maturity and development of maritime transport channels, more and more research on maritime transport safety risks has been carried out [2].

There are some motion and change processes in nature that can be described by differential equations, but such regular and good behavior is very rare. On the contrary, many uncontrollable and unpredictable events occur in nature and society, which are

non-calculable functions. Abrupt change theory is precisely the condition that can describe gradual changes in motion or abrupt changes. What the abrupt change theory wants to solve is the abrupt phenomenon of continuous change, so it is bound to be related to the qualitative theory of the solution of the differential equation, as well as to the topological characteristics, which can well predict and evaluate the occurrence of some events. Risk evaluation is the premise of risk prediction, and risk prediction is the core of risk evaluation. Through the study of maritime traffic risk assessment, the future safety situation of the maritime traffic safety system can be mastered, the level of maritime traffic safety can be predicted, and corresponding preventive measures can be taken to effectively control the risk of maritime traffic and reduce the casualties and property losses to the minimum or acceptable range [3].

2.1 Changing the past pattern of resource waste

Entering the new era, China's economy has achieved rapid development, making China's urbanization process exceed the scale and level of history. However, the continuous expansion and development of urbanization cannot do without the consumption of resources. Therefore, the rapid development of urbanization means excessive consumption of resources, and the use of green building technology has solved the problem of insufficient urbanization development and achieved a transformation of the development system. By introducing green building technology, resource recycling can be achieved, promoting coordinated industrial development, and in line with the sustainable development strategy proposed by the Chinese government. Promote green building technology in the process of urban construction, effectively utilize resources and energy, reduce resource consumption through urbanization, raise people's awareness of green development, and promote the construction of infrastructure bases in China.

By eliminating the; c is the bifurcation point set equation, and the bifurcation point set equation is the total number of points where the form of the potential function changes. Through the bifurcated point set equation, the normalization formula can be derived. The normalization formula is to normalize the different quality of each control variable of the system into the same germplasm that can be compared, so as to carry out quantitative recursive operation on the system, and obtain the total mutation membership function value of the system, which represents the system state, and take this as the basis for comprehensive measurement. In this paper, the mutation model will be improved. According to the established mutation model (namely, the cusp mutation model), the recursive operation will be carried out layer by layer from the factor layer according to the corresponding normalization formula, which shall follow the "complementary and non-complementary principle".

2.2 Important ways to promote energy conservation and emission reduction

The rapid development of China's economy is accompanied by excessive consumption of resources, uncontrolled development, excessive utilization of natural resources, and frequent occurrence of natural disasters. People's attention to environmental protection is also increasing. To achieve environmental protection, the Chinese government advocates environmental protection concepts and energy-saving and emission reduction lifestyles, and implements resource and environmental protection. Introducing "green" buildings is a concrete implementation of energy-saving and emission reduction policies, and is also an important way to achieve "green" development. Chinese cities use green buildings for construction, which are widely present and have contributed to China's sustainable development. Factors influencing the integration of green building technology in architectural design. Before construction, relevant personnel must make corresponding preparations. Green building planning is irreversible, and if there is green building planning, the smooth progress of construction work is to some extent guaranteed. Meanwhile, the planning and construction process of green buildings should be synchronized with building construction,

To avoid investing a large amount of resources in the processing of corresponding buildings in the next stage, so that the concept of green building can be fully reflected in the construction process. At the same time, in the process of green building, it is necessary to fully demonstrate the technical performance of the building, improve the structural system of related buildings, and improve the functional value and quality of the building. When planning a building project, it is necessary to fully consider energy needs and related building functions to ensure that lighting, ventilation, water pressure, and building functions meet necessary standards. The construction process should maximize the sustainable utilization of renewable resources, expand the scope of green building technology, fundamentally improve the efficiency of human, material, and economic resource utilization, reduce the possibility of waste of energy and building materials, and strengthen the management of construction investment costs. In the process of developing a green building plan, the employees involved must explain some possible issues that may arise during the construction process and building design [2]. In addition, the construction process is strictly carried out in accordance with the construction process regulations and construction drawings. The green building plane design improves the depth of work optimization, minimizes the confusion caused by external environmental factors, ensures that the expected results are achieved after construction, and improves the quality and efficiency of green buildings.

3. STRATEGIES FOR OPTIMIZING AND COMBINING GREEN BUILDING TECHNOLOGY IN ARCHITECTURAL DESIGN

There are many risk assessment methods for different aspects, and the common risk assessment methods mainly include analytic hierarchy process, N-K model, explanatory structure model, mutation progression method, etc. In order to select the method suitable for this study, the advantages and disadvantages of each method are compared in this paper, as shown in Table 1.

Table 1: Comparative analysis of coupling risk measurement method

Method name	merit	shortcoming
Analytic hierarchy	Comprehensive, Simple and practical, Less quantitative data is required	Measures that are too subjective and don't apply too much metric data
Interpret the structural model	The ability to decompose complex systems into clear subsystems	The process relies on subjective judgment and lacks objectivity
N-K model	Ability to measure the results of interactions between factors in complex systems	Complete historical data is lacking
Mutational progressional method	There is no need to consider the weight of risk factors, and comprehensively consider the relationship and impact of risk factors	Key risk factors need to be selected

In this paper, the results of risk factors at key nodes of maritime transportation should be measured. On the one hand, the risk factors themselves and the relationship between risk factors should be considered. On the other hand, the results of risk factors should be comprehensively considered. Although the N-K model can measure the results of the research problems in this paper, the processing process of the N-K model needs to completely rely on data and cannot consider the characteristics of the risk factors themselves. Therefore, the mutation progression method is the most consistent with the requirements of this paper [4].

Abrupt change progression method is a multi-criteria measurement method based on abrupt change theory, which can consider the characteristics of risk factors and coupling mechanism between key nodes of maritime transportation, and can establish a multi-level and multi-criteria measurement model of risk factor coupling effect. The mutation progression method can avoid the weight analysis of risk factors, but can take into account the importance of analysis factors. At the same time, the comprehensive effect value can be calculated according to the established hierarchical structure, which can be used as the basis for the overall comparison of risk size.

3.1 Optimization and integration of green concepts

Integrating green concepts into green buildings requires selecting energy-saving building technologies to improve the entire structure. Designers can examine the scientificity and attention of foreign high-tech green building technology, combine foreign green building technology with national conditions and business development realities, and create green buildings with Chinese characteristics. In the new era of socialism, the green concept has been widely applied in construction and has achieved good results. Therefore, in the specific application process of the green concept, attention should be paid to optimizing the combination to promote continuous innovation and optimization. Green building technology is an important guarantee for the quality and safety of construction projects.

(1)The hierarchical structure established by the factor analysis method adopted in this paper builds four layers as shown in Figure 1, in which layer A is the calculated value of the final risk coupling measurement of each key transport node. According to the coupling analysis of risk factors in Chapter 2, it is known that the final degree of risk coupling is determined by the vulnerability and adaptability indexes of key nodes of maritime transportation. Therefore, layer B is divided into two aspects: vulnerability and adaptability indexes. The number of factors in layer C, i.e. the value of n, is determined by the calculated contribution rate of cumulative variance. The number of factors contained in each factor in layer D, that is, the value of m, is determined by the calculated factor load. In addition, the importance of each layer decreases from left to right. For example, in layer C, factor 1 is more important than factor 2 to the vulnerability index or adaptability index, similarly, factor 2 is more important than factor 3 to the vulnerability index or adaptability index, and so on.

(2)During the establishment of the mutation model, the upper layer confirms the mutation model according to the lower layer, that is, layer A establishes the corresponding mutation model according to the number of factors in layer B. At this time, the factor in layer B can be regarded as the control variable, and its dimension determines the final mutation model. It can be seen from Figure 1 that it conforms to the cusp mutation. Similarly, the mutation model of each factor in layer B is determined by its corresponding number of risk factors in layer C.

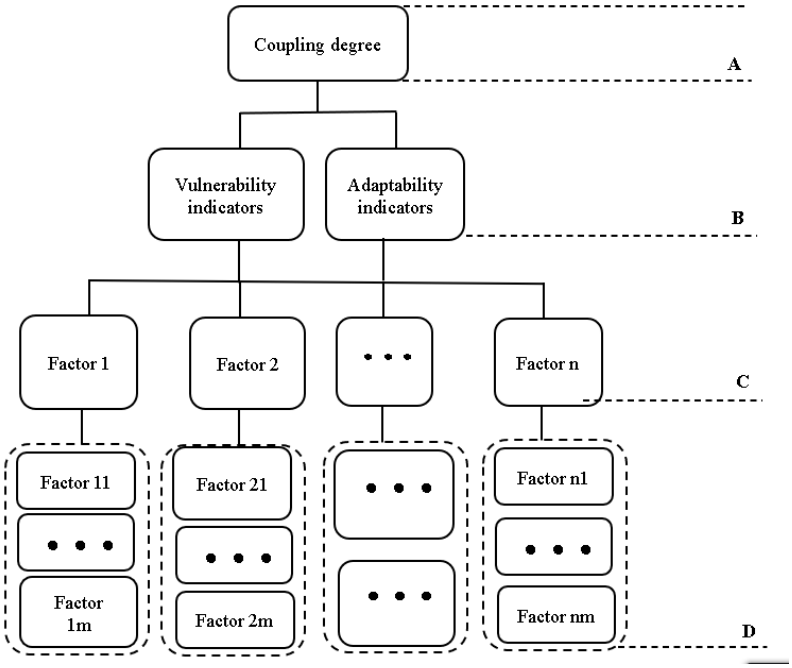

Figure 1: The diagram of hierarchical structure

3.2 Optimization and integration during the planning stage

In the construction planning stage, in order to effectively implement the green concept, it is necessary to carefully study the climate characteristics of the construction site and develop a green concept construction plan to maintain its popularity. Especially computer simulation technology can be used to optimize building orientation, thermal energy, light energy, wind energy and other resources during the construction process, and adjust and utilize natural resources through reasonable and efficient planning and design. In order to achieve building sustainability, reliance on resource consumption has also been reduced. For example, computer systems can be used to optimize aircraft structures and effectively match building shadows with their planar structures. This enables the room structure of the building to achieve and reduce the optimal conditions for sunlight and ventilation. By harmoniously connecting buildings with the environment, the optimization combination of green building technology and architectural design has been achieved, enhancing the living experience of homeowners.

3.3 Strengthening the Climate Adaptability and Optimizing Design of Buildings

When designing green buildings, it is necessary to consider the local climate conditions. In recent years, with the rapid development of China's economy, many events and problems are causing damage to the environment. In some areas, such as winter fog, extreme heat, and cities that are greatly affected, the environment and climate are deteriorating. These changes in the external environment cannot be solely considered through environmental technology. It is expected to optimize the building performance in green building design based on the local climate conditions of the building, and its climate adaptability will continue to improve. In green building design, various factors such as building scale and technical structure have a significant impact on energy conservation and environmental protection during building operation. There are many things to consider when designing green buildings. According to the local natural environment and cultural conditions, the architectural design must adapt to the climate environment, the internal spatial structure must be continuously optimized, and energy-saving, environmentally friendly, and recyclable engineering materials must be reasonably selected and utilized. Materials should be used to avoid adverse natural conditions affecting the building and ensure that it meets practical requirements. Recognize the concept of green building technology, adhere to environmental protection, and achieve efficient utilization of environmental resources. For example, when constructing a park, it is necessary to have an accurate and extensive understanding of the existing natural environment, such as pre existing lakes, and fully consider the characteristics of the original terrain.

3.4 Optimization and Combination of Building Energy Efficiency Design and Form Design

There is an important difference between green building design and architectural design, mainly because we use quantitative analysis rather than empirical knowledge when designing green buildings. In this regard, it is necessary to fully leverage the role of green buildings. Quantitative analysis methods can analyze the impact of energy consumption on building design through computer simulation, in order to reasonably optimize building design. In order to meet the requirements of green building and achieve the goal of green building, it is necessary to simulate energy consumption through computer in building engineering planning, effectively combine energy optimization and efficient design with green building design, and further optimize the impact of green building on design. The design method adopted in architectural form design should not only ensure the

aesthetics of the building, but also effectively combine with green building design to achieve the aesthetics of the building. Taking the design of the Swiss Re Building in London as an example, the surface of the building is pink conical, similar to a natural spiral curve, with many dark stripes of spiral structures on the surface. One side of the surrounding building is flattened and occupied by window frames that cross the curtain wall. Due to the difference in atmospheric pressure between the upper and lower layers, natural wind energy flows upwards, effectively achieving natural ventilation.

3.5 Optimization of enclosure structure design

The design of closed structures is also a very important material. In northern regions with relatively low temperatures, wall design must ensure privacy and insulation, and walls should be made of materials with high insulation performance. If there are holes in certain parts of the building, certain measures must be taken to prevent them. There are three main methods for designing energy-saving roofs: one is to install insulated roofs. This method requires sufficient temperature inside the building and insulation materials that are not easily damaged by strong winds and rain. Therefore, it is necessary to maintain the structural layer and add an air barrier layer to remove moisture. The second is to flip the insulated ceiling. This method uses an insulation layer in the waterproof roll material, resulting in excellent sealing effect of the entire roof and greatly improving the energy-saving effect. The third is planting roofs. This method reduces the temperature of shells and plants through evaporation, boiling, and shading, which has a beneficial impact on the environment. In architectural design, doors and windows are the key to internal and external heat transfer. If the design is more scientific in actual design, problems such as insufficient insulation of doors and windows and insufficient indoor heating may occur. Therefore, the design of doors and windows should combine green building technology, use energy-saving and environmentally friendly insulation materials, and maximize the insulation capacity of doors and windows.

3.6 Optimization and integration of lighting and shading design

Nowadays, light and dark structures are widely used in public places such as train stations and have achieved significant results. In public places, such as train stations, due to the large size and area of the building, the side lighting capacity of the building is not very good. Meanwhile, due to the high intensity of sunlight in summer, buildings are exposed to dynamic sunlight for a shorter period of time, making it difficult for the sun to evenly illuminate the buildings. Therefore, this type of building requires a large area and high luminosity, and a wide range of glass curtain walls must be installed to meet the actual lighting needs of the building [5]. As the waiting room of the station is crowded with passengers, in order to keep the waiting room clean, the average temperature of the crowded area can be kept below 25 ℃. Meanwhile, utilizing sunlight and shading can reduce the use of refrigeration equipment such as air conditioners and reduce energy consumption, Save a lot of energy. If a glass roof and glass wall are installed, a layer of anti shading layer needs to be applied to the roof and wall to achieve good results. Maritime transport plays a pivotal role in foreign trade and world economic growth. However, the catastrophic nature of maritime accidents has posed a serious threat to life and the environment. Maritime transport safety is a complex system susceptible to human, equipment and environmental risks. Based on the catastrophe theory, this paper evaluates the risk of Marine traffic, discusses the current development of Marine traffic, the current situation of the Marine traffic environment, and analyzes the applicability of catastrophe theory and the value of Marine traffic safety risk assessment. The basic principle of catastrophe theory is also introduced, and the analytic hierarchy process, N-K model, interpretive structure model, catastrophe series method and other Marine safety risk assessment methods are compared. The catastrophe theory is selected for Marine traffic safety assessment, and the Marine traffic safety risk assessment model based on the catastrophe theory is constructed. Finally, this paper expounds on the preventive measures of Marine traffic safety based on the catastrophe theory from three aspects: humans, ships and the environment. To provide the theoretical basis for the subsequent Marine traffic safety risk assessment based on the catastrophe theory.

3.7 Spatial Layout Design in Green Buildings

As for the concept of green building design, its application in the modern urban architectural design process aims to optimize the building space reasonably, improve the rationality of the building interior, improve the utilization efficiency of related building resources, and ensure the healthy and stable development of the green building industry. With the continuous development of urbanization in China, land resources are gradually depleted, and urban buildings are gradually shifting towards high-rise buildings. This may reduce the efficiency of using glass curtain walls in the architectural design process and improve the coordination of urban building planning. For example, by constructing underground parking lots in cities, fully enhancing urban underground space and expanding urban green spaces, it can effectively promote the good development of the city and also have great benefits for people's daily lives.

3.8 Functional Design in Green Building Design

For construction enterprises, the main purpose is to achieve the relevant functions of green buildings, meet the real needs of different populations, apply scientific and reasonable building design, and improve the performance and adaptability of

buildings. For example, measuring the environment, geographical location, and distance between buildings at the construction site, and adjusting accordingly. In addition, the community construction process should provide a highly integrated support system to improve community safety and environmental protection, and comprehensively implement various infrastructure deployments within the community to provide better services for residents.

It is self-evident that maritime transport safety assessment plays an important role in maritime transport, and the constant change of its risk factors has an important impact on maritime transport safety. Therefore, it is very necessary to study maritime transport safety assessment from the perspective of risk factors. The following are maritime traffic safety precautions based on the catastrophe theory.

(1)Human factor is the focus of maritime safety work. The greater the mutation membership function value in the risk decision scheme, the safer the maritime traffic safety system. Therefore, according to the membership index of factors, preventive measures are proposed in aspects of education and training, crew selection, rest and rest system, psychological consultation and performance evaluation. Training institutions should strengthen the education and training of seafarers, especially the education of safety culture; In the selection and personnel arrangement of seafarers, the physiological and psychological conditions of seafarers should be mastered, and the suitability of seafarers should be investigated. Improve your sleep schedule. In the maritime industry where human factors play a major role, the proportion caused by fatigue is as high as about, so it is particularly necessary to establish a reasonable working time system [5].

(2)Risk prevention measures for ship factors. In port waters, ships are managed by ports and shipping companies at the same time. Only when ships, ports and companies perform their duties seriously can they ensure the safety of ships in port waters. Safety management should be strengthened. Strengthen the ability of transportation ships to resist safety mutations, comply with relevant treaties of the International Maritime Organization, and conduct fire drills to improve the management level of ship organizations[6].

(3)Risk prevention measures for environmental factors. For the transportation environment, improving traffic density. Reasonably schedule ships to avoid multiple ships entering and exiting the port simultaneously, and improve transportation methods. Choose a reasonable mode of transportation for ships entering and exiting the port, reduce the time spent staying in narrow channels of the port, and improve traffic management regulations. For the natural environment, it is necessary to strengthen the lookout in the frozen area, avoid drifting large ice cubes in time to avoid sailing near the area with thick ice, and try to prevent the ice from freezing the ship's risk prevention measures in the area of high wind and waves. Listen to meteorological forecasts in a timely manner, carefully analyze the weather situation, and formulate preparation measures for preventing and resisting strong winds and waves in advance. Before sailing, stability calculations should be carefully carried out to ensure compliance with stability requirements, correct prediction of typhoons, and appropriate analysis and evaluation, to accumulate experience in typhoon prevention and resistance.[7].

3.9 Application of Green Optimization Technology in Buildings themselves

Green building is not only green building and construction, but also green optimization technology after using building products. The design of green buildings should consider several issues related to energy conservation and environmental protection: 1) The direction of building sunlight not only requires heat, but also fully utilizes solar energy. Sunward design can save heat energy. When designing green buildings, factors such as building height and space type must be considered to ensure that all rooms in the house have sufficient sunlight exposure. 2) The ventilation effect of buildings is also very important. Green building design should consider the characteristics of wind direction changes at different times based on local wind direction changes, and maximize the use of wind energy to maintain summer air while improving building ventilation efficiency. 3) When designing green buildings, thermal insulation technology formed by external walls should be considered. With the development of science and technology, various high-quality polymer materials are constantly being developed and used to improve their ability to control environmental temperature. The insulation effect makes the building warm in winter and cool in summer, improves people's living conditions, and reduces energy consumption. In addition, green building design is very important in water recycling technology, such as domestic wastewater recycling, rainwater collection system recycling, and promoting water resource recycling.

4. CONCLUSION

In summary, in the process of architectural design and construction, the rational use of green building technology is very important. It can not only promote the healthy development of resource society, but also promote the stable and rapid development of the construction industry. In order to fully optimize architectural design and green building technology, architectural design professionals must develop and innovate to promote the organic integration of architectural design and green building design. Green building design can reduce the cost of building design, ensure the effective utilization of resources, and achieve greater economic and social benefits for construction projects, continuously demonstrating the role and value of

using green building technology.

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