Research on Technology Development of High-rise Buildings Based on Modern Green Environmental Protection Theory

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Abstract. With the continuous development of construction technology in China's super-tall buildings, the construction of super-tall buildings has gradually expanded from first-tier cities to second-tier and third-tier cities. In order to create green super high-rise buildings, in addition to the rational use of key technologies in design and operation, it is also necessary to correctly grasp the current standard regulations for green buildings and green construction. According to relevant requirements and evaluation standards, correspondingly propose green the main points of construction technology, and at the same time put forward ideas for the application of clean and renewable energy in the construction process according to the current national conditions.

1. Introduction
In the construction of high-rise buildings, green construction technology is a guideline for conscientiously implementing sustainable development. It uses scientific management methods and standard operating methods to construct traditional construction technology and civilized construction, reduce noise, protect the environment, and save resources. Combined construction methods. In order to promote the improvement of good social, economic and environmental benefits, green construction technology has become the main competitiveness of construction enterprises, which can not only help the construction enterprise's image improve, but also help enterprises to ensure the quality of construction and reduce construction energy consumption.

2. Analysis of the significance and status quo of energy saving in modern buildings

2.1. Significance of energy-saving technologies in modern buildings
With the continuous development of society and economy, the economic development of all regions in the world has been promoted. Although the economic development level of each region has been optimized, it has caused a certain degree of loss in terms of resources and environment. Especially with the rapid development of the construction industry and the large number of applications of non-renewable resources, social resources have been reduced a little bit. Therefore, in the process of promoting the concept of energy-saving construction in the construction industry, it will help solve the environmental problems of the energy crisis and have a positive effect on the development of the country and society. The needs of the scientific development concept are displayed in the construction industry, mainly due to the implementation of innovations in energy-saving construction. In the process of
ensuring construction and saving energy resources, improve the construction skills of China's construction industry, and guide other aspects of China's construction industry to develop together [1].

2.2. Status of energy-saving projects in modern construction industry
According to the actual development case analysis, it can be known that at this stage, the amount of construction waste in China accounts for 13%-15% of the total amount of total garbage. Many of these huge amounts of construction waste are discarded without treatment. According to environmental protection analysis, this information data is very dangerous. There is not only one cause of this situation, but the most important one is that the construction waste is not treated properly, and building energy-saving technologies have not been comprehensively and correctly applied in engineering [2].

3. Green construction technology for underground engineering of super high-rise buildings

3.1. Downside and Downside
The normal method of underground engineering is to carry out the construction of the underground structure after the four surrounding protective structures of the foundation pit are completed. As all the foundation pits have been excavated, a large construction work surface is left for the underground structure construction, making the construction process relatively simple, Low cost, easy to control the quality of work. However, because the down-slope method is mostly suitable for shallow foundation construction, for deep foundation pit excavations of super high-rise buildings that are in dense urban areas, if all underground structures are constructed using the down-slope method, the deep pit excavation depth is large. The construction period is long, the construction area is small, and it may cause irreversible impact on the surrounding environment [3].

The reverse method itself uses the outer wall of the underground structure as the retaining wall structure for the foundation pit support, and the beam-slab structure serves as the horizontal support for the support structure, which can reduce the amount of deformation of the support structure and protect the surrounding environment; meanwhile, the reverse method is used in the basement. Digging the soil after the roof construction is completed can also effectively reduce site dust and construction noise. Figure 1 is a schematic diagram of the forward and reverse methods.

![Figure 1. Schematic diagram of the down and down methods.](image)

3.2. Construction deployment and environmental protection
At present, super high-rise buildings are mostly built in densely populated areas. Reasonable construction deployment of deep foundation pit excavations and underground structure construction can not only save construction land and reduce the impact of the construction on the surrounding area environment, but also allow the underground structure to be completed as soon as possible. Reduce the risk of irreversible environmental damage to the foundation of existing buildings, such as ground disturbances and ground subsidence.
In the actual engineering construction process, due to the large plane size of the foundation pit and the large-scale underground structure, in order to complete the construction of the underground part of the main building as soon as possible, the foundation pit construction often adopts a combination of forward and backward excavation. That is to say, the underground structure of the main building is constructed by the down-construction method, and the underground structure of the podium is constructed by the up-conversion method. In this way, the construction of the podium foundation pit will not affect the main building, and it can also provide a large ground construction space for the main building structure construction, saving construction land. Figure 2 shows the connection between high-rise building construction deployment and environmental protection [4].

Figure 2. The connection between high-rise construction and deployment and environmental protection.

3.3. Water protection
In areas with high groundwater levels, the construction of underground projects must consider the waste of groundwater during the excavation of the foundation pit. Using the lowest possible cost to effectively reduce the waste of groundwater is the key to achieving water protection in underground projects. Currently commonly used technologies include foundation pit closed precipitation technology and foundation pit water recycling technology. Foundation pit closed precipitation technology is mainly to use a closed watertight curtain with a small permeability coefficient around the pit to effectively prevent groundwater from seeping into the inside of the pit, and to extract a small amount of groundwater in the excavation area to control groundwater waste. General closed water-proof curtains include deep cement-soil mixing piles, high-pressure rotary jet grouting piles, underground continuous walls, or some supporting structures that can double as water-proof curtains. At the same time, a series of data such as changes in groundwater levels, pumped water, ground subsidence around foundation pits, and deformation of neighbouring buildings and pipelines should be continuously monitored during and after a period of precipitation [5].

Foundation pit water recycling technology consists of two parts: foundation pit construction precipitation recycling technology and rainwater recycling technology. Foundation pit precipitation
recycling technology can be summarized as "one lead and one row" two types. One guide: Infiltrate the upper stagnant water into the lower diving layer to recharge the foundation pit water to the ground; One row: Collect the foundation pit water extracted by precipitation, which can be used as domestic water for washing, flushing toilets, etc. Water, if the water body is treated or the water quality meets the requirements, it can also be used as water for structural maintenance and foundation pit support. Rainwater recycling technology refers to rainwater collected during construction, which is stored after infiltration, sedimentation, and other treatments, and is used for dust reduction and greening at the construction site. It can also be used as water for structural maintenance and foundation pit support after treatment. As shown in Figure 3, it is the content of water resources protection in high-rise buildings.

![Figure 3. Water protection for building construction.](image)

4. Green construction management measures

At present, the construction industry is still labour-intensive, and most construction entities are manufactured by laborers on site. Extensive management has always been the label of this industry. Super high-rise buildings are technically difficult, there are many units involved in construction, and the procedures are complicated. In order to achieve green construction, strengthening management is the top priority.

4.1. Establish a green construction management system

As shown in Figure 4, the Green Construction Management Committee is a management organization established specifically for the management of green construction of the project. Direct project managers. This green construction management system helps to comprehensively consider the green construction requirements in project implementation, and facilitates the organization and execution of construction tasks in various departments of the project.
4.2. Decomposition of Green Construction Management Responsibility

As shown in Table 1, the project manager is the first person responsible for green construction. He is responsible for the organization and implementation of the green construction and achieves the goals. Relevant project main management personnel also have a clear division of responsibilities to ensure that various tasks of green construction can be effectively implemented. See Table 1 for the assignment of green construction management responsibilities for a super high-rise project [6].

| Serial number | Position / department | Green Construction Management Duties |
|---------------|-----------------------|--------------------------------------|
| 1             | project manager       | Implement green construction laws and regulations and various rules and regulations, and take full responsibility for green construction throughout the project construction process |
|               | Chief engineer        | Take overall technical responsibility for green construction, strictly review technical plans, technical details, etc., implement national environmental management guidelines and policies, and strictly implement technical regulations, specifications, and standard documents |
| 2             | Security manager      | Implement and publicize relevant green construction laws and regulations, organize and implement various green construction rules and regulations, and supervise and inspect |
| 3             | Deputy Manager (Production Manager) | Responsible for implementing green construction measures, participating in green construction inspections, proposing corresponding rectification measures, and supervising implementation |
| 4             | Deputy Manager (General Contract Management) | Participate in green construction inspections and propose corresponding rectification measures for non-conformities detected; be responsible for implementing green construction related measures such as materials and equipment |
| 5             | Deputy Manager (Logistics Support) | Responsible for logistics management, epidemic prevention management, security management, etc. |

*Figure 4. Organization Structure of Green Construction.*
5. Technical development of high-rise buildings with green environmental protection index system

5.1. Model Check
After the green technology management indicator system was established, the structural equation model analysis software was used to fit the model for the first time. The results showed that the fitness indicators basically met the standards, and only a few indicators did not meet the standards. Therefore, the model was revised. The model fitting indicators are shown in Table 2. Each indicator basically reached the standard, indicating that the green construction technology management model constructed in this paper is good.

| Statistical test | Adaptation standard | Before model modification | Model adaptation judgment | After model revision | Model adaptation judgment |
|------------------|---------------------|--------------------------|--------------------------|---------------------|--------------------------|
| Absolute fitness index | | | | | |
| MRR | <0.05 | 0.052 | no | 0.041 | Yes |
| RMSEA | <0.08 | 0.084 | no | 0.051 | Yes |
| GFI | > 0.9 | 0.870 | no | 0.906 | Yes |
| AGFI | >0.9 | 0.903 | Yes | 0.911 | Yes |
| Value-added fitness index | | | | | |
| IFI | >0.9 | 0.887 | no | 0.914 | Yes |
| TLI | >0.9 | 0.868 | no | 0.921 | Yes |
| CFI | >0.9 | 0.891 | no | 0.911 | Yes |
| Minimal Adaptation Index | | | | | |
| PGFI | >0.5 | 0.733 | Yes | 0.714 | Yes |
| PNFI | >0.5 | 0.769 | Yes | 0.769 | Yes |
| PCFI | >0.5 | 0.844 | Yes | 0.826 | Yes |
| X² Degrees of freedom | <3 | 3.441 | no | 2.002 | Yes |

5.2. Analysis of results
It can be seen from Table 4 that each path coefficient reaches a significant level. Among them, the green construction technology saves material and the use of material resources has the greatest impact, its value is 0.903, the standard error is 0.144, the CR value is the T value of 9.512, and the P value reaches a significance level of 0.001; the green construction technology saves water and the use of water resources It is 0.861, the standard error is 0.148, the CR value is the T value of 9.918, and the P value reaches a significance level of 0.001. The impact of green construction technology on land conservation and land resource protection is 0.700, the standard error is 0.140, and the CR value is the T value of 8.044. The P value reached a significance level of 0.001; the impact of green construction technology on land conservation and land resource protection was 0.700, the standard error was 0.140, the CR value was T value of 8.044, and the P value reached a significance level of 0.001; the energy saving and energy impact of green construction technology was 0.820, the standard error is 0.137, the CR value is the T value of 8.709, and the P value reaches the significance level of 0.001. Each path has reached a significant level.
6. Environmental protection recommendations for building construction

6.1. Green management
Based on China's specific building reality, if you want to achieve true green construction, you must conduct green management of the building construction process. The specific steps of this management are as follows: First, the task and its requirements are determined for the entire construction process. With the accurate confirmation of construction-related requirements, it is necessary to continuously optimize the overall scheme and related detailed design of the entire green construction project. Secondly, the introduction of modern information-related management technology in the green construction management process. Make full use of the advantages of this technology to promote and promote the development and progress of green construction. In this way, the efficiency and quality of green construction can be fundamentally improved. Finally, comprehensively consider the influencing factors of various aspects for dynamic management. As a complex and diversified construction project, all aspects of green construction are extremely complicated. Therefore, if the project is to be implemented smoothly, it is necessary to fully consider the relevant staff, management personnel, natural environment, social life and other factors, based on the actual situation, combined with scientific and effective management technology and advanced high-end construction technology. And thoroughly implement the modern construction concept of energy conservation and environmental protection, green dynamic management of high-rise buildings. Only in this way can the green management strategy of high-rise building construction be carried out to the end.

6.2. Adopting green construction methods
No matter what kind of project construction, the improvement of work efficiency and the completion of work tasks are always important concerns that are constant. In order to achieve these goals quickly, continuous reform and innovation of construction methods are needed. Through continuous construction practice and trials, the best green construction methods have been correctly screened to promote and facilitate the development and progress of construction projects. Therefore, in concrete construction practice, the concept of green construction should be thoroughly implemented, and this concept should be effectively integrated into the actual operating details. For example, reverse engineering can be used in specific construction operations. The application of this method cannot only greatly reduce dust pollution during construction, but also have a certain degree of shielding effect on noise generated during construction. In addition, concrete seismic isolation technology can also be used in specific construction operations. The application of this technology can not only effectively relieve the physical fatigue of workers, but also quickly improve the quality and efficiency of construction projects.

6.3. Use of green construction materials
From a certain perspective, green construction materials are an important part of the entire high-rise building green construction process. In order to ensure the normal progress of green construction, workers should use green building materials for construction in actual operations. Compared with traditional construction materials, green construction materials have more prominent advantages, as follows: 1. When using green construction materials for construction, use as little as possible fossil fuels, toxic gas release materials, etc. And increase reuse and creative use of waste materials. 2. In the specific implementation of green construction, low-energy-consumption and low-pollution production technologies should be selected to the maximum extent to reduce energy waste, environmental pollution and other issues from the root cause, and fully ensure the effective progress of green construction management. 3. In the implementation process of specific high-rise buildings, when classifying and configuring materials, green construction materials should be applied to the greatest extent. Materials that release various toxic gases such as formaldehyde and benzene are strictly prohibited, so that the construction environment can be continuously obtained. Optimization and improvement, to continuously promote and promote the development of energy saving and environmental protection for green construction.
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