

Analysis on Construction Project Mode under Green Construction Concept

Ziyang Zhu *

School of Engineering Management and Real Estate, Henan University of Economics and Law,
Zhengzhou, China

* Corresponding Author Email: denglian@ldy.edu.rs

Abstract. The construction industry consumes a lot of resources and often destroys the ecological environment. Under this background, this paper explores the building mode under the concept of green building. Starting from the definition and concept of green building, this paper expounds sustainable supply chain management and green building technology to promote energy conservation, efficiency and sustainable development of the building industry. Then, by studying the form layout and green technology of Shenzhen Jianke Building, the application and embodiment of green concept in the construction industry are analyzed. The conclusion shows that the introduction of green building concept not only has a positive impact on the sustainable development of the construction industry and social welfare, but also conforms to the trend of global environmental protection. In the future development, with the continuous progress of science and technology, the field of green building will usher in the application of more innovative technologies. Green building is not only a single building, but also involves urban planning, infrastructure construction and other aspects. With the increasing global awareness of sustainable development, green buildings will become the mainstream trend in the construction industry and play an important role in promoting the global sustainable development process.

Keywords: Green construction; sustainable development; supply chain; green building.

1. Introduction

In an increasingly developed society, human beings are constantly exploiting and occupying natural resources, which leads to the emergence of many environmental problems. Under the traditional construction management mode, the rapid development of construction projects has many impacts on the environment. First, land development and land use in the construction process may lead to the destruction of ecosystems and the reduction of biodiversity. A large amount of land development may destroy the local natural landscape and ecological balance. Secondly, traditional buildings usually use a lot of resources. The collection, production and transportation of these resources will produce a large number of carbon emissions and other pollutants, which will exacerbate global climate change and air and water pollution. In addition, traditional buildings often lack energy efficient design, resulting in high energy consumption. Poor design and material choices can increase a building's energy consumption, thereby increasing its carbon footprint. Finally, the disposal of construction waste is also a problem. A large amount of waste generated by traditional buildings is often sent to landfills or incinerated, which not only wastes resources, but can also pollute soil and air. Therefore, the negative impact of traditional construction projects on the environment is obvious, which also encourages people to look for more environmentally friendly and sustainable construction methods and materials, and the introduction of green construction concept is crucial.

Green construction refers to the use of environmentally friendly materials, energy-saving technologies and environmental protection measures in the construction process to reduce environmental pollution and damage, reduce energy consumption, and improve construction efficiency and project quality. Green construction not only considers the construction stage of a building, but also looks at the entire building life cycle, from design and construction to maintenance and demolition, to ensure that the building is as environmentally friendly and sustainable as possible throughout the process. Its purpose is to promote environmental protection, achieve sustainable development, improve building quality and improve the living environment, which is of great

significance to promote the development of the construction industry towards a more environmentally friendly, efficient and healthy direction. Green construction management refers to a management method to protect the environment, save energy, improve construction efficiency and project quality through management and technical means in the process of green construction [1].

Green construction management mode refers to a management mode that adopts environmental protection, energy saving, sustainable development and other measures in the construction process. This management model aims to reduce the impact of construction activities on the environment and improve the quality and sustainability of construction projects [2]. It is dependent on traditional construction management technology, and integrates the concept and idea of sustainable development into the traditional construction management process. It uses the most effective and scientific management technology, the most sustainable environmental protection materials and technologies, and carries out dynamic management of construction projects for the purpose of minimizing pollution and maximizing energy saving [3]. The application of green concept in construction project management provides certain support for the construction industry to develop towards green and environmental protection in a more orderly way, which is the basis for the sustainable and healthy development of the construction industry and the main development direction of the construction industry in the future [4]. Green environmental protection is a concept that human beings need to practice, especially in the construction industry, which should make good use of green construction management mode [5]. This paper mainly starts with the concept of green building, and discusses the construction project management mode under the concept of green building. Then, the practicability of the construction project management mode under the green construction concept is verified through the green construction project management practice.

2. Construction Project Management under Green Construction Concept

The construction industry must actively adopt the approach of sustainability strategies to contribute to a more sustainable future, and through collaboration and continuous innovation can ensure that construction projects play an active role in global sustainability efforts [6]. The implementation of green construction needs the support of sustainable supply chain management, which provides practical basis and sustainability guarantee for green construction by providing environmentally friendly materials, optimizing resource utilization and promoting circular economy.

2.1. Sustainable Supply Chain Management

Traditional supply chain management involves the production, transportation and distribution of products, raw material procurement, production process and product distribution, etc. Each link will generate a large amount of greenhouse gases and a large amount of energy, and involve the acquisition and utilization of a large number of natural resources, including water, soil and minerals [7]. The negative impact of supply chain management on the environment is shown in Fig. 1. Sustainable supply chain management refers to a management method that considers social, environmental and economic factors in the entire supply chain activities, aiming to minimize the negative impact on the environment, improve the efficiency of resource utilization, promote social justice, and ensure long-term and stable economic development. It covers the whole process management from raw material acquisition, production, transportation, and storage to final product consumption, recycling and other links, in order to achieve the comprehensive goals of sustainability, efficiency and social responsibility.

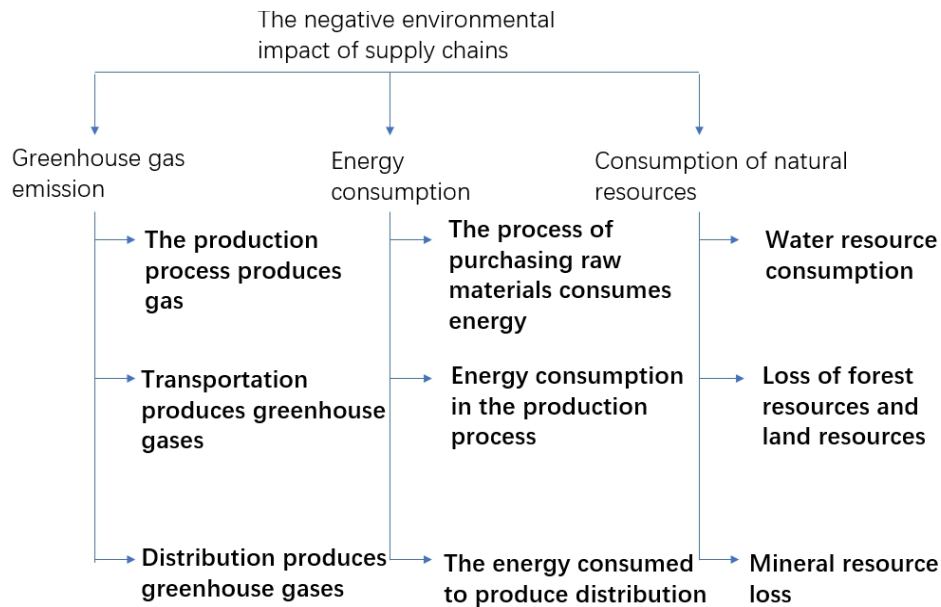


Fig 1. The negative environmental impact of supply chains [7].

Sustainable supply chain management has many meanings, it helps to reduce resource consumption, reduce carbon emissions and pollutant emissions, protect the natural environment, reduce ecological damage, and thus contribute to the ecological balance and environmental sustainability of the earth. It can also reduce resource waste, improve resource utilization efficiency, promote sustainable utilization of resources and reduce production costs by optimizing supply chain management process and resource utilization efficiency. In addition, by improving the efficiency of the supply chain and reducing operational costs and risks, sustainable supply chain management can help enhance the competitiveness and profitability of enterprises, and create more sustainable economic development for enterprises. To sum up, sustainable supply chain management is not only conducive to environmental protection and resource conservation, but also an important way for enterprises to achieve sustainable development, enhance competitiveness and brand value.

2.2. Green Construction Processes and Technology

Green construction processes and technologies cover multiple aspects aimed at minimizing negative environmental impacts and improving the energy efficiency and sustainability of buildings. The adoption of energy efficiency technologies includes the use of energy-efficient building materials, optimizing building design to maximize natural light and ventilation, adopting efficient heating, ventilation and air conditioning systems, and utilizing renewable energy sources such as solar and wind power. There is also a need for water management. In the production process, enterprises should establish a sound water resource recycling ecosystem by improving their own water resources recycling efficiency and according to the requirements of enterprise development, so as to ensure the scientific and rational use of water resources and achieve the goal of comprehensive management and utilization of water resources [8]. Water consumption and waste can be reduced by collecting and using rainwater, using low-flow taps and shower heads, installing efficient water-saving equipment, and optimizing irrigation systems. Waste materials are processed through science and technology to produce new green and environmentally friendly building materials to realize resource recycling [8]. At the same time, various advanced production technologies are applied in the production process of new green and environmental protection building materials to further simplify the manufacturing process, control energy consumption, avoid environmental pollution and reduce the impact on the environment [9]. There is a need to implement effective waste management plans, including reduction of construction waste generation, separate collection and recycling. Thus, the load on landfills can be minimized. Intelligent building technologies such as intelligent control systems and sensors are applied to realize intelligent building management and energy consumption monitoring, and improve

the energy efficiency and energy-saving effect of buildings. The application of these green construction techniques and technologies helps to build more environmentally friendly, energy saving, resource saving and healthy buildings, and promotes the development of the construction industry in the direction of sustainable development.

3. Green Building Case Analysis

Shenzhen Jianke Building, as a typical representative of green buildings in the hot summer and warm winter (especially hot and humid) climate area in southern China, highlights the road of green buildings with Chinese characteristics. The project is based on the climate and site-specific environment, through the shape and layout of the building, creating the prerequisite for the use of natural ventilation, natural lighting, sound and noise reduction and ecological sharing. Secondly, based on the shape and layout of the building, natural ventilation, natural lighting and ecological sharing can be achieved through the integration of local and low-cost technologies suitable for the climate, so as to provide suitable use conditions in the natural environment. Finally, passive and active technologies are integrated to ensure conditions of use in extreme natural environments.

3.1. Building Shape and Layout Design based on Climate and Site Conditions

Based on the oceanic monsoon climate of Shenzhen, which is hot in summer and warm in winter, and the measured site topography, sound, light and thermal environment and air quality, the building shape and layout were designed with the goal of integrating natural ventilation, natural lighting, sound insulation and noise reduction and ecological compensation.

3.1.1. "Concave" shape design with natural ventilation and lighting

Through the simulation and comparative analysis of wind and light environment, the shape of the building is "concave" font, as shown in Fig. 2. The concave faces the dominant wind direction in summer and backs to the dominant wind direction in winter, while rationally controlling the opening and depth to create basic conditions for natural ventilation and lighting. At the same time, the front and back Spaces are slightly staggered to further enhance the summer ventilation capacity.

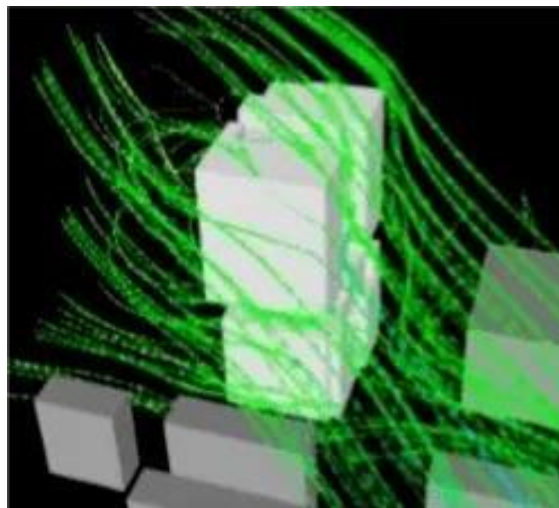


Fig 2. Diagram of the "concave" font structure [10].

3.1.2. Layout design with insulation, light and air quality

The layout is designed in combination with orientation and wind direction to achieve good lighting, insulation and air quality.

3.2. Noise Control

Through structural measures to prevent noise, non-office rooms such as exhibition halls, testing rooms and laboratories are set up from the first to the fifth floor to reduce the window area and reduce

the impact of outdoor noise on personnel. Double-layer Windows are used, LOW-E insulating glass is used in the room affected by outdoor noise, heat insulation and noise prevention. It is required that the weight insulation quantity is not less than 30 db. Indoor sound absorption and noise reduction measures are taken in some places.

3.3. Integrated Application of Active Technology and Passive Technology

3.3.1. Air conditioning technology as a supplement to natural ventilation.

Using passive technologies such as natural ventilation, after minimizing the air conditioning load and air conditioning time to the minimum, the air conditioning system is set up to meet the thermal comfort needs in very hot weather. The operation control of the air conditioning system is closely combined with natural ventilation, indoor and outdoor temperature and humidity are monitored, and natural ventilation is prioritized for cooling. Only when natural ventilation cannot independently bear the indoor heat and humidity load, the air conditioning system is started.

3.3.2. Lighting technology as a supplement to natural lighting.

Lighting system design is based on the interior layout design of each room or space, natural lighting design and use characteristics, the selection and design of energy-saving lighting types, lighting arrangements and control methods. Lighting system control is closely combined with natural lighting, and only when natural lighting cannot meet the lighting conditions, the artificial lighting system is turned on as needed.

3.3.3. Renewable energy utilization technology integrated with buildings

Avoiding a simple patchwork of renewable energy utilization technologies, the building uses renewable energy utilization and building integration technology. Innovative high-rise solar water heating solutions are adopted. The building's solar water heating system uses a central-distributed system to meet the hot water needs of employees in the shower to encourage green travel. Then, large-scale solar photovoltaic are integrated utilized. Multi-point application, the building is equipped with solar photovoltaic system on the roof, west facade and south facade according to the functional requirements. In addition, photovoltaic power generation and thermal insulation shading are integrated applications. The south photovoltaic panel is integrated with the sunshade reflector, the roof photovoltaic module is integrated with the flower shelf, and the west photovoltaic curtain wall is integrated with the ventilation channel, which generates electricity and plays the role of sunshade and heat insulation.

3.3.4. Water resources utilization technology combined with green landscape

The integrated system of reclaimed water, rainwater, constructed wetland and environmental art is set up. The supernatant of domestic sewage treated by septic tank is supplied to the standard water after treatment by ecological constructed wetland for toilet flushing and floor greening pouring water. The rainwater collected from the roof and the ground is filtered by the filter water layer, and the standard water is supplied to an outdoor green sprinkling layer after being treated by the ecological constructed wetland. When there is insufficient rainfall in the dry season, the water supply system will provide water for road flushing and landscape tanks to reduce municipal water consumption. After calculation and analysis, the entire building can reduce the operating cost of about 1.5 million Yuan per year, which saves 1.45 million Yuan of electricity, 54,000 Yuan of water, 610 tons of standard coal, and 1600 tons of CO₂ emissions per year, contributing to China's energy conservation and emission reduction.

4. Conclusion

In summary, the green building management model is a comprehensive concept and practice that aims to reduce the negative impact of buildings on the environment and promote the development of the construction industry in a more sustainable direction through the use of environmentally friendly

materials, energy-saving equipment, recycling resources, reducing waste emissions and other means. This model emphasizes full life cycle management, social participation, scientific and technological innovation and international cooperation, which is one of the key paths for the sustainable development of the construction industry in the future.

However, there are still many problems in green construction management, including the application of green construction management mode. The implementation of green construction requires the professional knowledge and skills of the people involved, so training and education is an important challenge that requires continuous improvement of employee awareness and competence. The use of environmentally sound materials and the adoption of energy-efficient equipment and technologies often require higher investment costs, which can increase the overall cost of the project and may be economically challenging for some projects. In addition, the technology and standards in the field of green building are constantly updated and iterated, and construction enterprises need to constantly follow up and adapt to new requirements and standards, which brings challenges to management and implementation. In addition to choosing environmentally friendly materials and working with sustainable suppliers requires building complex supply chain networks, managing supply chain sustainability and stability is also a challenge. With international cooperation and standardization efforts, the harmonization of global green building standards and increasingly stringent environmental regulations and policies worldwide have promoted the transformation of the construction industry to green buildings.

The development of green buildings will also benefit from the continuous innovation of new technologies, the construction industry has begun to pay more attention to the whole life cycle of buildings, the increase of public awareness of environmental protection, and the growth of demand for green buildings. These factors will bring more opportunities for green construction management. In the construction industry, it is necessary to make good use of green construction management mode, effectively integrate resources, optimize construction process, and achieve sustainable development goals.

References

- [1] Zhao Shupin. Innovative management Scheme of housing construction based on green construction management Model. *China Building Metal Structures*, 2023, 22(08): 160-162.
- [2] Zhou Runjie. Discussion on how to innovate construction management under the concept of Green Construction Management. *Chinese Architectural Decoration*, 2023, (14): 168-170.
- [3] Xu yanfen. The application of green energy saving construction technology in construction engineering. *Journal of engineering construction and design*, 2023, (9): 147-150.
- [4] Wu Zhoujie. Analysis of construction project management model Innovation from the perspective of green construction. *Brick and Tile*, 2022, (03): 134-136.
- [5] TAN Jiangang. Research on Green construction management Model of construction projects. *Building Materials and Decoration*, 2018, (38): 173.
- [6] Xing Yazhi, Liu Hao, Zhao Jiajun, et al. Discussion on Green construction management mode of building engineering project. *Guangdong Guoke Electric Power Research Institute. The fourth power engineering and technology academic exchange conference proceedings*. 2023: 2.
- [7] Huang X Y. Environmental sustainability strategy in global Supply chain Management. *Paper Information*, 2024, (02): 78-79.
- [8] Zhang Lei. Analysis on the development trend of water resources management model. *Rural Staff*, 2020, (20): 120.
- [9] Luo Ye. Role of new green building materials in construction cost management. *Low Carbon World*, 2024, 14(03): 79-81.
- [10] Ma Yan. Discussion on Green construction management model of construction projects. *Real Estate World*, 2023, (06): 97-99.