

Research on Sustainable Development Strategy of Civil Engineering and Environment in the New Era

Jinlan Tan^a, Dongping Hu^{b,*}, Peiliu Shao^c

Chongqing Metropolitan College of Science and Technology, Chongqing, China

^alanl1988@163.com, ^bhudongpingcq@126.com, ^cshaopeiliu@163.com

**Corresponding author*

Keywords: New Period, Civil Engineering, Environment Sustainable Development

Abstract: From the development experience of other countries, it is impossible to blindly pursue economic benefits in the development of civil engineering. Only by organically combining the economic and environmental benefits can we truly ensure the healthy and sustainable development of civil engineering in the new era. However, there are still many problems in the development of civil engineering. According to the concept of sustainable development in the new era, it is proposed to eliminate or alleviate the possible ecological and environmental problems in the process of large-scale economic construction, such as water resources reduction, water quality deterioration, soil erosion, etc. Ensure that civil engineering construction projects are sustainable development projects that can benefit mankind, develop and improve the living conditions of human settlements.

1. Introduction

At present, China is in a new period of rapid economic development and vigorous development of industry and agriculture. The domestic demand for various construction projects is also growing. Civil engineering construction project is a very big concept, which includes not only urban infrastructure construction, but also housing and bridge construction. Therefore, regardless of the size of the construction project, it is closely related to the actual production and life of Chinese residents. However, civil engineering has the characteristics of difficult construction, many consumables, and high pollution. Therefore, sustainable development can maximize the ecological and economic benefits in the whole development process.

2. History and Present Situation of Civil Engineering Development

2.1. History of Civil Engineering Development

Civil engineering is an important branch course of architecture specialty and an excellent professional discipline. It generally refers to various industrial production activities and technologies that use soil, stone, brick, wood, cement, plastic, various new metal materials, and other modern engineering materials to build houses, highways, tracks, bridges and culverts, tunnels, rivers, harbors, special buildings, and urban municipal sanitation projects. Due to the development

of modern engineering theory and science and technology, civil engineering has gradually been divided into several specialized disciplines, such as branches specialized in engineering materials and buildings, construction related construction industry and transportation, construction related to highway and bridge construction, water conservancy projects related to the construction of rivers, ports, dam and irrigation channels. The history of civil engineering can be traced back to the wild caves of ancient humans. In Chinese legend, Youchao is the inventor of the nest. Among the important relics of Yangshao culture in the late Neolithic Age in China, houses built with wooden bones, mud walls, and pottery kilns have also been excavated. There were rammed earth walls in the Xia Dynasty. Since then, the cement slab wall of the Shang Dynasty, the bricks of the Western Zhou Dynasty, and the large hollow bricks of the Warring States period have come out successively. In domestic history, such as the Wanli Great Wall, Zhaozhou Bridge, and Dujiangyan are all outstanding representatives of domestic ancient buildings with national characteristics. In Europe, dry bricks were used thousands of years ago. Human beings use chiseled natural rocks to introduce sintered bricks into buildings. In Chinese history, the first brick walls were built of stone, but later they were mostly built of clay. Through long-term experience accumulation, people also began to add straw to the cement to increase tensile strength. Later, silica fume was also developed and used to build brick walls. Silica fume is not suitable for large-scale buildings and underground works, because the natural hydraulic material - pozzolan cement can harden not only in the air, but also in the water. Therefore, as early as Rome, it was used to build roads, walls, and drainage ditches. The cement found in the Neolithic cultural relics in Gansu, China, has a hardness of about C10. The cement composition is basically the same as that of modern concrete. It is more than 3000 years earlier than the pavement built with natural pozzolan cement in the Roman period [1].

2.2. Current Situation of Civil Engineering Development

In today's world, the scientific and technological level in architecture has become very mature, so the demand for people's architecture is also changing day by day. In the construction of modern civil engineering, the building materials industry is also changing and changing day by day. It is precisely because of this development trend that the traditional and old building materials industry is gradually abandoned by the new building materials industry with perfect science and technology. Especially when choosing to use the building materials industry, the most important thing to consider is the quality of the building materials industry in operation. Throughout the world, the quality of building materials is also determined by their quality. In addition, we must also think about environmental protection. To solve this problem, we should use the new material technology advocated by China, take the environmental protection standards advocated by national policies and international organizations as the guidelines, and take people's development as our own responsibility. In addition, due to the high production cost of new materials, they can not adapt to the production and operation of the general public and the living requirements of the economy [2].

In the process of various civil engineering construction, the geological structure and ground structure of the construction site are often the main reasons that hinder the whole construction process. In fact, the main reason is not only that the infrastructure and environment are not ideal, but also that the building materials and construction environment have brought great damage to the normal progress and construction of civil engineering. Especially in the process of underground construction, the harm caused by this is very significant. In fact, at present, in terms of geological conditions and foundation structure, since there are still great limitations in the ground investigation and analysis technology used in civil engineering, it is impossible to achieve a higher standard of engineering construction standards. Therefore, how to improve such problems, we must inject more modern technical forces into us and innovate advanced ground exploration methods.

Looking at the whole country, although many colleges and universities in our country have already set up civil engineering, landscape planning, and other related courses, compared with the western developed countries, the current research is still late. Therefore, there are still some differences between its related research categories and those of western developed countries. Therefore, we must further study and borrow the country's best technical methods to make up for our own shortcomings in specific operation technology, to further improve the theoretical and practical technology. In the future, for further technological upgrading, we can also consider improving our own means by introducing modern electronic technology computers and using numerical simulation technology. The purpose is to reduce the economic loss of construction on-site operation and strive to achieve zero fault rate, to put the basic idea of safe construction on the ground [3].

3. Civil Engineering in the New Era and the Concept of Sustainable Development

In the actual civil engineering construction, due to the development of science and technology, people can already use innovative means to achieve the requirements of minimizing investment and air pollution to a certain extent, and then achieve the consistency of economic benefits and environmental protection effects. This system will not only bring further reduction of construction costs and higher economic and social values, it will bring more valuable social and cultural assets to people's children and grandchildren [4].

3.1. Necessity of sustainable development of Civil Engineering

With the development of the socialist market economy and the increasing degree of urbanization in China, China's civil engineering projects have also developed to a large extent. However, in the process of their development, people have also seen that there is a great contradiction between China's civil engineering, construction technology, and the urban ecological environment. If the civil engineering projects continue to develop according to the traditional Chinese methods, it will inevitably endanger the ecological environment balance of China, therefore, to overcome the above problems and better promote the comprehensive development of China's civil engineering construction and ecological balance, the integration of China's civil engineering technology and urban sustainable development will become particularly critical. When talking about civil engineering, people may think it is a very big category, which seems to be far away from people's daily life, and its biggest projection in people's daily life is the houses on the street and the bridges on the sea. However, in fact, civil engineering has always been inseparable from people's daily living environment, and is of great significance to the long-term stability and sustainable development of the country, The integration of civil engineering and environmental sustainable development can not only prevent people's daily living environment from being polluted and maintain national ecological peace and stability, but also comprehensively improve people's actual quality of life and make the living environment increasingly adapt to the actual living needs of modern humans. Finally, in the long run, considering the implementation of civil engineering projects combined with sustainability can benefit people's future generations, so that they can also live in a green mountain. Therefore, in the construction stage of civil engineering projects, we need to correctly and reasonably arrange the investment and use of each stage, so that it can be combined with sustainability as much as possible, in the process of practice, we also need to comprehensively update relevant technologies to reduce the second damage to nature in practice, and finally achieve the idealized effect of economy and common development of the environment [5].

3.2. Basic Principles and Characteristics of Sustainable Development of Civil Engineering

The main purpose of effectively integrating the sustainable, healthy, and vigorous development of construction and environmental protection is to realize the sustainable, healthy, and vigorous development of construction, to reduce the damage of buildings to nature as much as possible, to further optimize the composition of buildings and increase the longevity of buildings. Therefore, the sustainable, healthy, and vigorous development of construction must be coordinated and coexisted between society and nature, and can promote economic, the building that nature can continue to develop healthily and vigorously, that is to say, the basic principle that civil engineering can continue to develop healthily and vigorously is to realize the sustainable, healthy, and vigorous development of buildings and natural ecology; Realize the sustainable, healthy, and vigorous development of buildings, energy consumption and water bodies; Realize the effective and reasonable use of land; Realize the sustainable, healthy, and vigorous development of buildings, nature, society, human culture and environmental protection. The civil engineering construction design of buildings that can continue to develop healthily should comprehensively investigate the causes of nature, soil resources, and human body, and seek the balanced and healthy development of buildings and nature in a scientific, technological and reasonable way, to achieve the characteristics of vigorous development of civil greening, environmental protection, safety and health of construction engineering [6].

3.3. Basic Requirements for Sustainable Development of Civil Engineering

The mutual integration of traditional civil engineering technology and sustainable development technology is not the result of the mutual integration for no reason, but the corresponding regulations should be observed in the process of mutual integration. The general regulations are as follows. The first is to achieve the optimization of the utilization rate of land resources. Although it is called a vast land and abundant resources in China, the land here refers to the actual land area of China, and the land area is not equal to the actual land area used in civil engineering projects. Therefore, the sustainable development of land resources can be achieved only by making the construction land more scientific and reasonable. Second, the natural environment around the residential buildings and the natural environment around the actual construction can be unified and maintained. The third is the development of the surrounding ecological construction and construction environment, which is also a key content of the civil engineering project. Its main significance is to minimize the pollution to the surrounding natural environment during the construction of the civil engineering project. Fourth, the sustainability of the use of power resources, because a large number of machinery are required in the manufacturing process of civil construction projects, and the equipment can be launched only after various resource forces are required. If the integration of machinery and equipment can be achieved in the actual construction process of Chinese enterprise manufacturing projects, the sustainability of the use of resources can be achieved to a great extent. If these requirements can be met in a real civil engineering project, the development of both the civil engineering project and the environment can be achieved [7-8].

4. Integration of Civil Engineering and Sustainable Development

Building civil engineering is always inseparable from people's daily life and is of great significance to a country's long-term stability and sustainable development. Integrating building civil engineering and sustainable development can not only prevent people's daily living environment from being polluted, maintain national ecological peace and stability, but also comprehensively improve people's actual quality of life and make the living environment more and

more adapt to the actual living needs of modern humans [9].

4.1. Scientific Selection of Building Engineering Materials

To improve the sustainable development level of civil engineering, it is necessary to make a scientific and reasonable selection of building materials on the basis, to reduce the utilization rate of traditional building materials such as reinforced cement, and strengthen the research on the use of various new high-quality lightweight building materials. The construction unit must clearly understand that although traditional materials have many advantages in rigidity and strength, they are facing the problem of excessive construction dust pollution and noise pollution, which will have a direct negative impact on the surrounding environment. We should gradually increase the research and development of new materials, increase the application of new materials in the load-bearing parts of buildings, introduce more green building methods in the parts with great demand for building strength, and use traditional buildings, so that while improving the bearing capacity and construction quality of buildings, the harm of the whole building construction to the natural environment can be minimized [10].

4.2. Achieve Sustainable Development in the Construction Phase

Before the specific construction of civil engineering, the construction site and the surrounding environment must be surveyed to clarify the natural environment around the construction site and understand the geological conditions of the construction site, to carry out the construction step plan according to the big data scientific method and ensure that all construction links can be reasonably controlled. Through reasonable management and control, the project construction process and its impact on the surrounding environment will be reasonably controlled, and geological structure exploration near the project will be carried out to effectively avoid geological unstable sections, and construction safety control will be carried out to minimize unnecessary energy and environmental resource consumption and ensure the maximum protection of the earth's ecological balance [11].

4.3. Achieve Sustainable Development in the Design Phase

Management of construction process technology architecture is one of the keys to improve the integration quality, and it is also an important part of the whole management of construction process technology. Engineering researchers must effectively and reasonably carry out the architectural design of architectural drawings based on the characteristics of the project and the natural environmental conditions of the project. It is necessary to completely change the shortcomings of traditional building management and construction design that pay too much attention to economic benefits and project stability, strengthen the dissemination of ecological and environmental protection concepts in construction projects, and improve the balance between engineering economic benefits and environmental protection development, to reduce the application feasibility of high pollutant and high-energy construction project design technology. During the whole design period, the builder must do a good job in the contradictory budget between the project construction and the sustainable development goals, and make full use of the precious natural resources and natural environmental advantages near the project to coordinate the relationship between the surrounding natural environment and the project, to ensure that the whole building can be organically integrated with the surrounding natural environment while reflecting its own architectural characteristics, Thus, the degree of architectural aesthetics is improved [12]. At the same time, the designer must also determine the matching degree between the whole construction process and the architectural objectives of the project and meet the requirements of practicality and

humanization, to formulate a good engineering scheme [13-14].

5. Development Trend of Civil Engineering in the New Era

5.1. Sustainable Development

Looking at the whole country, many colleges and universities in China now offer courses related to civil architecture and landscape planning, but it is still relatively late compared with Western European countries. Therefore, there is still a big gap with the western countries in the research work of relevant basic theories. Therefore, we must make up for our deficiencies in the field of civil construction practice and operation technology by further learning and absorbing the most advanced national construction technology experience, to improve the architectural theory and practical technology. In the future, for better development, we should also consider improving our own way by introducing advanced electronic technology computers and using mathematical modeling technology. The purpose is to reduce the quality loss in the operation on the construction site and strive to achieve zero fault rate, to put the concept of safe construction on the ground.

5.2. Use Appropriate Materials

Building construction with high practical economic value is inseparable from the selection of new building materials. First of all, steel plastic products should have the advantages of high hardness, plasticity, weldability, and flexibility. Then, light building materials should have the advantages of light weight, high concentration, and good flexibility. While adopting this excellent advanced material, modern civil construction will also enter a new development history. At present, modern computer science, which is the most convenient application in the field of computer science, has become increasingly mature and is also increasingly developing in many aspects. Because of this, modern computer and other information technologies are also the key technologies to improve the development benefits of modern civil engineering. With its addition, people can adopt independent and scientific computer statistical methods to uniformly manage the big data related to construction. With the help of such technology injection, the work efficiency of civil engineering can be greatly improved in the development process, and the benefit of engineering construction can be optimized.

6. Realize Sustainable Development of Engineering Process

6.1. Removal of Wastes in Later Stage

The construction stage is the main key stage of the civil construction stage, and it is also an important key issue to ensure the sustainable development of the project. Due to the influence of Chinese traditional construction management mode, there are still a series of obstacles in the implementation of sustainable development of specific projects. Therefore, the application of the emerging project management construction modes must be further strengthened. At the same time, the construction personnel must further strengthen the research and development of various emerging project management and construction technologies, and carry out various data collection with the support of high-tech technology through the wide use of new operation devices and their construction methods, so that the overall construction of the project can achieve the goals of high efficiency, environmental protection and sustainable development. Take the structural health detection system as an example. Component health inspection is a typical example of using information technology to innovate the traditional construction inspection methods. It also has a

positive impact on ecological and environmental protection. In the specific process of health inspection, the method of placing sensor devices in the components will be used to evaluate the stability of components by using the data signals returned by the sensors, which can realize and effectively avoid the problem of traditional manual monitoring data errors, and the detection accuracy and work efficiency are relatively high. It is also important not only in the construction field, but also in the construction of pavements and bridges. The continuous progress of science and technology is a large force to promote the sustainable development of civil engineering. The relevant competent government departments must be clearly aware of this. Therefore, it is necessary to strengthen the R & D and optimization of project science and technology to better develop the energy-saving and sustainable engineering model [15].

6.2. Reasonable Utilization of Construction Resources

Engineering construction natural resources not only refer to the material resources and site resources used in the process of engineering construction, but also include a kind of energy resources and other material resources. Civil engineering construction generally has the characteristics of large scale and large amount of construction funds available. If the use of funds cannot be reasonably controlled, it is easy to waste funds, which will not only directly increase the construction cost of the project, but also may affect the sustainable ecological construction. Therefore, full attention must be paid to the correct control and application of the funds. In fact, during the construction process, the method of large-scale layout of garden landscape greening can be adopted to promote the sustainable, healthy, and rapid development of urban ecology, so that the redundant land can also be fully covered by the landscape and environmental greening projects in the park, to increase the overall landscape beauty of the community environment and provide more superior living environment conditions for residents. Civil engineering design and scientific research personnel must strengthen the in-depth research on renewable resources of green buildings, apply various resources to real life products in small areas, and build a small regional recycling system of various resources in small areas, to achieve the scientific research drive for the healthy development of ecological sustainability. All units must clearly understand that the rational use and economical utilization of resources are not the same concept. All resource utilization must be based on the construction conditions that meet the construction requirements. The quality of the project must be improved instead of saving the use of resources at the expense of the quality of the project. The rationalization and effectiveness of the whole resource utilization must be improved to achieve an ideal resource utilization model, so that all aspects of the project conditions can be consistent with the expected construction objectives.

7. Conclusions

Construction units should be aware of the impact and damage of construction on the environment and continue to strengthen construction reform. At the same time, it is necessary to formulate sustainable development projects and sustainable integration plans in accordance with the master plan for the development and reform of the construction industry, and ensure the realization of sustainable integration elements by appropriately adapting to the early stages of construction preparation and design, to protect the surrounding environment of the project as much as possible in each construction stage of the project. The whole structure can coexist harmoniously with the surrounding environment of the facilities, achieve the ideal integration effect, and ensure that the impact of the construction project on the environment is minimized.

References

- [1] Chen Hongbo. *Development and application analysis of green construction in civil engineering*. *Engineering and construction*, 2021, 35 (05): 1031-1032.
- [2] Ye Bingbing. *Research on sustainable development of green building materials*. *Papermaking equipment and materials*, 2021, 50 (09): 39-41.
- [3] Wang Shu, Zhang Yunbin, Zhang Yu. *Discuss the characteristics of modern civil engineering and the development of future civil engineering*. *Science and technology wind*, 2021 (14): 103-104.
- [4] Liu Xu. *Research on sustainable development strategy of civil engineering*. *Dwelling house*, 2020 (33): 177-178.
- [5] Mou Lihua. *Analysis on quality problems and control schemes of civil engineering and housing construction projects in the new era*. *Zhonghua construction*, 2020 (07): 74-75.
- [6] Zhang Wei. *Quality problems and control strategies of civil engineering and housing construction projects in the new era*. *China residential facilities*, 2020 (04): 92-93.
- [7] Huang Xiaoliang, Liu Haibin, Chai Xiang, Zhu Jingwei, Pan Zezhen. *Application of civil engineering materials in green buildings*. *Science and technology innovation*, 2020 (10): 91-92.
- [8] Hu Guohui. *Research on structural innovation and sustainable development of civil engineering*. *Residential and real estate*, 2020 (06): 193.
- [9] Qin Yaodong. *Prospect analysis of sustainable development of civil engineering*. *Residential and real estate*, 2020 (05): 275.
- [10] Fan Yongping. *Green construction and sustainable development in civil engineering*. *Dwelling house*, 2020 (02): 8.
- [11] Ju Leiyang. *Quality problems and control strategies of civil engineering and housing construction projects in the new era*. *Management and technology of small and medium-sized enterprises (last ten days)*, 2019 (05): 56-57.
- [12] Xu Yu. *Green construction and sustainable development in civil engineering*. *Green building materials*, 2019 (04): 55.
- [13] Wang Jiye. *Research on sustainable development of civil engineering design and green construction*. *Building technology development*, 2018, 45 (03): 72-73.
- [14] Zhang Nan. *Civil engineering and sustainable development in the new era*. *Residential and real estate*, 2016 (03): 132.
- [15] Lv Zhitao. *Civil engineering and sustainable development in the new century*. *Journal of transportation engineering*, 2002 (01): 1-5+12.