Construction Quality Management and Control in Water Conservancy and Hydropower Construction Projects

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Abstract: In water conservancy and hydropower construction projects, the construction management of construction projects plays a pivotal role. Water conservancy and hydropower construction projects are essential materials for the modernisation of the country, however, water conservancy and hydropower construction projects are often constrained by a variety of reasons such as the environment, man-made and so on, so the construction is very difficult. The article discusses this, discusses the construction of water conservancy and hydropower construction projects, and puts forward corresponding countermeasures, hoping to provide some reference and reference to the construction of water conservancy and hydropower construction projects.

Keywords: water conservancy and hydropower construction project; quality control; countermeasures

As an important part of national economic construction, water conservancy and hydropower construction projects are not only related to national energy security and water resources utilisation, but also directly related to the people's quality of life and the protection of the ecological environment. In these ambitious projects, construction quality management and control is particularly important, which is not only the guarantee of project safety, quality and efficiency, but also a key link to achieve the strategic goal of sustainable development.

With the continuous progress of science and technology and the increasing complexity of engineering construction, the requirements of water conservancy and hydropower construction projects for construction quality are also increasing. How to ensure that every process in the construction process meets the specifications, how to ensure the stability and durability of the engineering structure, and how to prevent the occurrence of quality problems, these problems need to be solved through scientific and systematic construction quality management and control.

At present, China's water conservancy and hydropower construction projects have made certain achievements in construction quality management and control, but there are also some problems and challenges. For example, some construction units do not pay enough attention to quality management, and the implementation of the management system is ineffective; the skill level of some construction personnel is insufficient, and the quality consciousness is weak; as well as the level of informatisation and intelligence is not high, and it is difficult to adapt to the needs of modern engineering construction, and so on. Therefore, it is of great practical significance and far-reaching development significance to

study in depth the construction quality management and control problems in water conservancy and hydropower construction projects, and to put forward effective countermeasures and suggestions.

This paper will focus on the construction quality management and control of water conservancy and hydropower construction projects to discuss, analyse the current problems, put forward the corresponding countermeasures and recommendations, with a view to improving the construction quality of China's water conservancy and hydropower construction projects to provide useful reference.

1 Characteristics of Water Conservancy and Hydropower Construction Works

1.1 Expertise

Water conservancy and hydropower construction projects are particularly outstanding in terms of specialisation, which is due to the fact that their construction environments are usually located in complex hydrological environments such as lakes and rivers. These environments not only have unique hydrological characteristics, but are also affected by a variety of factors such as climate, geology and topography. Therefore, professional analysis and control before construction is particularly important.

In terms of professionalism, the water conservancy and hydropower construction project requires the construction team to have a deep reserve of professional knowledge and rich practical experience. The construction team needs to accurately identify various factors in the construction environment, including water flow rate, water level changes, soil bearing capacity, etc., and formulate corresponding construction strategies and technical measures according to these factors. Only in this way can the construction process be ensured to run smoothly and the quality of construction be controlled to the greatest extent possible.

In addition, professionalism is also reflected in the precise mastery of construction technology. Water conservancy and hydropower construction projects need to use a variety of professional construction techniques and equipment, such as blasting technology, concrete construction technology, waterproofing technology and so on. The use of these technologies requires the construction team to have a high degree of professionalism and technical level to ensure the construction quality and safety.

1.2 Riskiness

The riskiness of water conservancy and hydropower construction project mainly comes from the speciality and complexity of its construction environment. As the construction needs to be carried out in the environment of lakes and rivers, the construction team needs to face a variety of potential safety risks, such as water current impact, landslide, collapse, and so on.

In order to reduce the risks in engineering construction, a corresponding preventive system must be established. Firstly, a strict safety management system and operating standards should be established to ensure the safety control of the whole project; secondly, the safety education and training of construction workers should be increased to enhance their knowledge and technical level. In addition, regular testing and maintenance of construction machinery and facilities should be carried out to ensure their good operation and safety.

In high-risk operations such as blasting treatment, construction teams need to be extra cautious. They need to operate in strict accordance with blasting technical regulations

and take effective protective measures to ensure the safety of construction personnel and the surrounding environment.

1.3 Broad scope

The comprehensive functional characteristics of the water conservancy and hydropower construction project determine that its scope is very wide. In addition to the basic functions of water discharge, hydrophobicity, water retention and storage, it is also necessary to consider various factors such as environmental protection, ecology and economy.

During the construction process, the construction team needs to consider various factors comprehensively and formulate appropriate construction programmes and technical measures. They need to communicate and co-ordinate with a number of relevant departments and units to ensure the smooth progress of the construction process. At the same time, they also need to pay attention to the impact of construction on the surrounding environment and take effective measures to minimise damage to the environment.

In order to realise the various functional requirements of water conservancy and hydropower construction projects, construction teams need to apply a wide range of relevant specialised technologies. These technologies involve structural engineering, hydrology, geology, environmental science and other fields. Therefore, the construction team needs to have interdisciplinary knowledge reserves and comprehensive capabilities to ensure the construction quality and functional realisation.

2 The necessity of Quality Management and Control of Water Conservancy and Hydropower Construction

2.1 Ensure Engineering Safety and Long-term Stability

The quality of water conservancy and hydropower construction projects is the core guarantee for their safe and long-term stable operation. In water conservancy and hydropower projects, key facilities such as dams, hydropower stations and sluices are subjected to enormous water pressure and natural forces. Therefore, strict management and control of the quality of these buildings is the first task to ensure the safety of the project. Once there is a problem with the quality of construction, it may not only lead to structural damage and functional failure of the project, but also cause serious safety accidents, posing a serious threat to the safety of people's lives and property. For example, problems such as cracks and leakage of dams, if not detected and dealt with in time, may lead to serious consequences such as dam destabilisation and dam failure. Therefore, strengthening the quality management and control of water conservancy and hydropower construction can timely detect and eliminate quality hazards and ensure the safety and long-term stability of the project.

2.2 Enhance the Economic and Social Benefits of the Project

The quality of water conservancy and hydropower construction project not only affects its safe operation, but also directly relates to its economic and social benefits. High-quality water conservancy and hydropower buildings can give full play to their functions in power generation, irrigation, flood control and other aspects, creating huge economic benefits for society. At the same time, these projects can also improve the ecological environment, promote regional economic development, enhance people's living standards, with significant social benefits. However, if the quality of the projects fails to meet the standards, it may not only lead

to functional failure and inefficient operation of the projects, but also increase the cost of maintenance and renovation, and reduce the economic benefits. In addition, quality problems may also trigger social dissatisfaction and public opinion pressure, negatively affecting the social benefits of the project. Therefore, strengthening the quality management and control of water conservancy and hydropower construction can enhance the economic and social benefits of the project and achieve sustainable development.

2.3 Safeguarding People's Lives and Property and the Ecological Environment

Water conservancy and hydropower construction projects are closely related to the safety of people's lives and property. Once there is a quality problem in the project, it may lead to serious safety accidents and bring great losses to people's lives and properties. For example, accidents such as turbine explosions in hydropower stations and dam failures may cause casualties and property losses. In addition, water conservancy and hydropower projects also have an important impact on the ecological environment. If the quality of the project fails, it may lead to ecological environment destruction, water resource pollution and other problems, which will pose a threat to people's health and quality of life. Therefore, strengthening the quality management and control of water conservancy and hydropower construction can timely detect and eliminate hidden quality problems and ensure the safety of people's lives and property and the ecological environment. This is not only the performance of being responsible for the people, but also an important guarantee for the realisation of sustainable development.

2.4 Promoting Technological Innovation and Industry Dvelopment

Quality management and control of water conservancy and hydropower construction is an important driving force to promote technological innovation and development of the industry. With the continuous progress of science and technology and the increasing complexity of engineering construction, the traditional quality management methods have been difficult to meet the needs of modern water conservancy and hydropower projects. Therefore, strengthening quality management and control can promote technological innovation and progress in the industry. For example, through the introduction of advanced monitoring equipment and technical means, real-time monitoring of project quality and data analysis can be achieved; through the optimisation of construction methods and processes, project quality and construction efficiency can be improved. These technological innovations can not only improve the quality and efficiency of the project, but also promote the development and progress of the whole industry. At the same time, strengthening quality management and control can also promote international exchanges and cooperation, learn from international advanced experience and technical achievements, and enhance the overall level of China's water conservancy and hydropower project construction.

3 Water Conservancy and Bydropower Construction Project Construction Quality Control problems

3.1 Unreasonable Surveys Done in the Early Stages

In the process of water conservancy and hydropower construction project construction, investigation and design is the premise for follow-up work, and at present, China's water conservancy and hydropower construction project construction process is not aware of the

significance of this work, and does not carry out enough investigation and design analysis of the construction site before the start of construction, which has led to the following problems: in the process of construction, water conservancy and hydropower construction projects, both drawings and textual information are limited to written analyses, and it is not possible to investigate the geographic and hydrological conditions of the construction site in the field; in the construction of water conservancy and hydropower construction projects, although some units have already done on-site investigation, they have not paid sufficient attention to it in practice.

3.2 Inadequate Quality Management During Construction

With the rapid development of the country's economy and society, it has a negative consequence on water conservancy and hydropower construction projects: focusing only on the high speed of the project and neglecting the high quality of the project, which leads to many problems in the construction of water conservancy and hydropower construction projects in China nowadays, resulting in a low degree of quality control of the project. In the construction of water conservancy and hydropower construction projects, there are often problems of incompetent and incapable construction teams due to hidden subcontracting. There are also some contractors who use artificial means to speed up the progress of the project, thus making the project appear some unreasonable situations. Insufficient supervision. Water conservancy and hydropower construction project is a complex systematic project, involving the preparation stage, construction stage and various stages in the construction process. However, in the construction of water conservancy and hydropower construction projects, there are often some supervisors' dereliction of duty, they do not carry out strict inspection of each process and each technology, and they just cope with the inspection of the superiors and work perfunctorily, without playing the role of supervision adequately.

3.3 Failure to Follow Construction Procedures

In water conservancy and hydropower construction projects, there are often cases where construction is not carried out in accordance with the regulations, which violates the science and norms of the project and also brings great potential danger to the quality of the project. Part of the construction enterprises are chasing after economic interests, ignoring the quality of the project, and adopting non-standard construction methods, the most obvious is that they are not carried out in accordance with the prescribed construction regulations.

In water conservancy and hydropower construction, every process and every detail is very important. However, some construction companies tend to reduce or minimise the construction processes in some cases in order to shorten the construction period and reduce the cost. For example, in water conservancy and hydropower construction, joint treatment is a basic but very critical job. The good or bad work of joint removal is not only related to the quality of the later project, but also to the stability of the whole project. However, in practice, some construction units, in order to save time and labour, neglect to carry out meticulous clearing of joints, resulting in rough and uneven joints, which leads to uneven joints, thus reducing the quality of joints.

Such a practice not only results in lower

quality of work, but also creates many safety issues for the project. Just a little bit of negligence in the construction process will bring irreparable consequences to the project. However, the damage to the integrity and brand image of the construction company has a negative impact on the competition and long-term development of the construction company in the market.

3.4 Low management awareness

Through the research and analysis of the current management of construction enterprises, it is found that there exists the phenomenon of focusing on the schedule and light on the management and light on the quality in the management of the current construction enterprises. Such a situation is mainly due to the low level of management of engineering supervisors, who usually do not have any management experience, and some of them have not even touched management, thinking that management is through the management of people, using the power in their hands to guide and interfere with the staff. As a result of improper management, there is often a confrontation between subordinates and superiors, which is largely due to the insufficient quality of the administrators themselves, the lack of humane management and the lack of appropriate incentives. The cultural level of administrators is not high enough to create a good example and demonstration effect.

4 Countermeasures Analysis to Strengthen the Construction Management of Water Conservancy and Hydropower Construction Project

4.1 Enhanced Site Surveys and Analyses

Before carrying out the construction of water conservancy and hydropower construction projects, it is necessary to carry out investigations and analyses, which is a prerequisite for the construction of the construction project, and if it is not possible to carry out scientific investigations and analyses of it, it will inevitably have a negative impact on the overall construction project. For this reason, before the construction of water conservancy and hydropower construction projects, it is necessary to send professionals and technicians to go deep into the construction site, comprehensively investigate and analyse the local environment, economy, hydrology and other conditions, and scientifically prove and analyse the above information, and accordingly plan the overall water conservancy and hydropower construction project construction plan and construction plan.

4.2 Analysis of Measures to Strengthen Management

Strengthening supervision. Perfect supervision and management methods have been proposed to refine the supervision duties and regulate the supervision work from the system. In accordance with the project requirements, the objectives of supervision, progress, material plan, etc. are clearly defined to ensure the standardisation of supervision work. By formulating the supervision rules, the quality standard of each part, each process and each stage of the project, as well as the whole process of quality supervision, quality assessment and acceptance are regulated in detail, so that the construction enterprises and each grass-roots employee can understand what should be done and how to be done in quality management. And it also facilitates the interconnection of various work processes, saving a lot of inspection work and saving a lot of time. In addition, relevant quality assurance signs should be set up, and relevant quality inspection stations should be set up to conduct regular quality sampling inspections of the project.

Strengthen the quality management. The quality control work of the project should be carried out from "before", "during" and "after" three aspects. In the construction process, first of all, we should qualify the construction unit, carefully review the construction plan and technical data submitted by the construction unit. All raw materials, semi-finished products, equipment, machinery, etc. entering the construction site should be closely examined, and anything that does not meet the requirements will not be allowed to enter the site. Post-facto monitoring means that the quality inspection department should go to the construction site to check the responsibility and authority of each technician to ensure that everyone is responsible; during construction, the construction supervisor should make a good construction logbook to write down the construction situation, problems and treatment methods, etc., so as to facilitate the acceptance of the project; auditing of the engineering drawings is also an important part of the work of the project supervision and supervision engineers in the process of engineering construction, whether or not they have According to the design drawings, once there is a problem, immediately make corrections; Review of engineering process, sampling of the engineering process links, the process requirements that do not meet the standard to be corrected; Review of construction materials, despite the fact that they have been audited before entering the construction site, but it is necessary to carry out a sampling check to ensure its quality and performance, to prevent unqualified materials are mixed into the building. Ex post facto management is the inspection and filing of the project after completion. After the completion of the project should be accepted, acceptance should be in accordance with the acceptance specification, substandard projects should be firmly rejected, requiring them to make the appropriate adjustments before acceptance; after the project acceptance, it is necessary to collect all the data and drawings used in the construction process, and archive them in strict accordance with the construction specifications, so as to better track the construction process and the construction programme.

4.3 Implementation of Strict Quality Pre-Control by Construction Enterprises

In water conservancy engineering construction projects, it has become a trend to manage the quality of the project by adopting the method of pre-control. On this basis, the construction enterprise should strictly abide by the contractual work schedule, and must not ignore some details, otherwise it is these details may have a great impact on the overall quality of the project. This concept also requires the establishment of a relevant supervision team to regularly supervise the construction process of construction enterprises, and once it is found that there are fraudulent behaviours, serious penalties will be imposed.

Concluding Remarks

The quality of water conservancy and hydropower construction project is related to the national economy and people's livelihood, although some achievements have been made in recent years in the construction, but should also see some problems. Water conservancy and hydropower construction enterprises should seriously analyse its problems, strengthen its on-site survey and analysis, strengthen the quality management, the implementation of the theory of pre-control, improve the quality of management personnel, for water conservancy and hydropower construction project quality assurance.

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