

Research on Safety Risk Identification and Control Strategy of Power Transmission and Transformation Project Construction Site

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Abstract: The rapid development of the power system, the number of power transmission and transformation projects of the power system surge, play an escort role for the rapid economic development of our country. In the construction of power transmission and transformation projects, due to the complexity and particularity of power transmission and transformation projects, in the actual construction process, some construction management units and the owner's project department fail to implement the relevant management regulations, which is easy to cause safety accidents. Safety risk management has become an important part of the construction process management of power transmission and transformation projects. Therefore, this paper discusses the safety risk management of power transmission and transformation engineering construction site from the perspective of power enterprise construction management unit, analyzes the existing problems in safety risk management of power transmission and transformation engineering construction site, and puts forward corresponding safety risk management countermeasures.

1. Introduction

Power transmission and transformation project has the characteristics of dynamic change, many environmental factors and wide involvement, which is easy to cause safety accidents and difficult to manage risk. In the process of power transmission and transformation project construction, there are electric shock, fire, height fall, object strike, poisoning, suffocation, collapse, mechanical injury, lifting injury and other safety risk factors. If targeted control measures are not formulated in time, these risks may lead to power safety accidents, which not only affect the safe operation of power enterprises. It also seriously threatens the safety of people's lives and property. The principle of "safety first, prevention first" is a high generalization of the importance of safety in the power industry, and all work should put safety first [1]. Safety management of power transmission and transformation projects is a series of management behaviors carried out by project managers for the project, including pre-project planning, specific implementation of the project, quality management, etc. It is particularly important to ensure the safety and stability of construction personnel and on-site

equipment during the construction process [2]. To do a good job in power infrastructure, safety management should be done first. Only by focusing on the safety management of infrastructure projects can risks existing in power infrastructure be effectively prevented and various accidents avoided [3]. The active implementation of safety performance by personnel at all levels is a crucial part of power grid construction and the foundation of all work [4]. Enterprise management and construction management should always uphold the concept of safe and standardized operation, pay full attention to the safety work of engineering construction, and fully implement the safety guarantee work of engineering personnel [5]. During the construction of power transmission and transformation projects, we must pay more attention to infrastructure projects, conduct in-depth research on existing safety weaknesses, and propose effective supervision measures and solutions [6]. At present, the power transmission and transformation projects are at the peak of construction, special extreme weather is frequent, and the security situation is more serious. To realize the safe and stable production and steady improvement of management level of power engineering is the top priority of power engineering at present. Therefore, it is of great practical significance for the stable development of the power industry to deeply analyze the key points and existing defects of the safety risk management of power transmission and transformation projects, and actively improve them to ensure the safety of personnel and equipment on the construction site. This paper analyzes the problems in safety risk management of power transmission and transformation engineering construction site from the perspective of power enterprise construction management unit, and puts forward corresponding safety risk management countermeasures.

2. Requirements for Safety Risk Management of Power Transmission and Transformation Engineering Construction Site

Engineering construction management should adhere to the "people-oriented, life first", adhere to the "science and technology prosperity", always put safety work in an extremely important position, promote the research and application of advanced technology around the site construction safety, promote the upgrading of technology and equipment, reduce construction risks, and improve the essential safety level.

The construction safety risk of power transmission and transformation project refers to the comprehensive description of the possibility of occurrence of certain foreseeable risk, the severity of consequences and the frequency of accidents in the construction operation of power transmission and transformation project. According to the principles of preliminary identification, retest assessment and graded control, the construction safety risks of power transmission and transformation projects are managed. The construction management unit shall perform the responsibility of safety risk management and supervision, and the project construction shall fully implement the construction safety risk management process of power transmission and transformation projects to ensure that the risks are always controllable and under control. The construction management unit shall carry out the construction safety risk management according to the requirements; Master the level 3 and above operational risks of construction management, supervise the filing of the level 3 and above risk permits, and the management personnel are in place according to the requirements; Timely and accurately report level 3 and above risk operation management information.

2.1. Classification of Risk Operations

The construction safety risk of power transmission and transformation project is divided into four levels: major risk, large risk, general risk and low risk, which are marked with red, orange, yellow and blue colors respectively. The risk level is graded according to the basic risk registration form, which is divided into five levels from large to small. The corresponding relationship between the

four safety risk levels and the construction risk rating table is shown in Table 1:

Table 1: The corresponding relationship between safety risk level and construction risk rating table

Safety Risk level	Construction risk level
Major risk	Level 1 operational risk
Greater risk	Level 2 operation risk
General risk	Level 3 and 4 operational risk
Low risk	Level 5 operational risk

2.2. Risk Operation Plan Control

After receiving the risk information, the construction management unit shall review it with the actual situation on site and report it to the higher level infrastructure management department. Secondary risks shall be issued by the construction management unit, and the early warning shall be lifted after the completion of the risk operation.

2.3. Risk Operation Process Control

Implement remote video surveillance during risky operations. It shall be supervised by risk control personnel on duty at all levels. At the same time, management personnel at all levels and safety inspectors adopt the form of "four not two straight" inspection and supervision, and fulfill the responsibility of risk to the post in accordance with the requirements.

2.4. Risk Publicity

Risk workplaces should be set up three or above construction site risk control boards.

3. There are Problems in Safety Risk Management of Power Transmission and Transformation Project Construction Site

Due to the greater difficulty in the construction of power transmission and transformation projects, more and higher requirements are put forward for the management of various departments and the professional skills of construction personnel. Therefore, safety management needs to be further strengthened to limit the occurrence of various safety accidents [7]. In the construction process of power transmission and transformation projects, there are problems such as weak awareness of safety risks of relevant responsible personnel and construction personnel, weak professional ability of safety risk management personnel, and imperfect safety management mechanism, including:

3.1. Construction Personnel have Weak Awareness of Safety Risks

Due to the characteristics of a power transmission and transformation project involving a wide range of specialties, a large amount of engineering construction, and a large number of construction personnel, in the actual process of power transmission and transformation project construction, the construction personnel recruited by the subcontractor have low cultural quality and uneven professional skills. Some construction personnel have not even participated in safety training and seriously lack safety awareness. In practice, the business ability is not fully skilled, so the construction cannot be carried out safely and reasonably [8]. In 2017, an inverted tower accident occurred at a power transmission and transformation construction site of a power company, resulting in 4 deaths and 1 injury, and direct economic losses of more than 5 million yuan. After investigation, because the

site operators did not confirm whether the site connection facilities are firm and whether the equipment meets the requirements, they rushed to carry out the construction, and the iron frame fell during the construction process, and the construction personnel fell from the height with the tower. Therefore, it is necessary and necessary to conduct professional skills training and safety training for construction personnel.

3.2. Lack of Highly Professional Safety Management Personnel

In the process of power transmission and transformation project construction, the professional quality of safety management personnel directly affects the progress and quality of the project, which is the top priority. Only the professional ability and quality of safety management personnel have been standardized and comprehensive training, in order to escort the construction of the entire project. In many power transmission and transformation projects, the construction and management unit does not pay attention to the key role played by the safety management personnel in the project construction process, and the safety management personnel set up are mostly to cope with the inspection of the superior department and the safety supervision department. This way of masking the ears and stealing the bell has caused negative effects on the safety management level of enterprises. In 2015, during the construction of a power transmission and transformation site, an electric shock occurred in a power company due to the lack of quality of safety management personnel, which directly affected the overall construction project and resulted in the death of three employees and the serious injury of two employees [9].

3.3. Security Risk Management is a Mere Formality

In practice, there are generally two problems in security risk management. First, the security risk management system is not perfect, not sound, that is, there is no rules to follow; second, a comprehensive security risk management system has been formulated, but it is difficult to implement or not enough because of weak pertinency and other reasons, that is, there are rules that are not followed [10]. These safety management problems have become the weak point of the steady development of power transmission and transformation projects, and according to the accident notification in previous years, the safety risks have not been paid attention to, and then led to some safety accidents. In the construction of some power transmission and transformation projects, because of the pursuit of project progress, safety risk management has not been paid attention to by relevant departments, and it is easy to ignore the strict implementation of safety risk management. At the same time, in the supervision of security risk management, due to the imperfect supervision mechanism, supervisors cannot really effectively play a supervisory role. In addition, there are some security risk management personnel in the security management work, do not really comply with the company's various systems and regulations, the preparation of security risk control data is not serious, not strong, only used to cope with the inspection of the superior department and the safety supervision department, so that the security risk control work is superficial and mere form.

4. Suggestions on Safety Risk Management of Power Transmission and Transformation Engineering Construction Site

The power transmission and transformation project must strengthen the risk control and strengthen the safety management to ensure the smooth progress and completion of the project. Therefore, it is necessary to improve the awareness of risk management, constantly improve the safety risk management mechanism, and reduce the occurrence of risk accidents and later economic losses [2].

4.1. Strengthen the Safety Education and Training Management of Construction Personnel

In the process of power transmission and transformation project construction, it is necessary to deeply implant the safety consciousness into the hearts of each construction personnel. Each construction personnel is required to receive regular safety education and training, and to study recent violation notification and accident case analysis, and managers are required to publicize relevant safety work system, procedures, and regulations, establish staff training files, and rigorously implement the safety management system. For example, every Friday safety day activities, learning safety training materials issued by the company's safety supervision department; At the beginning of each year, "Start the first lesson" is held to lay a good safety foundation for the start of construction; Before the annual spring and autumn overhaul, unified safety procedures study and participate in the safety access exam, only those with satisfactory results can enter the construction site, in order to ensure that the safety procedures are fully understood.

4.2. Cultivate Highly Professional Safety Management Personnel

Safety risk management personnel need to strengthen their job responsibilities and carry out risk identification according to the construction content of power transmission and transformation projects, set an example, and guide construction personnel to strengthen safety construction according to construction requirements in the actual construction process [7]. The safety management personnel shall participate in the safety education training organized by the Organization Department and the safety supervision Department of the company in accordance with the annual safety training plan. At the same time, I regularly participated in the safety risk control supervision meeting organized by the safety supervision department of the company, sorted out the construction operation plan, conducted safety risk analysis, and formulated corresponding control measures. In addition, the safety management personnel should actively participate in the safety education and training organized by the safety supervision department and the superior construction department, deeply understand the training content, and effectively improve the level of safety management and skills.

4.3. Establish a Sound Security Risk Management System

It should effectively utilize the safety production risk control platform by incorporating all operational plans into the platform for management. All construction sites must open video, and simultaneously upload construction work tickets, construction plans and other engineering project data for inspection by safety supervisors at any time. At the same time, electronic means such as electronic cameras and tablet computers are used to strengthen security risk management, and corresponding rules and regulations and violation assessment methods are introduced.

4.4. Formulate a Three-Level Safety Net Working Mechanism

It should implement the safety net regular meeting system and strengthen the safety management to achieve "same frequency resonance" and effectively "communicate the safety responsibilities and requirements to the grassroots level, the implementation to the front line, and the implementation to the post". In addition, the construction department should establish full-time or part-time safety personnel to participate in the unit level safety net monthly meeting. The meeting was organized by the company's safety supervision department, presided over by the person in charge of the safety supervision Department, and attended by safety supervision personnel (including safety supervision team) and safety officers of relevant departments. Subsequently, the safety officer of the construction department is responsible for organizing the workshop level safety net regular meeting, and the person in charge of the construction department is presided over by the department, and the manager of the owner's project department and the safety officer participate.

4.5. Further Promote the Investigation and Management of Security Risks

It should firmly establish the concept of "hidden dangers are accidents", in order to gain a deep understanding of the severity and complexity of the current production safety situation, in accordance with the principle of "comprehensive investigation, hierarchical management, closed-loop control", focus on the investigation and managing of safety management, special equipment, construction personnel and other hidden dangers, and resolutely prevent all types of safety accidents.

5. Conclusion

With the rapid development of China's economy, the power field has also obtained a better space for development, and the volume of power projects has continued to increase. With the gradual expansion of the scale of power transmission and transformation projects, the difficulty of safety risk management is also increasing. It is necessary to further solve the problems existing in the safety risk control of power transmission and transformation projects to ensure the smooth development of the construction of power transmission and transformation projects. This paper analyzes the problems existing in safety risk management of power transmission and transformation engineering construction site, and puts forward corresponding safety risk management suggestions, including safety training, safety management personnel training, establishment and improvement of relevant management mechanisms. Only by adhering to the concept of safe development, implementing the safety work policy of "safety first, prevention first and comprehensive treatment", standardizing the construction safety risk management of power transmission and transformation projects, and fully implementing the safety risk control work in all aspects, can we better ensure the safety of people and equipment at the construction site during the construction process, so as to ensure the safe and stable operation of the power grid, with the purpose of promoting an improvement in steady progress and long-term development of the power sector.

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