

Research on establishment and evaluation of security management system for highway engineering construction

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Abstract: Under the background of market economy, the highway transportation industry in our country has been keeping trend of rapid development, which not only drives economic development of various regions in our country but also brings huge revenue for national economy. However, many problems exist in the highway engineering construction, especially the security problem. Different from general engineering construction projects, highway engineering construction projects face complicated geographical condition and large construction difficulty, as a result, various potential risks are easier to appear. Therefore, it is needed to establish scientific and effective security management system for highway engineering construction thus to provide a safe environment for on-site construction personnel.

1. Introduction

Highway engineering construction projects can not only reduce transportation cost and guarantee national economy development but also provides guarantee for urbanization construction in our country, which have become indispensable power to promote national economy, such as 1241-kilometer Beijing-Shanghai High-Speed Railway connecting Beijing and Shanghai, and passing through 15 cities, Beijing-Hong Kong-Macao Highway which is called as “traffic artery connecting the south and the north”, Beijing-Tibet Highway which is the important component of national highway network and Beijing-Harbin Highway connecting Beijing and the Northeast Region. As one part of public engineering construction projects, highway engineering construction projects are characteristic by long construction period, high-place operation in the open air, large amount of labour, poor systematicness, various kinds of construction machinery and complicated construction environment, which present high probability of security accident. Highway engineering construction is of high risk, especially those taking bridge and tunnel as main structural forms, wherein, under the background of complicated geological condition, once security accidents appear, there will be a large difficulty for rescuing, besides, the life and property security of construction personnel will also face immeasurable losses. While security management refers to that the management personnel conduct a whole set of planned management activities involving organization, coordination, control and guidance for safe and smooth implementation of projects. Therefore, this paper aims at the establishment and evaluation of security management system for highway engineering construction for research.

2. Establishment of security management system for highway engineering construction

2.1 Establishment principle

2.1.1 Principle of people first

The establishment of security management system for highway engineering construction should adhere to the principle of people first. The security management of highway engineering construction mainly centers on life and property security of people, only when people first is taken as important idea for security management can the security awareness of related personnel be guided and educated correctly and the security accidents can be reduced. The security awareness of

enterprise leaders is very important for smooth implementation of project, because only when the leaders pay attention to security production can they have enough capitals and personnel to carry out security management. Therefore, it is needed to persist in the security management idea of people first, start from fundamentals and make all project participants actively maintain their security interests, only in this way can the on-site construction security can be effectively controlled and realize “zero” accident during the project life cycle.

2.1.2 Principle of legislation

Establishment of security management system for highway engineering construction should persist in the principle of legislation, which should be base on related laws and regulations. The following aspects should be followed: 1. Related laws and regulations of our country; 2. Assigned standards of construction industry; 3. Recognition and analysis on source of danger; 4. Related laws and regulations and standards of the highway engineering construction site; 5. Construction scheme characteristics; 6. Requirements of the project owner and related quality supervision department.

2.1.3 Dynamic principle

Establishment of security management system for highway engineering construction should persist in dynamic principle. In the highway engineering construction process, the environment is changing constantly, howling winds and heavy snow sometimes, and sunny days maybe. Therefore, we should adjust the security management system in real time to establish a cycling and dynamic circulation management process thus to realize effective implementation of security management system, eliminate hidden security dangers to the largest extent and achieve maximum implementation effect of the system.

2.2 Module analysis

2.2.1 Human factors

Human factors mainly include security awareness of personnel, professional technique level and operating ability. Wherein, security awareness mainly refers to attention degree of operating personnel on potential risks, wearing of protective equipment and attention on security of leader and management personnel; professional technique level refers to professional technique level of management personnel and operating personnel as well as operation qualification of related personnel based on professional knowledge; operating ability mainly refers to whether the operating personnel have corresponding labor ability and physical quality. Strengthening security awareness of operating personnel can directly and effectively reduce security accidents on construction site; strengthening security awareness of management personnel can make them find out hidden dangers timely and take measures to avoid possible security accidents; strengthening security awareness of leaders can make them pay attention to security problems in the construction process, invest a large amount of capitals, human power and technology to guarantee construction security fundamentally.

2.2.2 Environmental factors

The environmental factors mainly include operating environment on construction site, social environment and natural environment of project location. Wherein, operating environment refers to noise and dust on construction site, lighting situation on construction, enclosed management, fire prevention on site, on-site fencing and hygiene; social environment refers to local regulations and systems, local customs and residents’ belief; natural environment refers to various natural climates such as rain, snow, heavy wind and dust.

2.2.3 Material and mechanical equipment factors

The material and mechanical equipment factors include mechanical equipment, material and security protection equipment. Wherein, mechanical equipment mainly refer to various equipment and tools for construction, such as tower crane, road roller, blasting device and scaffold; materials refers to reinforcing steel bar and concrete for engineering subject; security protection equipment mainly refers to safety belt, safety helmet and fence.

2.2.4 Management factors

The management factors include sub-contractor management, security management institution, management of security protection and security technology. Wherein, the qualification and quality of sub-contractor directly affect the construction security and final engineering quality; security management institutions mainly carry out security check, assist in formulating various security production systems and supervise the security production situations of related departments; management of security production targets at taking preventive measures to avoid major accidents and reduce accident hazard to minimum level in face of accidents; while management of security technology aims at standardize construction activities more scientifically.

3. Evaluation research on security management system for highway engineering construction

3.1 Establishment principle of evaluation system

3.1.1 Comprehensive principle

The contents of evaluation system should comprehensively reflect the basic requirements of Regulations on Security Production Management of Constructional Engineering, cover various links of on-site security management of highway construction, guarantee evaluation scope to be complete and exhaustive thus to guide security management standardization of construction site.

2.1.2 Scientific principle

It means that evaluation index selection and system establishment should base on actual characteristics and evaluation theory of constructional engineering to guarantee objectivity and reliance of evaluation result.

3.1.3 Adaptive principle

It means that the evaluation system contents should meet with actual requirements of construction site, that is, the evaluation index setting should base on representative comprehensive index which are not overlapped in information and content, and can reflect one certain characteristic of security management of constructional engineering independently.

3.1.4 Operative principle

The evaluation system should base on theory and combine with actual construction situation tightly to persist in the concise, convenient, effective and practical principle. That is, the various indexes in the evaluation system should be measurable and comparable, the data can be quantized, the evaluation index and methods can be mastered easily and have clear guidance role to elevators.

3.2 Evaluation index

3.2.1 Make the evaluation premise and objective clear

The evaluation index system establishment should firstly base on making the evaluation premise and objective clear, including evaluation scope, evaluation period, evaluation stage and evaluation objective. Wherein, the research objective in this paper refers to evaluation on security management standardization of highway construction.

3.2.2 Determine the hierarchical structure of evaluation index system

The overall hierarchical structure of the evaluation index system can be analyzed and determined according to element composition, including primary index, secondary index and three-level index.

3.2.3 Prepare related theories and conduct practical research

Establishment of scientific evaluation index should be based on repeated collection of related research result materials, comprehensive survey and successful field research projects. In specific project practice, it is needed to collect information related to various stakeholders including on-site manager, security management personnel and operating worker, wherein, the information involves

security protection situation, security management system, management of security technology, file management, security measures on construction site, security protection, construction operation, bridge and tunnel engineering, roadbed and road surface engineering, besides, systematic understanding of specific matters should be conducted to complete the objective.

3.2.4 Screen and optimize indexes and finally determine the index system

According to the evaluation objective, the existing literatures and filed research materials should be sorted for deep comparison, analysis and research on the various factors of affecting construction security management standards thus to establish the primary index system. Based on this, it is needed to inquire the opinions of related experts to adjust the indexes repeatedly, determine the indexes according to index completeness, feasibility, stability and necessity, establish the index system structure, perfect the primary evaluation index system and establish the final index system.

4. Conclusion

Security management for highway engineering construction site is a long-term and dynamic work. In specific implementation process, many factors should be considered to analyze the source of security accidents, besides, corresponding measures should be adopted timely, which is of great practical significance to life and property security of related construction personnel. This paper conducts analysis from security management system establishment and system evaluation thus to practically enhance security management level of highway engineering construction site.

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