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The Significance of Safety Management to Construction Project Management

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Abstract:

As the core point of construction project management, safety management is closely related to project quality, construction progress and personal safety. Focusing on Guangdong Huagong Engineering Construction Supervision Co., Ltd. (Hereafter Referred to As "Guangdong Huagong"), this article analyzes the significance of safety management of construction projects, typical high-risk project management strategies and the safety management practice of this enterprise in actual projects. By combing policies and regulations, analyzing cases and summing up experience, this article explores the mechanism of safety management in the whole life cycle of construction projects. Aiming at the typical high-risk projects such as deep foundation pit, pile foundation construction and crack prevention of super-long basement structure, this article puts forward some targeted management countermeasures. It is found that a scientific and effective safety management system can not only effectively prevent accidents and ensure construction safety, but also improve project quality, control project cost and enhance the market competitiveness of enterprises. Guangdong Huagong Company achieved "zero accidents" in several projects by means of system construction, whole-process supervision and innovation of technical means, which provided a reference for the industry in safety management.

Keywords:

Safety Management, Construction Engineering, Risk Management, Supervision Unit, Construction Safety

1. Introduction

Construction industry is an important pillar industry of national economy, which plays an important role in promoting urbanization, improving living environment and promoting employment [1]. However, due to the long construction period, complex working environment and many participants, safety management has always been the core difficulty of project management. In recent years, the state has paid more and more attention to safety production, the relevant policies and regulations have been continuously improved, and the public's attention to project quality and safety has also been increasing [2]. In this context, all construction units must think about how to ensure the smooth progress of the project by means of scientific and effective safety management [3].

As a professional supervision enterprise based in Guangdong for a long time, Guangdong Huagong always regards safety management as the core responsibility of engineering supervision. In strict accordance with the Regulations of Guangdong

Province on Construction Engineering Supervision and related policy requirements, the company implements all-round and whole-process safety supervision responsibilities and actively guides the construction unit to improve the safety production management system [4]. In many large-scale projects, the company has effectively reduced the hidden dangers of construction safety by formulating detailed safety supervision rules, carrying out risk assessment and hierarchical control, and strengthening on-site supervision of high-risk processes, which plays an important role in ensuring project quality and personnel safety [5].

Based on the theme of "the significance of safety management to construction project management" and combined with the practical work experience of Guangdong Huagong Company, this article discusses the key role of safety management in modern construction projects. Starting with the basis of policies and regulations, this article analyzes the main institutional support of current safety management; Then, the typical high-risk project management strategy is deeply analyzed, and the successful experience and countermeasures in practice are summarized. Finally, suggestions on strengthening safety management are put forward to provide reference for colleagues in the industry.

2. The Role of Safety Management In Construction Engineering Management

The most direct function of safety management is to prevent safety accidents and ensure the life safety and health of construction site personnel. The construction site environment is complicated, and high-risk operations such as aerial work, deep foundation pit construction and large-scale mechanical operation are common, and a slight mistake may lead to serious accidents [6]. Taking Guangdong Huagong as an example, when participating in several residential quarters and municipal infrastructure projects, the company always regards "safety first" as the basic principle of on-site supervision [7]. By formulating detailed safety supervision implementation rules, carrying out regular safety inspections and organizing special hidden dangers investigation, the safety hidden dangers in construction can be detected and corrected in time.

Good safety management is beneficial to improve project quality. Safety and quality are closely linked. Only by ensuring construction safety can we ensure the implementation of construction technology specifications and the rational use of building materials. If safety management is neglected, workers will work with diseases and violate regulations frequently, which will inevitably affect the construction quality and even bury structural safety hazards [8]. In practical work, Guangdong Huagong Company pays attention to the combination of safety and quality control, especially in key processes such as concrete pouring, steel binding and formwork support, and strictly implements the on-site supervision system to ensure that each process meets the design and specification requirements.

Safety management also has a positive impact on project duration and cost control. On the one hand, safety accidents often lead to shutdown and rectification, casualties, equipment damage and other consequences, which directly disrupt the pace of construction and delay the progress of the project; On the other hand, in the event of an accident, enterprises need to bear corresponding economic compensation and legal responsibilities, and increase the project cost. For this reason, by establishing and

perfecting the safety management system and identifying and controlling the risk sources in advance, unplanned downtime and economic losses can be minimized [9].

Safety management embodies corporate image and market competitiveness. In the current competitive construction market, whether safety management can be effectively implemented has become one of the important considerations for owners to choose cooperative units [10]. Enterprises that maintain a good safety record for a long time are more likely to be favored by high-quality projects. Guangdong Huagong Company has been awarded the title of "Civilized Work Site for Safe Production" for many years, adhering to the safety management concept of high standards and strict requirements, and has been highly recognized by construction units in several key projects.

3. Management Strategies and Countermeasures of Typical High-risk Projects

In construction projects, some construction links are classified as high-risk projects due to technical difficulties, complex working environment or high potential risks. Once these projects are poorly managed, they will easily lead to safety accidents and affect the overall progress and quality of the project. For this reason, management strategies and countermeasures with strong pertinence and high operability must be adopted to ensure safe and controllable construction. In the practice of several projects, Guangdong Huagong has formed mature management experience for typical high-risk projects such as deep foundation pit engineering, pile foundation construction and crack prevention of ultra-long basement structure.

Table 1. *High-Risk Construction Projects: Safety Hazard Statistics and Control Effectiveness Comparison.*

Project Type	Construction Duration (Months)	Number of Safety Hazards	Number of Safety Accidents	Reduction Rate of Hazards After Control Measures	Average Cost Loss (10,000 RMB)
Deep Foundation Pit Engineering	18	235	6	78%	45
Pile Foundation Construction	12	160	3	65%	28
Crack Prevention for Super-Long Basement Structures	24	310	9	82%	60
High-Altitude Curtain Wall Construction	10	110	2	60%	20
Steel Structure Lifting	8	95	4	70%	35

As shown in Table 1, among all kinds of high-risk construction projects, deep foundation pit engineering and super-long basement crack prevention have relatively high safety risks, many hidden dangers and high accident rate. However, after the

implementation of targeted control measures (such as expert review, deformation monitoring, process optimization, etc.).), the number of hidden dangers is obviously reduced, which proves the effectiveness of risk classification and control strategy.

In the construction of deep foundation pit, the implementation of deformation monitoring and real-time early warning system helps to reduce 78% of potential dangers, effectively avoiding soil collapse and structural instability. In contrast, although the identified risks of high-altitude curtain wall construction are less, its potential consequences are serious, which emphasizes the need for continuous supervision and technical improvement.

Deep foundation pit construction is one of the most common high-risk operations in construction engineering, especially in the central area of the city, with dense surrounding buildings, high groundwater level and complex construction conditions. In order to effectively control risks, Guangdong Huagong Company usually adopts management strategies as shown in Table 2. Figure 1 shows an example of "kicking" accident caused by insufficient pile insertion depth due to high plastic mud sliding in deep excavation engineering.

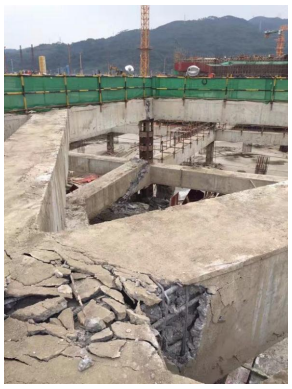

Figure 1. *Example of a "Kicking" Accident Caused by Mud Sliding in Deep Excavation Works.*

Table 2. *Risk Levels and Control Measures for Deep Excavation Works.*

Risk Level	Control Measures	Responsible Parties
High	Expert review + On-site supervision + Deformation monitoring	Chief Supervisor, Safety Department, Contractor's site manager
Medium	Supervision patrol + Periodic inspection	Specialist supervisor, Construction manager
Low	Daily patrol + Hazard record	Site inspector, Crew leader

Through the hierarchical management and control mechanism, the management responsibilities and implementation standards under different risk levels are clarified, and the dynamic monitoring of the whole process is realized.

Figure 2. *Collapse Accident of Deep Foundation Pit.*

As shown in Figure 2, inadequate support systems in deep excavation may lead to catastrophic collapse of adjacent infrastructure, validating the necessity of hierarchical control measures proposed in Table 2.

Pile foundation construction is greatly influenced by geological conditions, especially in soft soil layer, sand layer and other geological environments, which are prone to problems such as pile body deviation and broken pile. Therefore, Guangdong Huagong Company has formulated the key points of construction control as shown in Table 3 in a residential project.

Table 3. *Key Parameter Control Standards for Pile Foundation Construction.*

Controlled Item	Control Criteria	Inspection Frequency
Mud Specific Gravity	1.15–1.25 g/cm³	At least once per pile
Verticality Deviation	≤1%	At least 3 piles per shift
Sediment Thickness	≤50 mm	Before concrete pouring

Through the quantitative control of key parameters, the construction accuracy and safety are improved.

Due to temperature difference shrinkage, concrete shrinkage and other factors, cracks are easy to occur in the super-long and super-large basement, which affects the structural safety and waterproof performance. Combined with design optimization and construction technology improvement, Guangdong Huagong Company put forward comprehensive prevention measures as shown in Table 4.

Table 4*. Integrated Crack Prevention Measures for Long Basement Structures.*

Measure Type	Implementation Details	Application Effect
Design Optimization	Increased reinforcement density, reduced expansion joint spacing	Reduced crack occurrence
Material Control	Use of low-heat cement, addition of expansive agent	Controlled early shrinkage
Construction Management	Segmental pouring, enhanced curing, temperature monitoring	Improved construction stability

The above measures have been applied in many projects, which significantly reduced the incidence of cracks and improved the durability and safety of the structure.

4. Effectiveness of Safety Management in Guangdong Huagong Company

Guangdong Huagong is a professional supervision enterprise with strong comprehensive strength. In many years of engineering practice, the company has gradually established a set of safety management system that not only meets the requirements of policies and regulations, but also adapts to the characteristics of the project, and has achieved good results in several key projects.

According to the Regulations of Guangdong Province on Construction Project Supervision, the Management Regulations of Guangdong Province on Implementing the Primary Responsibility of Quality and Safety for Construction Units (for Trial Implementation) and other documents, combined with the actual situation, the company has compiled the detailed rules for the implementation of safety supervision, the management measures for projects with greater risks, and other systems. These systems have defined the safety management process of the whole process from project entry to completion. They not only include the special scheme review mechanism for high-risk operations, but also refine the work requirements such as on-

site inspection, hidden danger investigation and rectification closed loop, which provides strong support for project safety management.

In terms of implementation, Guangdong Huagong strengthens process supervision by means of daily inspection, special inspection and joint acceptance. Just like in a high-rise residential project, the supervisor noticed that the tower crane foundation was loose, and immediately asked to suspend its use and organize reinforcement treatment, which successfully avoided a potential accident. At the same time, the company introduced video surveillance, intelligent inspection, dust monitoring and other information means in several projects, which improved the efficiency and accuracy of safety supervision.

In an industrial park project, the project department and the construction unit jointly set up a "safety lecture hall" to carry out simulation drills, case analysis and other activities, which enhanced the risk identification and emergency response capabilities of the construction personnel. By setting up "safety red list" and "illegal exposure desk", a good safety culture atmosphere is created.

Judging from the actual results, in recent years, many projects supervised by the company have achieved the goal of "zero accidents" in safety production, and have also won many honors such as "civilized construction site of safety production in Guangdong Province" and "Guangzhou Quality Structural Engineering Award". Among them, a large commercial complex project has a construction area of over 200,000 square meters, involving many high-risk operations such as deep foundation pit, high-altitude curtain wall and long-span steel structure. The project team strictly implements various safety management measures.

5. Suggestions on Strengthening Safety Management

5.1. Improve the institutional system

Although the existing laws and regulations are relatively perfect, in the implementation of specific projects, some units have the situation of "emphasizing form and neglecting implementation". In view of this, it is suggested to further refine the management system and decompose the responsibility of safety management layer by layer to ensure that each post and each working procedure has a clear person in charge of safety.

For example, Guangdong Huagong Company implemented the "safety responsibility list system" in a large residential project, which defined the safety responsibilities of all parties such as construction, supervision and design in the form of a list, and regularly organized cross-inspection and performance evaluation. This practice not only enhances the operability of the system, but also enhances the sense of responsibility of the participants.

In the future, enterprises should be encouraged to build a more targeted safety management system according to their own characteristics, and at the same time strengthen the supervision and assessment of the implementation of the system to prevent the system from becoming a mere formality.

5.2. Improve the professional ability of employees

Human factors are very important in safety management. At present, the overall cultural level of front-line workers in the construction site is not high, and their safety

awareness is relatively weak, and illegal operations still occur from time to time. Therefore, it is necessary to strengthen training and improve the safety literacy of all staff.

Guangdong Huagong Company has carried out activities such as "daily safety disclosure before shift" and "accident case warning education" in several projects, and enhanced the training effect by means of short videos and animation demonstrations. At the same time, for managers, the company organizes special safety training at least twice a year and brings it into the performance appraisal system.

It is suggested that in the future, the mode of "holding certificates and continuing education" should be promoted in the industry, a unified safety training and certification platform should be built, and the entry threshold for employees should be improved, so as to truly achieve "everyone knows safety and everyone manages safety".

5.3. Promote the application of intelligent safety management means

Traditional manual inspection and paper recording methods have been difficult to meet the increasingly complex management needs of modern engineering projects. With the help of information and intelligent means, the efficiency and accuracy of safety management can be greatly improved.

In a commercial complex project, Guangdong Huagong Company introduced a "smart site" management system, which realized real-time monitoring of key areas and high-risk operations through video surveillance, face recognition access control, tower crane limit alarm and other functions. In addition, the UAV is also used to inspect the slope stability, which improves the safety monitoring level during the construction of deep foundation pit.

In the future, it is necessary to accelerate the in-depth application of Internet of Things, BIM, big data and other technologies in safety management, and build an intelligent safety supervision platform integrating risk early warning, data analysis and emergency response.

5.4. Prospect

In the new era, the construction industry is moving towards high-quality development, which makes the safety management of the construction industry no longer just stay at the level of "passive response", but must change to "active prevention and systematic management". In the future, safety management will be paid more attention to in three key aspects. One is systematization, which integrates the safety concept from the initial stage of design, thus creating a life-cycle safety management model covering all aspects of planning, design, construction and operation and maintenance. The second is standardization, and efforts are made to promote the construction of a unified safety management standard system, so that the safety management of different regions and different types of projects can reach a standardized level. The third is sustainability, which closely combines the concepts of green construction, low-carbon environmental protection and safety management to help the construction industry achieve the goal of green development.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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References

[1] Zheng, W.B. Main Achievements in Safety Management of Construction Projects at Home and Abroad: A Study Based on Safety Accidents, Safety Management Systems and Related Literature. *China Safety Science Journal,* 2022, 32(10), 8-17.

[2] Feng, S.C.; Qi, C.M.; Bu, B. et al. Analysis of Influencing Factors of Construction Safety Risks Based on Improved DEMATEL-ISM. *Journal of Engineering Management,* 2023, 37(1), 141-146.

[3] Xu, Y.L.; Li, L.L.; Chen, H.H. et al. Study on the Influence of Foreman-Worker Relationship on Safety Behavior of Construction Workers. *Journal of Railway Science and Engineering,* 2023, 20(8), 3138-3150.

[4] Xiong, J.; Peng, Y.M.; Cai, J. Research on Dynamic Evolution and Intervention Simulation of Construction Risks Based on MICMAC-FCMs. *Journal of Railway Science and Engineering,* 2023, 20(11), 4356-4366.

[5] Ye, H. Main Problems and Preventive Measures in Subcontract Management of Construction Industry. *Economics,* 2020, 3(3), 76-78.

[6] Li, M.; Chen, S.M.; Zeng, Y. Risk Assessment of Construction Sites under Rainstorm Disasters. *Journal of Safety and Environment,* 2024, 24(4), 1304-1313.

[7] Xu, J.B.; Chen, Q.; Cui, L.B. Research on Intelligent Management and Control Methods and Platform Application of Rail Transit Engineering General Contract Projects. *Urban Mass Transit,* 2024, 27(7), 266-274.

[8] Xin, Yo.Y.; Yang, D.L.; Fang, Q.C. Application of Improved GRA-TOPSIS Model in Risk Assessment of Prefabricated Building Construction. *Journal of Safety and Environment,* 2023, 23(7), 2212-2222.

[9] Lin, L.N.; Xu, M. Research on Optimization of Constraint Mechanism for Safety Accident Investigation in Construction Projects Based on Evolutionary Game. *Journal of Engineering Management,* 2023, 37(2), 134-140.

[10] Hu, C.M.; Liu, Y.H.; Huang, H. et al. Study on Early Warning Method for Integral Steel Platform Construction under Coupling Action of Risk Factors. *Journal of Safety Science and Technology,* 2023, 19(9), 103-109.

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