

Research on Safety Management of Construction Projects

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Abstract: *With the development of economy and society, our country has made great achievements in the field of construction. The speed of construction and the technical difficulty of production has reached a new level. The problem that comes along is that as the difficulty of construction increases and the scale of the project increases, the incidence of safety accidents also increases. And effective safety management can ensure the economic benefits while reducing the incidence of dangerous accidents and avoid unnecessary casualties. It is extremely important for the enterprise, the society and the country. This paper analyzes the current situation in safety management and explains the causes of accidents and their influencing factors through the theory of safety science. From there, we have to increase the efforts of government supervision, strengthen the safety responsibility of construction units, strengthen the education and differential management of people with high accident rates, as well as the prevention of major risks, and other aspects of specific analysis.*

Keywords: *Building construction, Safety, Management, Safety accidents, Risk prevention*

1. Introduction

With the rapid development of China's construction industry and the increase in the difficulty of the project, there is a consequent increase in the incidence of safety accidents. The work in safety management has also brought greater difficulty.

Safe engineering construction is not only related to the safety of production employees, but also to the stability and harmony of society. Working at height in construction, bad weather and environment construction, heavy and intensive labor are all factors that may cause safety accidents. Due to their complex causes, building construction workers then become a high-risk occupation. Often, large amounts of money are invested in safety in projects very large amounts of human and material resources, but they are not able to effectively avoid the frequent occurrence of safety accidents. Therefore, we have to study some possible sources of hazards in construction, and look for the causes of these safety accidents, so as to effectively prevent them. The research results of this paper can provide some theoretical support for each enterprise construction safety construction, and also put forward some solution measures, which have strong reference value for some enterprises.

2. Overview of Engineering Safety Management

Safety management of engineering is to use one's rich field experience and theoretical knowledge to efficiently mobilize resources from all aspects in the midst of engineering construction in response to the problems that arise, so that all parties can effectively participate, improve production enthusiasm and productivity, plan and direct the relevant matters, make the personnel, machinery and materials on site to get efficient cooperation and improve the quality of the project. Of course, the premise of all this should be built under the effort to minimize the chance of accidents, to avoid casualties, damage to the surrounding environment, waste of materials, loss of property, etc., which is also the most important principle and goal of safety management.

In the process of construction, construction companies must follow the relevant regulations and industry norms to ensure the safety of construction activities. At the same time, according to the different projects combined with specific analysis of the specific reality, to create a good safety place, so that construction personnel and equipment and the surrounding environment have sufficient safety assurance^[1]. Safety management in construction usually means safety management in the whole life cycle,

in which the construction unit and related units should be able to manage the safety construction problems in construction in accordance with the relevant national requirements and regulations, improve the management system of safety responsibility, and also try to improve the safety awareness of the participants, and implement the concept of safe construction through various means, so that Construction safety management is qualified, the project can be carried out in safety in an orderly manner, to complete a complex engineering project.

3. The Current Situation of Security Management and Factors Affecting Security

3.1. To Determine the Main Responsibility for the Production

Construction companies reveal a series of problems on site, such as a general lack of legal awareness, the cost of violations is not high, lax law enforcement and other safety management issues. Since construction enterprises manage production, safety must also be supervised at the same time. The main responsibility for the production of construction units is determined, which stipulates that the relevant units must set up a full-time production safety department to be responsible for safety management, while increasing financial support for safety management, in order to create a good environment for safe construction. At the same time, safety responsibilities should be clearly defined, a system of responsibility division should be established, regular assessment should be conducted to ensure that relevant staff have the safety knowledge to meet production needs, and safety learning and education should be organized regularly.

From the past implementation, the construction unit is generally able to carry out various safety management in accordance with the requirements of the higher government, but the shortage is in the construction unit, there is no good safety awareness, for the construction and supervision of enterprises related to supervision is still far from enough, and sometimes will put forward a lot of unrealistic requirements, causing greater pressure on the construction unit, which may lead to the occurrence of safety accidents.

3.2. Strengthen the Safety Knowledge Education Work

In construction units there are more front-line personnel who are not very educated, they often do not pay enough attention to safety, do not have the relevant knowledge of safety work, do not know how to carry out safety protection and rescue, which is also an important reason for many accidents. This recent many safety accidents, because of not in accordance with the prescribed safety operations to operate and do not comply with the unit's safety system caused by the safety of the accident accounted for a considerable proportion. Therefore, strengthening safety knowledge education work and continuously improving the occupational safety of front-line staff in construction units is an important work to do a good job of safety management, and is also an effective measure to clean up construction safety hazards and reduce the incidence of accidents. In order to better conduct safety education and make it achieve the desired effect, a new education model can be adopted. A special place can be established for them to conduct experiential training to achieve better results in the experience. However, in the actual implementation process, due to the relatively large mobility of personnel, some of the projects with imperfect management of the system are not well implemented to the staff for experiential education, while some of the enterprises with better management may have personnel repeatedly educated, which is actually a waste of resources and also triggers resistance of the staff.

3.3. Factors Affecting the Inadequate Level of Security Management

3.3.1. Unreasonable Construction Period

The construction period is reasonably projected according to the actual situation of the project, which is scientific and safe and reasonable. However, in the construction, the construction unit will often ask the construction unit to adjust the construction period because of its own interests and make unreasonable reduction of the construction period^[2] The construction unit often requests the construction unit to adjust the schedule and make unreasonable reduction because of its own interests. There is a typical phenomenon that the time node at the end of the year for the holiday will blindly push the schedule to show its positive posture. And the construction unit can only choose to work overtime under such pressure. After the front-line workers work more than the load, safety issues are often easy to don't people ignore, safety protection will also be reduced, the body is also extremely fatigue, it is easy to cause

casualties and equipment and material losses. This kind of accident is also common in China.

3.3.2. Insufficient Investment Funds for Safety Management

In the tender, due to the current competition in the construction industry, some construction companies will take a low price strategy when bidding, but at the same time in order to pursue corporate profits, it reduces the investment in safety, the lack of safety education and financial expenditure on protective equipment measures, thus greatly increasing the incidence of accidents.

The imperfection of the market management mechanism can also cause great difficulties for safety supervision. The construction unit does not have enough supervision of the project and is not able to achieve qualified safety management. At the same time, the supervision of higher management departments in the industry is also not perfect, the supervision is not up to the requirements, there is no effective governance measures and supervision. At the same time, non-standard enterprises will choose to exploit the loopholes, resulting in a great potential for safety accidents and reducing the level of safety management.

The construction unit often does not have a higher voice in front of the construction unit, from their own interests the construction unit will sometimes intentionally delay the release of construction funds or let the construction unit advance part of the funds required for construction. At this time the construction unit for their own sustainable development and their own profits, will choose to reduce the cost of safety management, resulting in the project for the lack of safety funds, the lack of necessary protective measures, greatly increasing the incidence of accidents.

3.3.3. The Quality of Relevant Employees Needs to Be Improved

First of all, the lack of specialized safety management personnel, many practitioners are old, fresh graduates from colleges and universities are rarely willing to engage in safety management, the problem is that the overall professionalism of practitioners is not high, the management level is not enough, at the same time, due to the age of the older, their knowledge is slow to update, in this era of rapid development can not do well to keep up with the times, a lot of knowledge has become obsolete, to meet the Can not meet the requirements of the current enterprise construction. Although the authorities are now strengthening education in this area, but the staff turnover, serious brain drain, this time may need to consider improving the assessment criteria and systematic training.

Secondly, due to the development of the construction industry, the number of construction-type units gradually becomes more and more, and the relevant talents needed cannot meet the gap brought by the increase in the number of projects. Many enterprises recruit many employees who do not have professional skills and knowledge in the form of labor dispatch, and due to the lack of awareness and weakness of safety production skills, many of them are not very suitable for heavy physical activities due to their age. This will undoubtedly increase the safety risks and is irresponsible to the individual and to the enterprise and society.

4. Measures to Improve the Level of Engineering Safety Management

4.1. Increase Government Supervision

Not only in the construction process to strengthen supervision, in the beginning of the bidding phase of the project should be strictly investigated and punished the non-compliant behavior of the construction unit^[3] The construction unit should be strictly investigated and punished for non-compliance at the bidding stage. It should also ensure the reasonable construction period and not allow the construction unit to compress the construction period for its own benefit, forcing the construction unit to blindly catch up with the construction period, and at the same time, the construction unit should also be decisive to split the project which should be constructed by one contractor into many many sub-projects and award to many different contractors, and sign non-compliant contracts.

Severe disposal of the construction unit failed to pay the safety management funds as scheduled, not in accordance with the contractual agreement to pay the construction unit works and a series of violations. Before giving for the safety supervision procedures and relevant license certificate, review whether his construction period is reasonable, and on the way of construction, regularly organize personnel to check whether there is a deliberate shortening of the contracted period, if the delay is due to the impact of force majeure factors, the construction unit can be instructed to allow it to extend the period appropriately^[4] If the delay is caused by force majeure factors, the construction unit may be instructed to allow an

appropriate extension of the construction period.

If a project has already started and is found to have irregularities, the Ministry of Construction has the responsibility to instruct the contractor to rectify and stop the work in accordance with the relevant laws and regulations, and to further investigate and hold the contractor accountable according to the relevant laws if there are major accident hazards or major safety accidents in the process.

When supervising the safety of construction units, it should also check whether the configuration of their relevant professional safety staff meets the requirements, whether the special safety programs in construction can be effectively implemented, whether the money used for safety management is used in the designated way and whether clear accounts are available. At the same time, a safety rating system is established to reduce the corresponding safety rating of the enterprise after the occurrence of safety accidents and the generation of safety hazards.

4.2. The Implementation of Construction Unit Safety Responsibilities

The construction unit is a very important part of the whole project, from the schedule as well as cost control are to play a co-ordinating role, that in the safety management is also the case. If the construction unit can pay enough attention to the safety management and implement to the construction unit, the project safety has enough protection. The construction unit can choose the construction enterprise with better safety management level mechanism to control the safety management level from the source. In the bidding to carefully verify the safety production management capabilities of multiple bidding enterprises and safety management norms. The bidding enterprises that do not meet the requirements should be eliminated. The construction unit should be a participant in the whole life cycle safety management, set up a set of safety evaluation system to constrain the construction and supervision enterprises at one time, to achieve the purpose of supervision and reduce the incidence of accidents. Regular safety inspections should also be conducted on site to rectify non-compliant safety practices. Supervise the construction contracting enterprises to improve the safety management system and management level.

4.3. Improve the Professionalism of Safety Management Workers

China's construction is also developing rapidly, building many amazing national projects, inevitably will face more and more complex technical processes, construction site safety hazards also increased and easy to be ignored. This is when the safety professionalism of employees is particularly important. Companies need to adopt various methods to improve the professional skills of safety management staff, so as to improve the overall safety management level.

First of all, according to the actual situation, from the recruitment of a ring to improve the standard, especially certain engineering situation is complex and changeable, and the past has a greater difference with the challenging project is, it is more demanding solid professional foundation background and relevant practical experience of people as safety leadership, but also should set the relevant title or technical career threshold, from a certain degree can ensure that the induction of personnel safety management professional ability.

Secondly, for the relevant safety management personnel to carry out regular professional skills learning, through a variety of ways of interaction to improve business skills. To ensure the safety management needs of construction sites in different situations, construction technologies and environments.

Finally, the personnel on this position should be given more appropriate work welfare treatment, but also to improve their treatment standards as appropriate, to prevent the loss of talent and effectively improve the motivation of employees to work. Can also choose suitable candidates from other positions to train the talent of safety management, in the knowledge of other positions can be more understanding of the overall project profile, the safety management work is also beneficial.

4.4. New Security Education Model and Difference Management

Instead of relying solely on the traditional safety education and training model, certain innovations are made to improve authenticity. Introduce experiential education methods to simulate construction scenes and related scenarios to feel the safety hazards that are usually not easy to find from another perspective. Compared with incomplete information, construction workers' cognition is updated more

frequently under complete information, and the ratio of the number of unsafe behaviors and hazards of workers is lower^[5]. To a certain extent, experience can help workers cognize risks while also restoring past cases to simulation again, giving people a more intuitive feeling and leaving a deeper impression, helping to make safety education more profound and vivid. At the same time, the awareness of the danger will be improved.

Through modern intelligent technology to establish a worker information collection management system, for each person to participate in training and safety skills assessment to record and update in a timely manner. If irregular operation etc. is found to reach a certain number of times, their operation can be restricted. In terms of worker management, a distinction is made between inexperienced and experienced workers with helmets or clothes, and the leadership of safety management can provide an effective reference when arranging work. In particular, the education of newcomers should be strengthened to increase the number of times they participate in safety skills training and safety awareness education to meet the requirements of corporate safety construction standards as soon as possible.

4.5. Accident-Prone Season and the Safety Management of the Time

In the hot season and the end of the year such a safety accident-prone time period, safety management personnel is to raise awareness of the work, or to carry out a series of safety-related activities competition, etc., in increasing inspection efforts at the same time reward aspects are also moderately increased to increase the enthusiasm of staff rectification, do not allow workers to operate in violation of the corresponding hidden dangers, to investigate the accident rate to a minimum. In the accident-prone time period to strengthen the duty, strict implementation of the duty schedule, to ensure that the construction of the whole full-time safety management personnel present patrol make. In holidays, etc., there should also be leading cadres on duty to deal with unexpected accidents.

4.6. Strengthen Accident Prevention and Inventory of Hidden Dangers

A very important part of the site construction safety management is the advance prevention of accidents and the advance prevention and control of major risk sources. Because once these major sources of risk are triggered, they can cause serious safety accidents with unimaginable consequences. In order to avoid such major accidents, the contracting construction unit should take the initiative to find the sources of danger and do a good job of recording and classifying them, and regularly conduct a check to discuss the possible sources of danger at a later stage and dispose of them early according to the corresponding safety standards in accordance with the site conditions. The construction unit and the supervision unit shall do dynamic supervision in the process of on-site operation, and have an overall control and comprehensive understanding of site safety. In some key construction nodes if necessary also need to supervise the side station, in order to ensure the quality of construction and timely detection of problems.

At the same time, the key inventory of accident-prone places should be done. In the construction process, falling objects and earth collapse are the most frequent types of accidents, and safety supervision should be carried out for such accidents. In addition, the necessary safety protection must be done in key parts, such as elevator entrances, holes, deep pits and some temporary structures, to eliminate large safety accidents to the maximum extent.

5. Conclusion

National infrastructure is getting faster and faster, the industry is developing rapidly in the background, frequent construction safety accidents also bring huge economic losses, make every effort to avoid accidents and maintain the safety of people's property and lives is the top priority. The overview of safety management explains the basic concept of safety management, determines the main body of safety responsibility of construction units, gives the factors affecting safety management including duration, safety management investment funds and staff literacy, etc. The measures to improve safety management are given, and are studied in terms of government, construction units, education of employees in the workforce, and the key prevention aspects of the enterprise itself. These research contents have important reference value for related enterprises.

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