Research on Optimization of Emergency Management Process in Construction Enterprises

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Abstract: Taking the emergency project management process of a construction enterprise as the research object, this paper analyzes the problems existing in the current emergency project management, such as long management chain, mismatch between decision-making procedure and emergency demand, insufficient preparation of talents, unsmooth resource organization and obstacles in project performance. Based on benchmarking method, ESIA analysis method, PDCA and SDCA cycle theory, through internal and external benchmarking, process improvement, removal, simplification, integration and automation, and continuous improvement of PDCA and SDCA cycle, the overall process, project undertaking decision-making process, project management decision-making process and resource guarantee process of emergency project management are designed, so as to optimize the scheme of emergency project management process. The research results show that the proposed optimization scheme plays a significant role in improving the efficiency and effect of emergency project management in construction enterprises, which can provide experience for similar enterprises and help to promote the overall improvement of emergency project management level in construction industry.

Keywords: emergency project management; process optimization; benchmark aiming method; ESIA analysis method

With the vigorous development of modern construction industry, the scale and complexity of construction enterprises are increasing, and emergency project management is facing unprecedented challenges. As a key link to ensure construction safety and reduce accident losses, the optimization of emergency project management process is particularly important. At present, many construction enterprises have problems in emergency project management, such as complicated process, poor information transmission and lack of talents, which seriously restrict the speed and effect of emergency response [1] Therefore, this paper aims to explore the specific problems existing in the emergency project management process of construction enterprises through specific enterprise cases, and put forward optimization strategies. By proposing effective optimization measures, it provides theoretical support and practical guidance for enterprises to achieve more efficient and safer emergency project management, thereby enhancing their competitiveness and social image, and providing experience for similar enterprises.

1. Enterprise Profile

M is a key construction enterprise in China, with a number of construction and professional contracting qualifications, including highway, municipal and housing construction, as well as Grade A in highway engineering design, classified military industry and Grade A in geological disaster construction. There are nearly 10,000 employees, including many experts and high-end

talents [2] The company's main business covers project contracting and investment, and has participated in a number of national and local key municipal, rail and railway projects. At the same time, it has rich experience in the fields of environmental protection, airports and new infrastructure, and has won the highest awards in national construction projects. The company has the ability to undertake large-scale, classified and emergency projects, participated in the construction of emergency hospitals, and actively rescued at the disaster site, showing strong performance ability and social responsibility.

2. The Current Situation of Emergency Project Management Process

2.1 Decision-making Process

(1) Enterprise Management Decision-making Procedures

Company M has a perfect decision-making mechanism. The company conducts business activities under the leadership of China Construction, a wholly-owned shareholder. The company has a board of directors, which implements the shareholders' decisions or resolutions. The board of directors has a senior manager, who implements the general manager responsibility system. The manager conducts deliberation and decision-making on the company according to the resolutions or authorization of the board of directors. All departments of the company make decision-making and daily management within the scope of their duties and powers. When major decision-making matters, important personnel appointment and dismissal matters, major project arrangements and large-sum capital operation matters are involved, they need to be submitted to the Party Committee (Standing Committee), the Board of Directors and the General Manager's Office for a resolution before the relevant responsible subjects can implement them, as shown in the decision-making flow chart of "Three Heavies and One Big" in Figure 1.

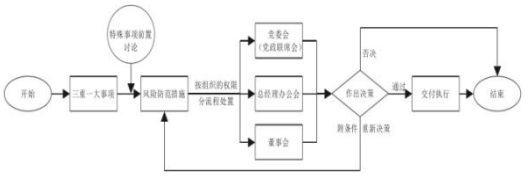

Figure 1 "Triple One Big" Decision Flowchart

(2) Project Undertaking Decision-making Process

After the marketing staff or other employees of the company collect the project information, the marketing department performs preliminary self-evaluation and detailed evaluation on the obtained information according to the procedures specified by the company. Only those projects that meet the established standards will be submitted for approval, and the process needs to be approved by the leaders in charge of the company. When entering the bidding stage of the project, the Market Development Department is responsible for starting the internal review process after obtaining the bidding documents, and all relevant departments conduct compliance audit within their responsibilities and authorities. Only when the evaluation is passed can the project enter the bidding link. Before submitting the bidding documents, the commercial management department needs to complete the cost estimation and submit it formally after review and approval. For those significant projects that may break through the cost red line, do not conform to the conventional bidding procedures or have potential loss risks, before deciding to bid or undertake [3], collective decisions must be made in accordance with the company's "three majors and one big" decision-making process, and submitted to the joint meeting of the party and government or the board of directors for final decision. In order to ensure the standardization and risk prevention of the enterprise's internal governance structure, any project that has not been reviewed internally or has not followed the "three majors and one big"

collective decision-making process shall not be undertaken.

2.2 Project Implementation Process

After completing the bidding procedure or making a collective decision and deciding to undertake the project, the company will carry out project management according to the provisions of China Construction Project Management Manual (revised in 2015) [4].

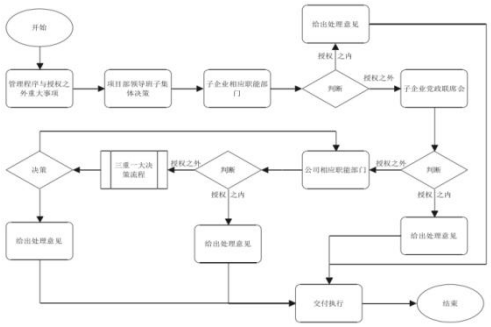

Figure 2 Decision-making process of major issues in project performance management

Important matters that occur outside the routine project management process, or cannot pass the routine process management because they are beyond the scope authorized by the project department, shall be handled according to the decision-making process of the project department's major event performance management as shown in Figure 2.

2.3 Risk Control Procedures

The management of quality and safety risks aims at preventing quality and safety accidents and protecting enterprises from economic losses and reputation damage through fine regulation and coordination of process activities during project implementation. To this end, M Company has built a perfect management system and internal control mechanism in compliance with laws, regulations and ISO standards. In routine operation, these institutional processes can ensure the stability of enterprises [5]. However, in the context of emergency project management, the safety of people's lives and property has become the primary task, requiring the leadership to conduct on-site command and immediate decision-making. At this point, the traditional decision-making process may fail, and risk management is highly dependent on the judgment of leaders. In this situation, the balance between cost control and risk prevention becomes difficult, and the project duration, quality and safety risks are easily affected.

3. Problems Existing in Emergency Project Management Process

3.1 The Management Chain is Lengthy

Company M adopts legal person management project mode, and carries out project management through three-level management and control system (head office, subsidiaries and project department) to ensure the efficiency and effectiveness of daily management. However, in the emergency management mode, this system appears to be lengthy and the feedback is slow. The daily office of the company relies on OA office platform, cloud network platform and financial information integration platform to realize the informatization of approval process, but the process is complex, involving multiple levels and departments, and the longest approval time may exceed 20 working days. Moreover, due to the lack of contract agreement and incomplete project information, emergency projects can not be approved through the network platform, and only traditional paper processes can be adopted, which leads to low efficiency of approval. Therefore, it is suggested to shorten the management chain and reduce it to two-level management (company and project) under emergency management mode, and modify relevant systems to speed up the approval process and improve management efficiency.

3.2 Decision-making Procedures do not Match the Emergency Demand

Under the relevant provisions of the company's decision-making management, all functional departments are responsible for the approval and decision-making of management matters within the authorized boundaries, such as the decision-making process of project undertaking. For matters beyond the authorization limit, collective decision-making should be made on a case-by-case basis according to the "triple and one big" decision-making procedure shown in Figure 1. This may cause the process to take more than one month.

In construction enterprises, the project performance risk already exists in the undertaking stage. In order to ensure that the risk of the project to be undertaken is under control, it is necessary to approve and control measures in advance. However, as a central enterprise, in the stage of project implementation, decisions on major issues are made according to the decision-making process of project implementation management shown in Figure 2. Decision-making proposals need to be examined and approved by functional departments and senior leaders at two levels of headquarters. Obviously, in emergency engineering, a long decision-making process is not allowed. Therefore, while shortening the management chain, we must simplify the process and establish a special emergency engineering construction leading body to replace the management decision-making function of the company and its subsidiaries. Fully authorize the simplified two-level management and control system in order to realize rapid decision-making and response.

3.3 Inadequate Preparation of Talents

The response survey of project performance management personnel shows that the current management system is difficult to meet the manpower demand of emergency projects. In the emergency mode, the common practice is to lead the on-site command and dispatch a large number of nearby project personnel, which affects the normal performance of other projects, and the dispatched personnel may lack the professional ability and comprehensive quality of emergency management. In view of this, it is necessary to establish a special talent preparation mechanism for emergency projects, such as the company's emergency engineering talent pool, so as to quickly determine the participants when receiving emergency instructions, ensure the quality of emergency project teams, and minimize the impact on other projects.

3.4 Resource Organization is not Smooth

The implementation of engineering projects depends on the integration of various resources, including manpower, labor, materials and machinery. In the practice of project management, most resources need to be selected from social resources through bidding procedures, except that the project department managers are internal staff. The company expressly stipulates that direct construction without bidding and contract signing is strictly prohibited, and offenders will be punished. Usually, bidding is the key step of resource investment, but the process takes a long time. Taking an emergency isolation observation site project of the company as an example, due to an emergency, construction started without bidding, and case handling and leadership recommendation were adopted, which increased the management difficulty and buried the settlement risk. Under the mode of emergency project management, the bottom line of business management has encountered great challenges and can not meet the immediate needs of emergency project management. Although the mechanism of one

thing and one discussion can solve some problems temporarily, it is not a feasible way to solve the emergency project management problems for a long time. Therefore, the bidding management system should be optimized, and the labor and material resources commonly used in emergency projects should be tendered in advance, and an emergency project resource database should be established, so as to quickly respond to the demand, alleviate the conflict with the company's bidding management bottom line, and prevent the unreasonable quotation risk in subcontracting and sub-supply settlement.

3.5 There are Obstacles to Project Performance

The company usually manages the project performance comprehensively according to the principle of legal person managing the project and the general management process, involving contract signing, planning, resource allocation, process monitoring and so on. However, the company faces obvious obstacles in the performance of emergency projects: first, emergency projects often lack complete contract conditions and technical information, and it is difficult to make detailed planning and planning; Secondly, in case of emergency, bidding and resource allocation cannot be carried out according to the conventional process, and the resource support system needs to be adjusted; Finally, the emergency project takes the construction period as the priority, so some management functions need to be delegated to the project level, and the company's functions turn to coordination and service to meet the unrealistic all-round management requirements.

4. Optimization Method and Scheme Design of Emergency Project Management Process

In order to meet the company's demand for emergency engineering business management, based on the concept of business process reengineering, the management process of emergency engineering is adjusted, improved and enhanced by benchmarking, ESIA analysis and PDCA and SDCA cycle theory.

4.1 Process Adjustment Based on Benchmarking

When optimizing the emergency project management process, the benchmarking method can be used, which is divided into two dimensions: internal and external. Internal benchmarking focuses on three key steps: first, by learning from the existing processes, the efficient and applicable parts are screened out and retained, while the redundant and inefficient links are removed; Secondly, realize the transfer of internal experience, that is, refine the accumulated experience and practices in practice into an institutionalized process; Finally, aiming at the core goal of emergency project-timely delivery, adjust and optimize those process steps that may hinder the realization of the construction period.

In the aspect of external benchmarking, firstly, the enterprise's own management process is combined with the government emergency management system to ensure that the two are connected with each other to meet the requirements of government emergency management; Secondly, compare the management process of the dominant construction units in the industry, analyze their advantages and the effect of improving management efficiency, learn from their successful experience, and improve their own shortcomings, so as to keep up with the competitive external enterprises and realize the continuous improvement of management level.

4.2 Process Optimization Based on ESIA Analysis

ESIA analysis covers five core links:

perfection, elimination, simplification, integration and automation, aiming at optimizing management processes.

(1) Perfection: In view of the inapplicability of the current company management system and process in emergency project management, in order to ensure the smooth implementation and timely delivery of the project, it is necessary to improve the relevant systems and processes according to their characteristics. This includes establishing emergency plan system, optimizing procurement process, building resource pool, and reconstructing project management and decision-making mechanism.

(2) Removal: ESIA analysis emphasizes reducing non-value-added activities. Redundant, worthless and non-compliant processes within the company should be eliminated. Especially in emergency project management, unnecessary project undertaking decision-making links need to be removed to reduce the waste of manpower and material resources.

(3) Simplification: The core of simplification lies in reducing unnecessary examination and approval links and personnel, and enhancing employees' sense of responsibility through innovative methods. In the process of emergency project management, we should abandon the rigid approval and decision-making mode in traditional project management and simplify the processes of system, approval nodes, meetings and reports.

(4) Integration: Considering the differences between traditional project management and emergency project management, it is necessary to realize the organic integration of management processes under two different business models under the unified management framework of the company. The goal of integration is to form an efficient whole, to ensure that all organizations, functional departments and project management institutions can cooperate effectively to meet the needs of each stage of project management.

(5) Automation: On the basis of perfection, elimination, simplification and integration, computer technology is used to realize the automation and networking of information processing, reducing communication costs and information transmission errors. In view of the complexity and urgency of emergency engineering, an automatic trigger emergency engineering plan system is established to ensure the rapid start of emergency engineering management process under preset conditions.

4.3 Process Improvement Based on PDCA and SDCA Cycle

After benchmarking and ESIA analysis successfully adjusted the company's emergency project management process to the established standards, PDCA cycle was used to continuously promote the progress of management level, and SDCA cycle was used to ensure that management was maintained at an efficient and stable level. The optimization process of the whole management process strictly follows the circular path of PDCA-SDCA, which covers the stages of planning, execution, inspection, disposal, re-standardization, re-execution, re-inspection and re-disposal, and forms a spiral mode. As shown in Figure 3, through the continuous promotion of PDCA and SDCA cycle, the management level of the company has been continuously and steadily improved.

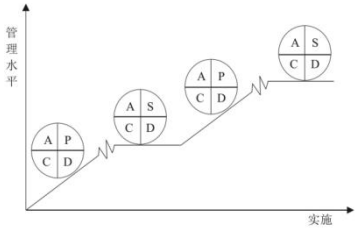

Figure 3 PDCA circulation and SDCA cycle

4.4 Emergency Project Management General Process and Project Performance Process

Based on the above analysis and demonstration, this paper specially designed an independent management process for emergency project management, aiming at strengthening the management efficiency of emergency projects and improving the performance quality of projects.

4.4.1 General Process of Emergency Engineering Management

Under the guidance of the Emergency Response Law, the emergency response process includes four core stages: prevention and emergency preparation, monitoring and early warning, emergency disposal and rescue, and recovery and reconstruction. As a part of the emergency response chain, the emergency project undertaken by the company mainly involves two stages: emergency disposal and recovery and reconstruction. In order to coordinate with the government's emergency response system, on the basis of formulating the "emergency project rapid response plan", the company conducts efficient management within the enterprise with reference to the process shown in Figure 4. Compared with conventional project management, emergency project management pays special attention to optimizing decision-making organizational structure, shortening decision-making response time, and preparing resources in advance according to the requirements of the plan to ensure that emergency projects can be quickly put into emergency disposal when they start.

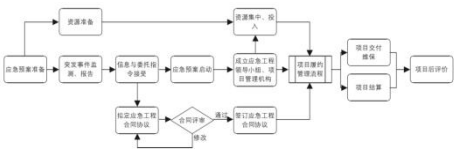

Figure 4 General Process of Emergency Engineering Management

4.4.2 Project Undertaking Decision-making Process

Considering the company's current system and process, the emergency project is obviously covered in the decision-making category of "three majors and one big". Traditionally, the project undertaking decision-making process should be followed and the decision-making process of "three majors and one big" should be combined. However, the urgency of emergency engineering determines that it cannot tolerate the lengthy and complicated decision-making process. Therefore, it is necessary to reconstruct the decision-making process of emergency project undertaking. In view of the administrative mandatory nature of emergency projects and the social responsibilities undertaken by enterprises, emergency projects need not make additional decisions when emergencies occur, but should directly start emergency plans. Subsequently, according to the established plan, an emergency engineering leading group was quickly established to make decisions, and a project management organization was established to ensure the project performance, as shown in Figure 5.

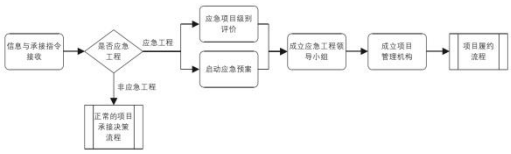

Figure 5 Project Undertaking Decision Process

4.4.3 Project Management Decision-making Process

In the process of project implementation, temporary decision-making matters occur from time to time. According to the traditional system and process, these decisions need to be put forward by the project team first, then reported to the subsidiary enterprises step by step, and finally made by the company. If the characteristics of "three majors and one big" are involved, it is necessary to follow a specific decision-making process, which will undoubtedly greatly affect the performance efficiency of the project. In view of this, the decision-making mechanism of

emergency project management needs innovation. Specifically, the emergency engineering leading group and the project management organization should be clearly defined and granted the corresponding decision-making authority, and a two-level authorization list should be formed. For the decision-making matters beyond the authority of the project department, the leading group should make a quick decision, thus effectively avoiding the delay caused by the lengthy decision-making process to the project performance. This optimized project management decision-making process is shown in Figure 6.

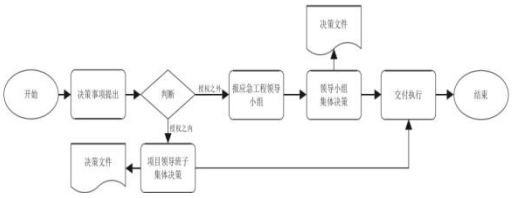

Figure 6 Project management decision-making process

4.4.4 Resource Guarantee Process

In order to ensure the efficient implementation of emergency project management and the achievement of delivery targets, the key is to build a solid resource base, covering all-round guarantee of talents, labor service units and material supply. Based on the daily project management experience of enterprises and the regular evaluation of partners, we should devote ourselves to cultivating and supporting labor operation and material supply enterprises to form a high-quality resource pool. On this basis, through internal invitation to bid, select partners and sign strategic agreements to build a strategic resource pool. When the emergency project needs to respond quickly, these resources can be directly called, which effectively avoids the obstacle of complicated bidding process to the rapid response of the project. After the completion of the project, it is necessary to evaluate and examine the used resources, remove the unqualified ones and update the strategic resource pool.

Talent is the core driving force of enterprise management and project performance. Especially in emergency engineering, the demand for talents is more urgent, and an experienced, skilled and comprehensive talent team is needed. Therefore, we should focus on the establishment of emergency engineering talent pool, and formulate a scientific talent evaluation standard system by combining internal training with external recruitment, and comprehensively evaluate and assess talents from multiple dimensions, so as to provide solid talent support for emergency engineering.

4.4.5 Project Performance Management Process

On the basis of constructing and optimizing the company's "one case, three databases" system (including Emergency Project Rapid Response Plan, emergency talent pool, labor operation and material supply strategic resource pool) to consolidate the resource reserve and emergency preparation, it has created a prerequisite for the company's rapid response to emergency projects. In order to improve the performance efficiency of emergency projects, the original three-level management and control system can be simplified and optimized into a two-level management model, namely, the company-level emergency project leading group and the project department at the project level. The leading group will be fully responsible for the authorization and decision-making of the original company's decision-making matters, and through the effective use of strategic resources, the company's decision-making response time will be greatly shortened. In this mode, the functions of the company will focus on coordination, resource support, monitoring and early warning, and reduce formal inspection, assessment and reporting processes, thus strengthening the autonomy and process management of the project and making it

more focused on the objective management and external coordination of the project.

Conclusion

To sum up, this paper puts forward optimization design methods and specific optimization suggestions for emergency projects of enterprises. Through this study, construction enterprises can better cope with emergencies, improve the efficiency and effectiveness of emergency project management, and thus enhance their competitiveness and social image. At the same time, this study also provides experience for similar enterprises, which is helpful to promote the management level of emergency projects in the whole construction industry. With the continuous development of the construction industry, emergency project management will face more challenges. Therefore, it will be a long-term and important task to continuously optimize and improve the emergency project management process.

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