Analysis of Problems and Countermeasures in Engineering Quality and Safety Supervision and Management from the Perspective of Government Supervision

Li CAO

Lujiang County Housing and Urban-Rural Development Bureau, Hefei, Anhui, 231500, China

Keywords: government supervision perspective; engineering quality; safety supervision and management; problems and strategies

Abstract: Against the backdrop of the continuous expansion of engineering construction scale, engineering quality and safety supervision and management from the perspective of government supervision still faces numerous problems that hinder the full play of its regulatory role. These include an imperfect legal and regulatory system and an unsound supervision mechanism. To address these issues, systematic measures need to be taken from multiple aspects, such as improving the legal and regulatory system and enhancing the supervision mechanism, so as to ensure the orderly progress of engineering construction and fundamentally safeguard people's lives and property.

1. Introduction

In the field of construction, engineering quality and safety are the lifelines. They not only affect people's lives and property but are also closely related to the improvement of urban functionality and stable social development. With the acceleration of China's urbanization process, the innovation of industrial construction formats, and the continuous emergence of smart parks and underground utility tunnels, the difficulty and safety risks of engineering construction are increasing day by day, posing higher requirements for engineering quality and safety supervision and management. The government, as the main force in engineering quality and safety supervision, bears responsibilities such as regulating market order and safeguarding public interests. However, in the context of increasingly diversified market entities, many problems have gradually emerged in government supervision work. Based on this, analyzing the problems and strategies of engineering quality and safety supervision and management from the perspective of government supervision is an important measure to improve the governance system in the engineering construction field.

2. Problems in Engineering Quality and Safety Supervision and Management from the Perspective of Government Supervision

2.1 Imperfect Legal and Regulatory System

In the engineering quality and safety supervision and management from the perspective of government supervision, an imperfect legal system is one of the core issues, which is mainly reflected in the following aspects: Firstly, compared with the development of new engineering formats, laws have inherent lag[1]. At present, core laws and regulations such as the Regulations on the Administration of Construction Project Quality do not clearly stipulate emerging fields such as the data security of intelligent construction and do not refine the quality traceability requirements for the production of prefabricated components. As a result, government supervision work has no basis to rely on and cannot effectively regulate the construction behavior of enterprises. Secondly, the connection between local and national regulations is not smooth. Some regions lower quality and safety standards in regulatory regulations to attract investment, which is inconsistent with national mandatory norms. Additionally, some cities still use urban engineering regulatory regulations from a decade ago and have not added supplementary clauses for new requirements such as the safety of underground utility tunnels. This leads to the inability of supervisors to

  DOI: 10.25236/icacel.2025.134

improve the accuracy of law enforcement when facing complex projects. Thirdly, there are problems with vague definitions of violations and unclear penalty standards. Laws and regulations do not clearly define behaviors such as "illegal subcontracting," and the range of fine amounts is wide, with unconstrained discretionary power, leading to frequent occurrences of unfair law enforcement.

2.2 Unsound Supervision Mechanism

In government engineering quality and safety supervision, an unsound supervision mechanism is the main problem affecting the improvement of supervision efficiency. At present, in government safety supervision and management, there is a problem of vague division of regulatory powers. Although departments such as the fire department and the housing and urban-rural development department are involved in engineering supervision, their power and responsibility boundaries are not clearly defined. For example, in the safety supervision of deep foundation pit construction, the housing and urban-rural development department is responsible for daily inspections, and the emergency department is responsible for emergency response. However, there are no clear regulations on the transfer and handling process after hidden dangers are discovered, resulting in difficulties in the smooth implementation of hidden danger rectification work. Moreover, there is no clearly designated competent department for the safety of rural self-built houses, leading to a long-term state of no supervision and prominent illegal construction problems. Meanwhile, the government supervision process lacks standardized criteria, and there is a problem of excessive discretionary power. Currently, government supervision work relies heavily on personnel experience, and a unified standard system and content system have not been formed. For example, in the same area, the sampling ratio for steel bar spacing detection by different supervisors can differ by up to 40%, and some personnel even simplify the inspection process. There are no clear time limits for the rectification and acceptance of violations, and enterprises often delay under the pretext of ongoing rectification. Supervisors lack the basis to force rectification, resulting in supervision work becoming a mere formality. In addition, the lack of a departmental collaboration and linkage mechanism and information barriers affect the orderly implementation of supervision. The regulatory information systems of various departments operate independently, and there is a lack of a joint law enforcement mechanism, leading to repeated requirements and increasing the burden of enterprise inspections.

2.3 Lagging Supervision Technical Means

From the perspective of government supervision, lagging supervision technical means are an important factor affecting the efficiency of engineering quality and safety supervision, mainly reflected in the following aspects: Firstly, the real-time dynamic monitoring capability is poor. For high-risk links such as deep foundation pit support, excessive reliance is placed on regular on-site inspections by personnel, making it impossible to capture risks such as "formwork displacement" in real time and comprehensively. Problems can only be discovered after failures occur. For concealed works, only stage-by-stage verification methods are used, and there is a lack of technical traceability throughout the construction process, making it difficult to detect behaviors such as cutting corners in a timely manner. Secondly, the utilization efficiency of regulatory data is low. Most of the rectification notices and inspection records generated during the supervision process are stored in paper ledgers, etc. A unified and complete database has not been formed, and it is impossible to identify high-risk enterprises, making it difficult to enhance the precision of supervision. Thirdly, the application of intelligent supervision tools is insufficient. Many regions have not promoted the use of technologies such as Internet of Things sensors, resulting in a limited coverage of supervision and an inability to adapt to the expanding scale of engineering construction.

2.4 Insufficient Staff Competence

Insufficient staff competence is a shortcoming that restricts the actual effectiveness of government engineering quality and safety supervision. In actual supervision, the professional competence of some staff does not match engineering requirements. They lack professional

knowledge of new formats such as intelligent construction and find it difficult to accurately identify technical hidden dangers when checking projects using Building Information Modeling (BIM) technology. They are not familiar with construction specifications for complex structures and the performance of new materials, and only focus on the surface during inspections, easily overlooking deep-seated quality and safety risks. Some staff have insufficient sense of responsibility and focus more on processes than actual effects in supervision work. They do not attach importance to minor illegal behaviors and do not urge enterprises to thoroughly rectify problems. In addition, staff have poor active learning abilities and insufficient learning awareness. They do not take the initiative to learn continuously updated engineering technologies and regulatory norms and still use old experience and standards to carry out supervision work, resulting in a disconnect between supervision content and current requirements and an inability to meet the requirements of engineering quality and safety supervision.

3. Countermeasures for Engineering Quality and Safety Supervision and Management from the Perspective of Government Supervision

3.1 Improve the Legal and Regulatory System

To address the problem of an imperfect legal and regulatory system in engineering quality and safety supervision, solutions should be formulated from the aspects of dynamically updating regulations, standardizing the connection between local legislation, and refining the definitions of violations and penalty standards to provide legal support for the smooth conduct of government supervision work[2]. In establishing a dynamic regulatory update mechanism, focus on revising core regulations such as the Construction Law and clarify regulatory clauses for emerging fields such as intelligent construction: Add "full traceability of component production" requirements for prefabricated buildings and "data security management" regulations for intelligent construction, clarifying the storage norms and sharing permissions of construction monitoring data to avoid data tampering affecting the effectiveness of supervision. When standardizing the connection between local legislation, issue the Guidelines for the Formulation of Local Engineering Quality and Safety Supervision Regulations, clearly stipulating that local legislation should strictly follow national mandatory standards and prohibiting the lowering of standards to attract investment. Local clauses that conflict with national regulations should be revised within 3 months. Establish a local legislative filing and review mechanism. After local regulations are issued or revised, they need to be filed with the Ministry of Housing and Urban-Rural Development for review by relevant national departments for regulatory consistency. Order the timely modification of local clauses that lag behind engineering development to truly form a joint regulatory force between the national and local levels. When refining the definitions of violations and penalty standards, issue the Detailed Rules for the Identification of Illegal and Violating Behaviors in Engineering Construction, clearly define specific situations of "illegal subcontracting," such as considering "project management personnel not signing labor contracts with the contracting unit" as subcontracting. Narrow the range of fine amounts, refine engineering quality violation fines into "0.5% - 1% for general violations and 1% - 2% for serious violations," clearly define the criteria for "serious violations," and apply a "daily penalty" mechanism, imposing an additional fine of 3% of the fine amount per day on enterprises that fail to rectify within the time limit to increase the cost of illegal behavior.

3.2 Enhance the Supervision Mechanism

To address the problem of an imperfect supervision mechanism in government engineering quality and safety supervision, efforts should be made from multiple aspects to build an efficient supervision mechanism and improve regulatory quality. Specifically, clarify power and responsibility boundaries to completely eliminate overlaps. Formulate the List of Powers and Responsibilities for Engineering Quality and Safety Supervision, divide departmental responsibilities according to the processes of pre-event prevention, in-process inspection, and post-event handling. The Ministry of Housing and Urban-Rural Development is responsible for

supervising the quality and safety of the entire engineering lifecycle, the emergency management department is responsible for accident emergency rescue and investigation, and the fire department is responsible for reviewing and accepting fire protection designs. At the same time, effectively fill regulatory gaps by incorporating rural self-built houses into the regulatory system and designating township governments as the responsible entities for local supervision and setting up dedicated regulatory personnel. Relevant departments should actively promote the standardization of supervision processes and reduce the space for discretionary power[3]. Establish a unified Operation Specifications for Engineering Quality and Safety Supervision, clearly defining inspection standards, contents, and frequencies. For example, for residential projects, stipulate inspections every 10 days during the foundation construction stage and every 8 days during the main structure construction stage. Formulate a "closed-loop management process for violation rectification," clearly define rectification deadlines, generally requiring rectification within 7 days, and require enterprises to submit rectification plans and rectification process videos. Supervisors should conduct re-inspections within 3 days after the rectification deadline expires to avoid enterprises delaying rectification through a rectification-re-inspection-cancellation closed loop. In addition, break through information barriers and build a cross-departmental collaboration and linkage mechanism. Build an engineering quality and safety supervision collaboration platform to comprehensively integrate regulatory data from departments such as the housing and urban-rural development department, the emergency management department, and the fire department: The housing and urban-rural development department synchronizes rectification situations discovered during daily inspections to the platform, and the emergency management department can view hidden danger levels in real time and formulate emergency plans[4]. Establish a joint law enforcement system and conduct quarterly multi-departmental joint inspections for complex projects, led by the housing and urban-rural development department with the participation of the fire department, etc., formulate unified inspection plans, and share inspection results.

3.3 Innovate and Apply Supervision Technical Means

To address the problem of lagging supervision technical means, breakthroughs need to be made in the following aspects to build a modern regulatory system and improve government supervision efficiency. Firstly, build a real-time dynamic monitoring network to cover high-risk links and concealed works. For high-risk operations, it is mandatory to install Internet of Things sensors to collect data such as load changes and formwork verticality in real time and upload it to the government platform. Set warning thresholds, and the platform will immediately send alerts to construction units and supervisors to achieve early detection and early handling of risks. For concealed works, use intelligent devices to photograph key construction nodes and upload them to the regulatory platform for online verification by supervisors to avoid cutting corners. Secondly, build an integrated supervision database. Integrate scattered paper ledgers and electronic documents to build a regulatory database for the entire engineering lifecycle and find regulatory priorities through data analysis. Increase inspection frequencies for high-frequency violation links and implement key supervision + special interviews for high-risk enterprises[5]. Finally, actively promote and apply intelligent supervision tools to expand the supervision scope. Apply AI video surveillance systems at construction sites, use algorithms to automatically identify dangerous behaviors such as objects thrown from heights and illegal hot work, and immediately issue audible and visual alarms and upload them to the regulatory platform to help supervisors conduct real-time supervision. In addition, develop a "mobile supervision APP" to achieve full-process operations such as on-site inspection - problem uploading - rectification tracking - acceptance and cancellation. Supervisors can call up project data at any time to improve supervision levels.

3.4 Improve Staff Competence

To improve staff competence, a systematic improvement system should be built to construct a modern engineering supervision team. On the one hand, organize professional training activities to fill staff competence gaps[6]. Collaborate with universities to offer special courses such as intelligent construction and prefabricated buildings, and impart skills such as BIM model verification and

prefabricated component connection detection through theoretical explanations + on-site practical operations. Only those who pass the assessment can participate in project supervision work. For new building materials, regularly hold technical observation meetings, lead supervisors to visit benchmark projects, and learn performance detection methods for new materials to ensure that staff professional competence matches engineering requirements. Implement a mentor-apprentice pairing system, where experienced senior supervisors teach newcomers and enhance staff practical abilities through case analysis and on-site guidance[7]. On the other hand, improve a continuous learning mechanism to drive staff competence updates. Build a dynamic update library of regulatory norms and technologies, timely include newly revised Regulations on the Administration of Construction Project Quality and new detection technology standards, and push these materials to supervisors through an online learning platform, requiring supervisors to complete 8 hours of online learning per month and pass tests. Hold policy and technology interpretation meetings every quarter and invite experts to interpret key points of new regulations, application skills and difficulties of new technologies to ensure that supervisors fully grasp current requirements. At the same time, encourage supervisors to obtain professional certificates such as Certified Construction Supervisor, and provide certain rewards for those who obtain the certificates to enhance their learning initiative and prevent knowledge lag from reducing supervision levels.

4. Conclusion

In conclusion, engineering quality and safety supervision and management from the perspective of government supervision is a long-term and complex task that covers a wide range of areas. It is necessary to strengthen supervision and management work from aspects such as improving laws and regulations, enhancing supervision mechanisms, and improving staff competence to comprehensively improve engineering quality and safety levels and ensure the orderly conduct of engineering construction work.

References

[1] Xu, L. Analysis of Problems and Countermeasures in Engineering Quality and Safety Supervision and Management from the Perspective of Government Supervision. China Science & Technology Panorama, 2024(4)：174-176.

[2] Tang, Y. Y. Problems and Optimization Strategies in Engineering Quality and Safety Supervision and Management from the Perspective of Government Supervision. North & South Bridge, 2022 (9)：172-174.

[3] Zhang, L. Y. Research on Problems and Countermeasures of Engineering Quality and Safety Supervision in Sichuan Province from the Government's Perspective. Southwest Jiaotong University, Sichuan，2022.

[4] Gao, M. Analysis of Problems and Countermeasures in Engineering Quality and Safety Supervision and Management from the Perspective of Government Supervision. Architectural Engineering Technology and Design, 2022,10(28), 73-75.

[5] Yang, X. W. Analysis of Problems and Countermeasures in Engineering Quality and Safety Supervision and Management from the Perspective of Government Supervision. China Construction, 2023(21):46-48.

[6] Wang, J. Research on Problems and Countermeasures of People's Livelihood Engineering Construction in Suzhou City from the Perspective of a Service-Oriented Government. Shandong University of Science and Technology, Shandong, 2022.

[7] Zhu, G. H. Problems and Countermeasures in the Supervision and Management of Water Conservancy Engineering Quality and Safety at the Grassroots Level. Water Safety, 2025 (7):160-162.