

Optimizing Construction Engineering Management Through Prefabricated Construction Technology: Applications and Approaches

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Abstract: Amid ongoing societal advancement, a range of emerging technologies has been progressively integrated into the management of construction engineering. Among these, prefabricated construction technology has gained increasing prominence. Characterized by low implementation costs and high application value, this technology has been adopted with growing frequency in practical construction contexts. In application, relevant construction entities are required to prefabricate building components in advance and transport them to the construction site for subsequent assembly. The adoption of prefabricated construction technology effectively mitigates the influence of external environmental factors, enhances construction efficiency, and aligns with future trajectories of national development.

Keywords: Prefabricated; Construction Technology; Construction Engineering; Construction Management.

1. INTRODUCTION

Under the background of advocating green, low-carbon, ecological and environmental protection in China, prefabricated construction technology has been widely applied, and its development momentum is rapid, even showing signs of replacing traditional construction techniques. This technology significantly reduces the consumption of building materials and water and electricity resources, and plays a significant role in improving the construction efficiency of the construction industry. Integrating this technology into the construction process not only helps to improve the quality of domestic buildings, but also enhances the economic benefits of construction enterprises. Prefabricated technology is increasingly widely used in urban construction projects. In recent years, the country has also actively promoted prefabricated technology to maximize environmental protection, reduce carbon emissions, and achieve the goal of green development.

Information disclosure of listed firms is a vital reference for investors to evaluate how the firms are operating and whether investment in the firm is trustworthy[1]. With the development of text analysis, non-financial disclosures in annual reports become another source of information, in addition to the traditional perspective of financial reports. Studies have revealed that, apart from financial disclosures, text information in annual reports improves transparency and reputation of firms and reduces capital cost[2].

Management tone covers a wide range of possible aspects in firms' operational performance, financial status, and future prospects. Seeking for hidden but reliable information for investment potentials of firms can therefore reduce the uncertainty of risks of investment decisions. In this regard, investment decisions of investors in capital market won't be satisfied with traditional quantitative analyses of financial indicators. They will also consider the qualitative text information of management tone[3]. Earnings communication conferences are one of the most important platform for communications between management members and investors, and contain much text information within management's answers.

The considerations of focusing on management tone in earnings communication conferences and exploring the impact of profitability and financing constraints are as follows. First, annual reports disclose information regarding financial and non-financial statements. The procedure of extracting management tone from annual reports to analyze the impact may be confusing, as both quantitative data of financial information are likely to combine with qualitative data of non-financial statements. The combination can affect the determination of the real effect of management tone. Second, earnings communication conferences are platforms for statement about the firms' past performance and future development. The conferences reflect the attitude and feelings of management members about the firms' prospect, and often take place after firms release their annual reports. Therefore, qualitative

information on earnings communications conferences is more significant than quantitative financial disclosures. Third, in contrast to the regulative format of annual reports and the sufficient preparations before releasing, investors' questions during earnings communications conferences are random, open, and instantaneous. This situation requires timely and targeted answers from management, which makes it hard to manipulate the tones. In this way, information disclosures can reflect managers' attitude towards the operations and development of firms more accurately and truthfully.

Profitability and financial constraints are both vital factors for firms' sustainable development. Profitability indicates how well a firm operates and financial constraints measures the difficulty of financing into the firms. Investors may refer to the profitability of firms in annual reports to re-evaluate their investment decisions, and financing agencies like banks are likely to be sensitive to the cash flow of firms before approving new loans. When facing operational stress or great financing constraints, management members have the options to whether show the difficulties or try to cover and whitewash the issues. Regarding this situation, management tone is a possible opportunity for management crew to control their disclosure.

2. ADVANTAGES OF APPLYING PREFABRICATED CONSTRUCTION TECHNOLOGY

2.1 Creating a Model of High-Quality Buildings

By adopting the factory production mode, the use of prefabricated construction technology in current construction projects can significantly reduce the utilization of human resources. In the construction process, the application of prefabricated construction technology can replace traditional manual construction, reducing losses and construction errors during technical construction [1]. At the same time, through the application of this factory production mode, various construction materials are directly transported to the construction site, which can largely avoid quality problems existing in traditional construction processes, thereby promoting the improvement of construction project quality.

2.2 Exploring New Paths for Construction Project Management

For prefabricated technology, the most prominent feature is that the production and design of various components are carried out in accordance with factory standards, which ensures that the standardization of each production link is improved in the subsequent construction stage. We are committed to improving the comprehensive capabilities of relevant construction personnel, ensuring that each task in the construction process is clearly assigned to specific construction teams to ensure the clarity of task allocation. In order to better meet the continuous development needs of the modern construction industry, we also need to improve the technical level of construction personnel and their adaptability to new management models to ensure the sustainable and healthy development of the construction industry [2].

2.3 Seeking Breakthroughs in Engineering Management Modes

In the entire project construction process, the application of prefabricated construction technology can save at least 1/4 of the working time of a construction project, and also reduce the proportion of wet work time during construction, resulting in a significant improvement in the workload and work efficiency of the entire project [3]. Moreover, in the process of cross-operation, analyzing this technology from different perspectives can greatly improve the efficiency of construction management.

3. APPLICATION OF PREFABRICATED CONSTRUCTION TECHNOLOGY IN CONSTRUCTION PROJECT MANAGEMENT

3.1 Hoisting of Prefabricated Components

To ensure the smooth implementation of hoisting prefabricated components in actual construction, it is necessary to first clarify the specific construction plan, formulate an efficient plan and arrange the construction schedule practically on this basis. However, it also requires that all work during construction be clear to ensure division of labor and cooperation, orderliness, and avoid chaos [4]. Construction personnel must abide by their posts during operations, fully cooperate with the work arrangements of management personnel, ensure the fulfillment of

personal responsibilities, and strictly follow the scientific construction process, standardize the operation procedures, and ensure the accurate hoisting and numbering of components to facilitate the smooth assembly of the building. In construction practice, once difficulties are encountered, they must be reported immediately. Only by discovering and solving problems in a timely manner can we effectively respond to challenges. By clarifying responsibilities and strictly implementing them, we can promote the overall improvement of construction efficiency and lay a solid foundation for the smooth progress of subsequent work.

3.2 Production and Manufacturing of Prefabricated Beams and Columns

It is obvious that during the manufacturing stage of prefabricated components, their production process is often susceptible to many influences from the external environment. In the process of implementing production management, many problems will also be encountered, which will further adversely affect the manufacturing efficiency and quality of components [5]. The key is to introduce cutting-edge engineering facilities and ensure the completeness of their functions. At the same time, standardized management of construction personnel's behavior is also crucial. When using prefabricated technology in building construction, the primary task is to complete the preparation of construction templates in advance, place the templates in appropriate positions according to the construction design drawings, and then clean the surfaces of components and related materials to ensure they meet the cleanliness standards. During operation, construction personnel can connect the formwork to the sleeve connectors through positioning, fix them on the steel bar holes according to actual needs, and strengthen the installation of embedded parts to prevent unstable fixing caused by external factors. During the construction process, it is also necessary to ensure the accuracy of instructions, check for pipe blockages, thoroughly clean the molds before prefabricated beam production, and position the installed side molds to ensure the flatness of component installation.

3.3 Construction Technology of Prefabricated Interior Shear Walls

In the process of applying prefabricated construction technology, this technology has significantly promoted a leap in construction quality. However, during the building implementation phase, construction personnel must conduct meticulous inspections of connecting components to prevent various safety risks caused by loose connections, which in severe cases may even affect the seismic capacity of the building [6]. To maximize compliance with engineering quality construction standards, enhancing the effectiveness of construction is crucial. In component connection operations, construction teams can use bolts to ensure the tightness of joints. During the assembly and use of prefabricated components, various factors need to be comprehensively considered, and grouting preparation for cement slurry should be carried out in advance to ensure that the underlying floor slab is completely embedded in the bolt holes of the prefabricated slab, thereby enhancing the tightness of the connection. For prefabricated buildings, installing shear wall connecting bolts at their core parts is a key measure to ensure structural stability.

3.4 Installation and Construction Technology of Prefabricated Buildings

In constructing the overall framework of prefabricated buildings, the core links are the assembly of laminates and the splicing of building components. During the assembly phase, operators must attach great importance to the assembly of laminates and ensure that they maintain a certain distance from the work surface as much as possible during construction. During construction, construction specifications must be strictly followed, and various operating steps must be clarified to reduce the possibility of incorrect assembly, thereby ensuring the overall quality of laminates and the improvement of construction efficiency [7].

3.5 Component Batch Management and Correct Use of Identifiers

In the implementation of prefabricated construction projects, the material management link is crucial. When handling the stacking of components, appropriate protective measures must be implemented to prevent component damage caused by improper stacking during transportation. If component damage is found during transportation, it should be immediately marked as a non-conforming product, and its entry into the prefabricated building construction process must be resolutely prohibited to avoid quality problems or impact on the smooth progress of construction. For the prefabricated components to be used, relevant identifiers must be prepared, which can greatly facilitate the management and utilization of components in subsequent assembly work. The component storage location needs to be hardened and equipped with a corresponding drainage system; stacking measures can be adopted when appropriate to avoid component damage and waste of site resources.

4. CONCLUSION

During the actual construction management period, first of all, various tasks should be clarified to ensure that division of labor and cooperation are well-organized and avoid chaos. At the same time, for relevant construction personnel, they need to take on their responsibilities in the construction process. Prepare the construction formwork in advance, place the formwork in a reasonable position according to the construction design plan, and then clean the surfaces of the components and related materials to ensure they are fully clean. Relevant construction personnel need to check the connectors in a timely manner to avoid loose connections and subsequent safety hazards. During the assembly process, technical personnel should focus on strengthening the installation operation of prefabricated laminated plates, and must maintain the necessary distance from the working surface during the installation process. In the component stacking and sorting stage, appropriate protective strategies must be implemented to prevent damage to components due to improper stacking during handling.

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