

Original Research Article

An exploration of innovative audit models for the whole-process tracking audit of prefabricated building projects

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Abstract: This paper based on the perspective of the entire life cycle of prefabricated buildings, sorts out the core connotation and characteristics of whole-process tracking audits, analyzes the pain points of current audit work in terms of concepts, processes, technologies, talent, and guarantee mechanisms, and explores innovative paths for audit models by combining digital technologies such as BIM and the Internet of Things. It constructs a whole-process audit system of "pre-judgment, in-process control, and post-review," verifies the feasibility of the innovative model with practical cases, and incorporates architecture diagrams and tables to enhance professionalism, providing theoretical and practical references for improving the audit quality of prefabricated buildings and promoting the standardized development of the industry.

Keywords: prefabricated building; full-process tracking audit; model innovation; BIM technology; risk prevention and control

1. Introduction

Driven by the "dual-carbon" goals and the industrialization strategy of the construction industry, the state has continuously introduced policies to promote the development of prefabricated buildings. The "14th Five-Year Plan for the Development of the Construction Industry" clearly proposes to gradually increase the proportion of prefabricated buildings in new construction. Prefabricated buildings achieve an organic combination of component factory prefabrication and on-site assembly, significantly shortening the construction cycle, reducing on-site pollution, and improving project quality ^[1]. However, they also have characteristics such as complex project management, diverse participating entities, and high difficulty in quality control, placing higher demands on the professionalism, comprehensiveness, and timeliness of project auditing. Full-process tracking auditing, as a new model that breaks through the limitations of traditional post-audit, embeds audit nodes into the entire project lifecycle, achieving dynamic monitoring of project quality, progress, cost, and safety. However, at present, full-process tracking auditing of prefabricated buildings in my country is still in the exploratory stage. Traditional auditing concepts, methods, and technologies are difficult to adapt to its special characteristics, and many problems restrict the effectiveness of auditing ^[2]. Therefore, exploring innovative auditing models, solving pain points and difficulties, and building a scientific and efficient auditing system are of great theoretical and practical significance for promoting the coordinated development of prefabricated buildings and auditing work.

2. Core connotation and characteristics of full-process tracking audit of prefabricated building projects

2.1. Core connotation

Full-process tracking audit of prefabricated building projects is a professional auditing model where auditing institutions, based on laws, regulations, industry standards, and project contracts, conduct dynamic tracking, supervision, and evaluation of project investment, quality, progress, safety, and environmental protection throughout the entire project lifecycle, starting from the decision-making stage and extending to design, component production, on-site assembly, completion and delivery, and operation and maintenance ^[3]. Its core objective is to promptly identify problems and risks, standardize project management, and ensure that the project achieves its goals of quality compliance, progress compliance, cost control, safety reliability, and

environmental compliance, thereby improving investment efficiency and management level. Compared with traditional cast-in-place building audits, it emphasizes full-process, dynamic, refined, and collaborative auditing. It not only focuses on physical quality and final settlement but also emphasizes the control of special stages such as component production and hoisting.

2.2. Key characteristics

The unique attributes of prefabricated buildings determine the distinct characteristics of their full-process tracking audit: First, the audit scope is comprehensive, covering the entire project lifecycle and encompassing special stages such as decision-making, design, component production, and hoisting, requiring comprehensive auditing of multiple stakeholders and nodes; second, the audit nodes are unique, with key nodes in each stage, such as raw material testing for component production and hoisting accuracy auditing during on-site assembly, requiring precise control of key points; third, the technical requirements are professional, involving multiple technologies such as BIM and prefabricated component production, requiring auditors to possess multi-field professional knowledge; fourth, strong collaboration is required, necessitating coordination among multiple stakeholders such as construction, design, and production to achieve information sharing.

3. Existing problems in the full-process tracking audit of prefabricated building projects

3.1. Outdated audit concepts and insufficient adaptability

Most auditing institutions still adhere to the traditional auditing concepts of cast-in-place buildings, lacking a deep understanding of the characteristics of prefabricated buildings. They cling to the mindset of "emphasizing post-event over pre-event, emphasizing accounting over control," focusing their audits on the final settlement stage while neglecting audits of early decision-making and component production, thus failing to prevent risks in advance^[4]. Furthermore, they lack a full life-cycle auditing concept, resulting in disconnected audit nodes and an overemphasis on compliance audits while neglecting investment, energy conservation, and other benefit evaluations, thus failing to meet the development needs of prefabricated buildings.

3.2. Low level of digital auditing and prominent information barriers

Prefabricated building construction involves a large amount of data on components, construction, and costs. However, most auditing firms still rely on manual auditing, lacking the application of technologies such as BIM and IoT. Auditors cannot obtain real-time data, and reliance on paper documents leads to data distortion and inefficiency. The lack of a unified digital auditing platform prevents information sharing among various entities. According to a 2024 report by the China Construction Industry Association, 85% of prefabricated building projects suffer from data gaps between design, construction, and operation, further exacerbating auditing difficulties. Furthermore, some auditors lack sufficient digital operation skills, hindering the improvement of digital auditing capabilities^[5].

4. Innovative path for full-process tracking audit of prefabricated building projects

4.1. Innovating audit concepts and establishing scientific thinking

Breaking through the limitations of traditional audit concepts, we establish a full life-cycle audit concept, integrating auditing throughout the entire project process to achieve pre-project prediction, in-process control, and post-project review. Simultaneously, we establish a "quality-first, efficiency-oriented, and green-oriented" mindset, balancing compliance and efficiency auditing to promote the green and sustainable development of projects^[6]. We strengthen the concept of collaborative auditing, enhance communication and collaboration among multiple stakeholders, break down information barriers, and encourage auditors to proactively update their knowledge and concepts, transforming their role from "post-project accountant" to "full-process controller." **Figure 1** illustrates the innovative path.

4.2. Optimize audit processes and build a closed-loop system

Combining the characteristics of prefabricated buildings, optimize the audit process and clarify the key

points of each stage: In the decision-making stage, review feasibility and investment estimates to prevent decision-making risks; in the design stage, review the rationality of the scheme and the standardization of components to avoid design flaws; in the production stage, monitor enterprise qualifications, raw materials, and component quality to ensure component qualification; in the assembly stage, review hoisting plans, accuracy, and safety to ensure construction compliance.

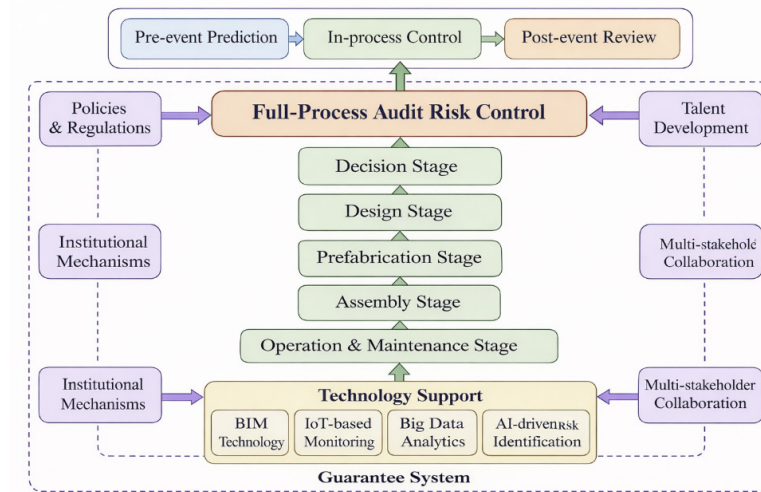


Figure 1. Path architecture diagram.

5. Conclusion

The full-process tracking audit of prefabricated buildings faces challenges such as outdated concepts, non-standardized processes, and low levels of digitalization. The innovative approach proposed in this paper, which constructs a full-process audit system, can effectively improve audit efficiency and quality, prevent engineering risks, and ensure investment returns. It provides a feasible practical path for prefabricated building auditing and promotes the standardized development of the industry.

About the author

Keran Wang (2004.04-), female, Han ethnicity, native of Qingdao, Shandong Province.

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