

Research on the Synergistic Mechanism between Green Building Material Certification Standards and Engineering Procurement Management

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Abstract: The effective connection between green building materials certification standards and engineering procurement management is an important guarantee to promote the green development of the construction industry. At present, the green building materials certification standard system has been gradually improved, and the engineering procurement management process has been optimised, but the two are still facing problems such as insufficient standard adaptability, missing procurement process connection and lagging information technology level in the actual synergy. In view of the above problems, this paper puts forward optimisation countermeasures from the aspects of perfecting the certification standard, improving the green procurement process and strengthening the construction of information technology platform, aiming at enhancing the application efficiency of green building materials, promoting energy conservation, emission reduction and sustainable development of the construction industry, and providing references and lessons for the relevant policy formulation and industry practice.

1. Introduction

With the transition of China's construction industry to green and low-carbon, the importance of green building materials in engineering and construction has become increasingly prominent. Green building materials certification standards are an important basis for promoting the popularisation and application of green building materials, and play a pivotal role in ensuring the quality of building materials and promoting the sustainable performance of buildings. However, at present, when the actual procurement management of engineering projects, the green building materials certification standards and the procurement process often appear between the poor interface and the implementation of the situation is not in place, thus affecting the efficient use of green building materials in the project construction process. Therefore, it is of great significance to study the synergistic mechanism between green building material certification standards and project procurement management to promote the efficient application of green building materials and improve the greening level of construction projects. By combing the characteristics of green building materials certification standards and engineering procurement management, the article analyses the important problems existing in the synergistic process of the two, and then puts

forward targeted optimization countermeasures, with a view to playing a theoretical reference and practical guidance for the development of China's green building and the procurement management of green building materials.

2. Green building materials certification standards and the characteristics of engineering procurement management

2.1 The development status and system composition of green building materials certification standards

In recent years, green building materials are the main carrier of energy saving and emission reduction and low carbon development in the construction industry, and the certification standards system is also gradually improving and popularising. Driven by policy and market demand, green building materials certification standards have formed a relatively systematic structure, involving product performance, production process, resource conservation, environmental impact and many other dimensions ^[1]. At present, most of the green building materials certification to take a hierarchical evaluation, in accordance with the building materials energy saving, environmental protection and functional indicators of sub-grade management, so as to achieve scientific quantification and classification to guide the performance of green building materials. From the point of view of the construction of the certification system, China's green building materials certification standards include national standards, industry standards and local standards, involving the selection of materials, production and processing, construction and application and post-care. Some advanced green building materials also need to meet international certification requirements, such as LEED, BREEAM, etc., to ensure smooth docking with international green building assessment standards. Multi-level, diversified certification system for the standardised development of green building materials industry has a certain role in promoting, but by the level of regional development, the industry's technical capabilities and regulatory mechanisms and other factors, the implementation of standards and the scope of application is still limited.

2.2 Engineering procurement management process and the application of green building materials convergence characteristics

Engineering procurement management is a very important link in the implementation of construction projects, the promotion and application of green building materials play a vital role in supporting. The traditional engineering procurement management process is generally quality, cost and schedule as the central goal, less green building materials procurement into the systematic management system ^[2]. In today's deepening of the green building concept, green procurement has been gradually integrated into the project procurement planning, supplier selection, contract management and acceptance assessment of each link, and formed a set of green procurement management system covering the whole process. In the actual operation of procurement management, the effective integration of green building materials relies on the close co-operation of various participants in the supply chain, such as builders, designers, constructors and material suppliers ^[3]. Procurement plans need to clearly limit the types, specifications and performance requirements of building materials according to the certification standards, and in the procurement and implementation stage, the qualification of suppliers and material testing and acceptance need to be combined with the certification requirements. Through procurement contract constraints and on-site supervision mechanisms, the use of green building materials can be promoted to meet design and certification requirements. However, in the actual project, limited to the poor information sharing and supply chain management deficiencies, the procurement of green building materials

convergence also exists in the process of cumbersome and inefficient implementation of the problem.

2.3 The Promoting Effect of Synergy between the Two on Sustainable Construction

The organic synergy between green building materials certification standards and project procurement management is a key guarantee to promote the sustainable development of the construction industry. Certification standards for green building materials performance evaluation and quality control to lay the foundation, and engineering procurement management through the institutionalised process of green building materials for rational selection and efficient allocation ^[4]. The synergistic effect of the two is not only conducive to promoting the application of green building materials in the whole life cycle of the building, but also to promote energy saving and consumption reduction, environmental protection and occupant health of construction projects to achieve the desired results. Through standardisation, certification and procurement management, the risk of unqualified or inefficient green building materials can be reduced from the source, which is conducive to the rational allocation of resources and supply chain optimisation. Constructing a synergistic mechanism is conducive to guiding building materials production enterprises to continuously improve product performance and promote green building materials technology innovation and industrial upgrading ^[5]. For the owner, green building materials certification and procurement management synergy can enhance the green value of the project and market competitiveness, while ensuring that the project quality and cost can be controlled, which is conducive to the construction industry towards the direction of low-carbon, environmental protection and efficient transformation and development.

3. Problems in the synergy of green building materials certification and procurement management

3.1 Insufficient adaptability in the implementation of green building materials certification standards

Although the green building materials certification standard system is constantly improving, in the actual implementation of some of the standards there is insufficient adaptability. On the one hand, there are significant differences in the level of regional economic development and the maturity of the construction market, and it is difficult to consider the regional demand and industrial base of the unified standard, resulting in the applicability of certain regional certification is not strong. On the other hand, some of the standard index system is outdated and cannot reflect the technological progress of building materials and market application needs in a timely manner, which makes it difficult to adapt to the certification needs of new green building materials. Some enterprises in the certification process, there is a 'heavy certification, light application' phenomenon, will be certified as a knock on the door of the market access, ignoring the green performance in the actual application of the project and follow-up maintenance. After entering the construction stage, due to construction conditions and cost pressures, some green building materials, the green performance of the replacement or reduction, the results of the certification has not been completely transformed into the actual benefits of the project. Green building materials certification link there is not enough supervision, third-party agencies level of good and bad phenomenon, further weakening the authority and effectiveness of the implementation of standards.

3.2 Engineering procurement management in the green procurement link missing

Green building project construction green building materials procurement link is directly related to the degree of greening of the project. However, at present, some engineering projects in procurement management has not established a complete set of green procurement process, the emergence of green procurement requirements and traditional procurement inertia conflict, the implementation of the phenomenon of insufficient strength. Some projects, although in the design phase on the green building materials to carry out clear provisions, but the procurement process is no effective implementation path and supervision mechanism, making green procurement in the vague, some non-certified building materials into the construction site in large quantities. The lack of implementation of green requirements in procurement management is also reflected in supplier management. The lack of long-term co-operation mechanism between some contractors and suppliers of green building materials, and the poor matching of suppliers' capability and certification standards have affected the stability and compliance of green building materials supply. Green building materials procurement process involves multiple interests, information sharing and communication mechanism is not unified, the lack of professional competence of procurement staff and other factors also restrict the green procurement of project management in-depth integration.

3.3 The low degree of informatisation of standards and management affects the synergistic effectiveness

The level of information management has an important supporting role for the synergistic effectiveness of green building materials certification and procurement management, but at present the relevant informatisation degree is generally low, and has not formed an efficient synergistic management platform. In the certification process, green building materials certification information is usually manifested in paper or scattered electronic information, there is no unified database and dynamic updating mechanism, which makes it time-consuming and costly for purchasers to select and verify materials and information asymmetry. In procurement management, green building materials related information is not fully connected with project information management systems (such as BIM, ERP, etc.), and the problem of information silos restricts the synergy of procurement planning, supplier selection and construction site management. Once the scale of the project is large or involves cross-regional procurement, the lack of traceability and transparency of green building materials certification information, management costs and potential risks increase. Some construction units are relatively backward in information construction, and procurement management still relies on traditional manual methods, which is difficult to meet the demand for real-time supervision and feedback in the certification and use of green building materials, thus affecting the overall synergy efficiency and management quality.

4. Optimisation Countermeasures for the Synergistic Mechanism of Green Building Material Certification and Engineering Procurement Management

4.1 Improvement of Green Building Material Certification Standard System and Applicability

Whether the green building material certification standard system has scientific and applicability is a prerequisite for whether the certification and procurement can be efficiently coordinated. In view of the limited coverage and lagging update of the existing standards, it is necessary to promote the dynamic optimisation and hierarchical improvement of the standard system. On the one hand, it is necessary to take into account regional differences, the diversity of building types and other factors to refine the classification standards and applicable conditions, in order to enhance the

operability of the standards in different regions and projects. For the ever-emerging new green building materials, it is necessary to establish a flexible mechanism for dynamic updating of the standards to ensure synchronisation of technical indicators and industrial development. During the development of standards, industry associations, scientific research institutions and leading enterprises can be strengthened to participate in the promotion of green building materials performance indicators, evaluation methods and testing methods standardisation and modularity. Through the introduction of international advanced certification system ideas and methods, the domestic standard authority and international compatibility can be enhanced, so as to provide a unified standard basis for cross-regional and international green building projects. There is an urgent need to strengthen the professional capacity and supervision mechanism of the third-party certification organisations in the implementation of the standards, and to strictly control the certification process in a fair and scientific manner. The results of late tracking and evaluation should also be certified and integrated into the standard system. Through sampling feedback, building materials should be certified based on actual project application results, to support standard revisions and technological upgrades. This will contribute to the formation of a closed-loop management system for standard system revisions, certification implementation, and supervision with accountability.

4.2 Sound green procurement process and supervision and management mechanism

Green building materials procurement is a vital part of the greening process of engineering and construction. The procurement process and supervision mechanism is perfect directly determines the synergistic mechanism can play a role. Procurement should be in accordance with the certification standards front planning green building materials procurement needs, green building materials use needs to be integrated into the project, design and budgeting stages, so that the procurement management front embedded. Procurement documents, contract documents and tender conditions need to clearly define core information such as green building material certification levels, performance parameters and supply sources, so that green requirements are not weakened or ignored in the subsequent implementation process. Supplier management is also important to ensure the sustainability of green procurement. A green building materials supplier pool and dynamic management system should be set up to give priority to authoritative certified suppliers, and to regularly assess suppliers' supply capacity, performance and product consistency. Through long-term co-operation and the mechanism of elimination of the fittest, suppliers should be promoted to continuously improve their green product supply capacity and service level. At the level of supervision and implementation, a multi-body co-operation supervision mechanism can be introduced to strengthen information sharing and responsibility constraints among owners, designers, supervisors and constructors. For green building materials in procurement, transport, on-site acceptance and use and other links, to establish traceability supervision files, so that the whole process of closed-loop management of materials. For key projects and bulk purchase of green building materials, special audits and third-party supervision can be used to prevent green purchases from being a mere formality or the existence of false certification, alternative use and other irregularities, so as to effectively ensure the efficient use of green building materials for the project.

4.3 Promote the construction of information technology platform to enhance the level of synergistic management

The level of information technology directly determines the synergistic efficiency and transparency between green building materials certification standards and procurement management. Supported by information technology means, the construction of an information management

platform covering the whole process of green building materials certification, procurement, construction and later operation and maintenance has become the key to improve the level of synergy. By integrating the green building materials certification database, supplier management system and project management system together, it realises the interconnection and real-time sharing of green building materials information, and breaks the information silo between each link. In procurement management, we can use BIM, ERP and other digital tools to closely link green building materials information with engineering design, budget and construction plan, so as to visually manage and dynamically optimise the green procurement plan. For the certified building materials, we can build a material full life cycle traceability management system with the help of Internet of Things and blockchain technology to realise real-time tracking of the source, production and transportation, admission and use of materials, so as to ensure that the whole process of green building materials can be controlled, queried and traced from the certification to the landing. The informatisation platform should have intelligent analysis and early warning functions, and combine with big data analysis technology to identify and feedback information such as abnormalities, material performance deviation and supply chain risks in the procurement execution process in a timely manner, so as to provide scientific support for management decision-making. For construction units and suppliers, the use of information technology management platform is also conducive to improving the internal management level and service capacity, and promoting the green building materials procurement management from rough to refined, intelligent transformation further for green building materials certification procurement management synergy mechanism to lay a solid foundation for sustainable operation.

5. Conclusion

The efficient synergy between green building materials certification standards and engineering procurement management helps to ensure the reasonable selection and effective application of green building materials in the whole life cycle of buildings. By perfecting the standard system, improving the procurement process and upgrading the level of information technology, a solid foundation can be laid for the large-scale promotion of green building materials. In the future, it is necessary to continue to deepen the construction of synergistic mechanism, promote the dynamic updating of industry standards, optimise the management mode and strengthen the technical support, so as to inject new kinetic energy for realising the green and low-carbon transformation and high-quality development of the construction industry.

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