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Analysis of the Collaborative Mode of Cross-Border Procurement Supply Chain for Environmentally Friendly Building Materials under the Background of Green Building

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Abstract: Driven by the carbon peaking and carbon neutrality goals and against the backdrop of the vigorous development of the global green building industry, the demand for cross-border procurement of environmentally friendly building materials, the core carrier of green buildings, has been on a steady rise. The cross-border procurement supply chain for environmentally friendly building materials involves multiple subjects, links and scenarios, and poor collaboration has become a key bottleneck restricting the efficient supply, cost control and realization of green value of environmentally friendly building materials. Based on the development demands of green buildings, this paper systematically analyzes the current collaboration status of China's cross-border procurement supply chain for environmentally friendly building materials, and dissects the prominent problems and their root causes such as insufficient subject collaboration, information asymmetry, low logistics efficiency and disunified standards. Combining the supply chain collaboration theory and green management theory, it constructs a five-in-one collaboration mode of "subject collaboration-information collaboration-logistics collaboration-standard collaboration-benefit collaboration", clarifies the core content, operation mechanism of each collaboration dimension as well as the three support systems of technology, institution and talent, and puts forward targeted optimization countermeasures. This study provides theoretical support and practical reference for promoting the high-quality development of green buildings and enhancing the competitiveness of the cross-border procurement supply chain for environmentally friendly building materials.

Keywords: Green building; Environmentally friendly building materials; Cross-border procurement; Supply chain collaboration; Collaboration mode

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1. Introduction

Global climate change and ecological environment governance have become the common focus of the international community. The carbon peaking and carbon neutrality goals have driven all industries to transform

towards green and low-carbon development. As a key field of energy consumption and carbon emission, the construction industry is bound to take the path of green transformation. However, China's environmentally friendly building materials industry presents a pattern of "insufficient high-end supply and overcapacity in the mid-to-low end", which has led to the year-by-year growth of the scale of cross-border procurement of environmentally friendly building materials. China not only needs to import high-end low-carbon environmentally friendly building materials such as low-carbon cement and photovoltaic building materials from developed countries in Europe, America and Japan, but also exports mid-to-low end environmentally friendly building materials to Southeast Asia, the Middle East and other regions. Cross-border procurement has become an important link connecting the domestic and international environmentally friendly building materials markets and ensuring the high-quality development of green buildings.

Nevertheless, the cross-border procurement supply chain for environmentally friendly building materials includes various subjects such as purchasers, overseas suppliers, logistics enterprises and inspection institutions, and involves multiple links including procurement, transportation, customs declaration and warehousing. Affected by factors such as policy differences among countries, disunified standards and geopolitical fluctuations, the problem of poor collaboration has become increasingly prominent, which seriously restricts the improvement of supply chain efficiency, cost control and realization of green value. Therefore, constructing a scientific and reasonable collaboration mode and breaking the collaboration bottlenecks are of great theoretical and practical significance.

2. Analysis of the current status and problems of collaboration in the cross-border procurement supply chain for environmentally friendly building materials

2.1. Development status of cross-border procurement of environmentally friendly building materials

With the rapid development of China's green building industry and the advancement of the carbon peaking and carbon neutrality goals, the scale of cross-border procurement of environmentally friendly building materials has been expanding continuously, showing distinct development characteristics. The demand for cross-border procurement has witnessed two-way growth. The development of domestic green buildings has driven a surge in demand for high-end environmentally friendly building materials, with purchasers mainly importing high-end products such as low-carbon cement and photovoltaic building materials from developed countries in Europe, America and Japan. At the same time, China's mid-to-low end environmentally friendly building materials have achieved a remarkable growth in exports to Southeast Asia, the Middle East and other regions by virtue of their cost-performance advantages. Moreover, the subjects of the supply chain have become increasingly diversified. In addition to traditional purchasers and overseas suppliers, supporting subjects such as inspection institutions, customs declaration enterprises and cross-border e-commerce platforms have joined in one after another, providing comprehensive and targeted services for cross-border procurement and enriching the supply chain ecosystem. Third, the awareness of collaboration has been gradually enhanced. All subjects have gradually broken the pattern of acting on their own, and taken the initiative to strengthen communication and cooperation to promote the collaborative development of the supply chain. Fourth, the application of new technologies has been gradually popularized. Big data, blockchain and other new technologies are widely used in information transmission, quality traceability and other links, providing a strong support for improving the level of supply chain collaboration [1,2].

2.2. Existing problems in the collaboration of cross-border procurement supply chain for environmentally friendly building materials

Despite the certain progress made in the collaborative development of China's cross-border procurement supply chain for environmentally friendly building materials, there are still many prominent problems that seriously affect the collaboration efficiency and competitiveness. Specifically, the problems are mainly reflected in the following five aspects.

2.2.1. The problem of insufficient subject collaboration is prominent

The cooperative relations among all participating subjects are relatively loose. Purchasers and overseas suppliers mostly carry out short-term cooperation, and poor communication between the two sides is likely to cause various problems such as procurement errors and delivery delays. Meanwhile, there is also obvious poor collaboration between supporting subjects and core subjects, with significant shortcomings in information sharing and process connection. In addition, the collaborative coordination role of intermediary organizations has not been fully exerted, making it difficult to drive all subjects to forge synergy.

2.2.2. The problem of information asymmetry is particularly prominent

The serious disconnection of information between purchasers and overseas suppliers directly leads to frequent supply-demand mismatches. At the same time, information barriers exist among all links of the supply chain, which greatly reduces the overall response speed of the supply chain. More importantly, there is a lack of a unified and efficient information sharing platform in the industry at present, resulting in lag and distortion in information transmission, which further greatly reduces the collaboration efficiency of the supply chain.

2.2.3. There are obvious shortcomings in logistics collaboration

On the one hand, there is a lack of effective collaboration among logistics enterprises, and the application of intermodal transportation mode is also insufficient, leading to cumbersome transportation processes, high logistics costs and low transportation efficiency. On the other hand, the connection between logistics planning and other links of the supply chain such as procurement, warehousing and sales is not close enough, which is prone to problems such as inventory backlog and transportation delays. In addition, the development of green logistics is relatively slow, and the construction scale and operation management level of overseas warehouses have not kept up with the development of cross-border procurement, making it difficult to meet the core demand for high efficiency and convenience in cross-border procurement.

2.2.4. Disunified standards have caused prominent cross-border barriers

Due to the significant differences in environmental protection requirements, technical specifications, quality standards and customs declaration processes among countries, and the mutual non-recognition of national inspection and certification systems, coupled with the frequent changes in customs declaration policies, it not only greatly increases the risks and operational costs in the procurement link, but also seriously hinders the collaborative advancement of the supply chain [3].

2.2.5. Unreasonable benefit distribution leads to insufficient motivation for collaboration

In the collaborative development of the supply chain, core subjects occupy the main share of benefits in the supply chain by virtue of their dominant position, while the legitimate rights and interests of supporting subjects

have not been fully guaranteed. At the same time, the benefit distribution mechanism lacks transparency and the risk-sharing mechanism is not perfect. The superposition of these problems has further intensified the interest conflicts among all subjects, and ultimately led to the continuous lack of internal motivation for the collaborative development of the supply chain.

2.3. Analysis of the root causes of collaborative problems

An in-depth analysis of the root causes of the collaborative problems in the cross-border procurement supply chain for environmentally friendly building materials is mainly reflected in four aspects as follows:

(1) There is a lack of collaboration concept. All subjects take the maximization of self-interest as the core, lack the awareness of win-win collaboration, and have insufficient understanding of the importance of supply chain collaboration, making it difficult to form collaborative synergy;

(2) The institutional system is imperfect. There is a lack of targeted laws and regulations, industry standards and policy support, and no sound collaboration mechanism has been established among all subjects, resulting in a lack of standardized operation norms for collaborative operation;

(3) The technical support is inadequate. The application of new technologies such as big data and the Internet of Things is not in-depth enough, the relevant infrastructure is imperfect, and there is a shortage of interdisciplinary collaboration talents, which restricts the advancement of collaborative work;

(4) The cross-border environment is complex. There are significant differences in policies and standards among countries, prominent trade barriers, and external factors such as fluctuations in the international market and geopolitical conflicts, which further increase the difficulty of collaboration [4–6].

3. Construction of the collaborative mode of cross-border procurement supply chain for environmentally friendly building materials

3.1. Principles and objectives of the collaborative mode construction

The construction of the collaborative mode of the cross-border procurement supply chain for environmentally friendly building materials must strictly follow four core principles to ensure the scientificity and applicability of the mode as outlined:

(1) The green collaboration principle, which is closely aligned with the development trend of green buildings and the requirements of the carbon peaking and carbon neutrality goals. It focuses on promoting the whole-process green transformation of the supply chain, so as to achieve a win-win situation of environmental and economic benefits;

(2) The win-win collaboration principle, which not only takes into account the diverse benefit demands of all participating subjects in the supply chain, but also establishes a reasonable benefit distribution and risk-sharing mechanism to fully mobilize the enthusiasm of all subjects to participate in collaboration;

(3) The efficient collaboration principle, which focuses on optimizing the operation processes of all links of the supply chain and strengthening the application of new technologies in the supply chain, so as to effectively improve the overall operation efficiency of the supply chain;

(4) The flexible adaptation principle, which requires the collaboration mode to flexibly respond to changes in the external market environment, effectively solve various barriers encountered in the process of cross-border procurement, and ensure the stable and orderly operation of the supply chain [7–9].

The core objective of the mode construction is to address collaboration dilemmas and achieve efficient full-

chain collaboration. Specifically, it is to improve collaboration efficiency, reduce procurement and logistics costs, ensure that the quality of environmentally friendly building materials meets the requirements of green buildings, realize a win-win situation of benefits for all subjects, build stable collaborative relations, and promote the green, low-carbon and sustainable development of the supply chain, in line with the development demands of green buildings and the carbon peaking and carbon neutrality goals.

3.2. Overall framework of the collaborative mode

Based on the above principles and objectives, and combined with relevant theories such as supply chain collaboration theory and green management theory, this paper constructs a five-in-one collaboration mode of "subject collaboration–information collaboration–logistics collaboration–standard collaboration–benefit collaboration" for the cross-border procurement supply chain of environmentally friendly building materials.

Guided by the development demands of green buildings, with the win-win supply chain collaboration as the core and supported by technological innovation and institutional guarantee, this mode organically integrates the five collaboration dimensions to realize the efficient, green and sustainable collaboration of all subjects and links in the supply chain. Among them, subject collaboration is the core foundation, clarifying the role positioning and collaborative responsibilities of each subject; information collaboration is the key support, resolving the problem of information asymmetry through a unified information sharing platform; logistics collaboration is the core link, improving efficiency and reducing costs through process optimization, promotion of green logistics and improvement of overseas warehouse layout; standard collaboration is an important guarantee, breaking cross-border barriers through promoting standard alignment; benefit collaboration is the fundamental driving force, realizing a win-win situation of benefits for all subjects through the establishment of a reasonable mechanism. The five dimensions are interrelated and mutually supportive, jointly promoting the collaborative development of the supply chain to meet the development needs of green buildings [10].

3.3. Core dimensions and operation mechanism of the collaborative mode

Subject collaboration, information collaboration, logistics collaboration, standard collaboration and benefit collaboration are the core dimensions of the five-in-one collaboration mode, and each dimension has a clear operation mechanism.

As the foundation, subject collaboration requires clarifying the role positioning and collaborative responsibilities of purchasers, suppliers, supporting subjects and intermediary organizations, building a diversified collaboration system, establishing a long-term and stable collaborative cooperation mechanism, and realizing complementary advantages and joint efforts of all subjects.

Information collaboration is the key to resolving information asymmetry. It is necessary to build a unified information sharing platform relying on new technologies such as big data and the Internet of Things, integrate the information resources of all subjects, realize full-process information sharing such as supply-demand matching and order management, and establish and improve the mechanisms for information collaboration, synchronous update and security guarantee to ensure the authenticity, timeliness and security of information.

Logistics collaboration is the core link. It is required to optimize the full-process collaboration of logistics planning, transportation and warehousing, promote intermodal transportation and green logistics modes, improve the layout and collaborative management of overseas warehouses, enhance logistics efficiency, reduce logistics costs, and realize the green and high efficiency of the logistics link.

Standard collaboration is an important guarantee. It is necessary to promote the alignment and mutual recognition of national standards for environmental protection, technology, quality inspection and customs declaration, unify the quality inspection and certification system, strengthen the coordination and early warning of customs declaration policies among countries, and effectively break cross-border standard barriers [11,12].

Benefit collaboration is the fundamental driving force. It is required to follow the principle of fairness and win-win, establish a reasonable benefit distribution mechanism, formulate distribution standards and diversified distribution methods according to the contribution of each subject, improve the risk-sharing mechanism at the same time, clarify the risk liability of each subject, and establish risk early warning, response and compensation mechanisms to mobilize the enthusiasm of all subjects for collaboration and ensure the sustainable and stable operation of the collaboration mode.

3.4. Support system of the collaborative mode

To ensure the smooth operation of the collaborative mode of the cross-border procurement supply chain for environmentally friendly building materials, it is necessary to build a sound support system covering technology, institution and talent, providing all-round guarantee for the implementation of the collaboration mode.

In terms of technical support, it is necessary to strengthen the application of new technologies such as big data and the Internet of Things, optimize the infrastructure such as information sharing, strengthen the R&D and promotion of technologies related to environmentally friendly building materials, promote the integration of cross-border e-commerce platforms and supply chain collaboration platforms, and improve the level of collaborative intellectualization and operation efficiency.

In terms of institutional support, it is necessary to accelerate the improvement of relevant laws and regulations, standardize the collaborative behaviors of all subjects, strengthen government policy guidance and support, give full play to the role of industrial associations, formulate collaboration norms and industry standards, and coordinate the interest relations of all subjects.

In terms of talent support, it is necessary to increase the training of interdisciplinary collaboration talents, promote the cooperation between universities, enterprises and industrial associations in talent cultivation, strengthen internal enterprise training and international talent exchange and cooperation, and improve the professional literacy and collaboration ability of talents.

4. Optimization countermeasures for the collaborative mode of cross-border procurement supply chain for environmentally friendly building materials

Combined with the previous analysis of the current status, problems and root causes of the collaboration in the cross-border procurement supply chain for environmentally friendly building materials, and aiming at the five-in-one collaboration mode, this paper puts forward targeted optimization countermeasures from the core collaboration dimensions and support systems to promote the continuous improvement of the collaboration mode, so as to enhance the level of supply chain collaboration and meet the demands of green buildings and the carbon peaking and carbon neutrality goals.

4.1. Strengthen subject collaboration and improve information collaboration to solve the problems of weak collaboration foundation and information asymmetry

It is necessary to deepen the long-term strategic cooperation between purchasers and overseas suppliers, promote

the in-depth collaboration between supporting subjects and core subjects, give full play to the coordination and service role of intermediary organizations such as industrial associations and cross-border e-commerce platforms, and build a diversified collaborative ecosystem. At the same time, build a unified and efficient intelligent information sharing platform, integrate the full-process information of all subjects, improve the mechanisms for information collaboration, synchronous update and security guarantee, promote the in-depth application of new technologies such as big data and the Internet of Things, and improve the efficiency and accuracy of information transmission [13].

4.2. Optimize logistics collaboration and promote standard collaboration to break through cross-border logistics and standard barriers

It is necessary to improve logistics collaboration processes, promote the intermodal transportation mode, strengthen the cooperation among logistics enterprises and the connection between customs declaration and inspection, and improve customs clearance efficiency; accelerate the standardized and intelligent layout and collaborative management of overseas warehouses to shorten delivery cycles and reduce logistics costs; promote the green logistics mode, adopt environmentally friendly packaging and new energy transportation vehicles, and establish a green logistics evaluation and incentive mechanism. At the same time, promote the alignment and mutual recognition of China's environmentally friendly building materials standards with international and regional standards, actively participate in the formulation of international standards, unify the quality inspection and certification system, strengthen the coordination and early warning of customs declaration policies among countries, and effectively avoid policy and standard risks [14].

4.3. Improve benefit collaboration and consummate support systems to enhance collaboration motivation and support capacity

It is essential to adhere to the principles of fairness and mutual benefit by establishing a benefit distribution mechanism and diversified allocation methods based on the contributions of each stakeholder. The supervision mechanism for benefit distribution should be improved to safeguard the legitimate rights and interests of all parties. Furthermore, the risk-sharing responsibilities of each stakeholder must be clearly defined, alongside the establishment of risk early warning and response mechanisms, as well as a collaborative risk compensation fund, to ensure the stable operation of the supply chain. At the same time, greater emphasis should be placed on strengthening technological, institutional, and talent support. This includes increasing investment in new technology research and development and infrastructure construction, improving relevant laws, regulations, and policy support systems, encouraging industry associations to develop collaboration standards, and enhancing the training of interdisciplinary talent and international exchange programs. These measures will collectively ensure the effective implementation of the collaborative model.

5. Conclusion

The research on the collaborative mode of the cross-border procurement supply chain for environmentally friendly building materials under the background of green buildings in this paper still has many limitations and needs further improvement and deepening. Future research can be carried out from four aspects: expand the research scope to cover more categories, markets and participating subjects to improve the universality of the research conclusions; construct a scientific performance evaluation system for the collaboration mode, and accurately

quantify the collaboration effects by combining quantitative and qualitative methods; pay close attention to dynamic factors such as international policies, technological changes and geopolitics, optimize the collaboration mode and countermeasures, and enhance the supply chain resilience; strengthen the comparative research on the collaborative mode of the cross-border procurement supply chain for environmentally friendly building materials with developed countries, learn from advanced experience, further optimize China's collaboration mode, promote the high-quality development of cross-border trade in environmentally friendly building materials, and better meet the demands of green buildings and the carbon peaking and carbon neutrality goals.

Disclosure statement

The author declares no conflict of interest.

References

[1] Zhou C, 2025, Research on the Overseas Development Path of Cross-border E-Commerce Supply Chain Empowered by Digital Technology. Modern Business, 2025(2): 68–71.

[2] Wu H, 2026, Research on the Impact of Digital Procurement on Supply Chain Performance. China Circulation Economy, 2026(1): 133–136.

[3] Guo A, Zhang Y, Song X, 2025, Innovative Practice of Procurement under the "Six-in-One" E-commerce Framework. Tendering and Procurement Management, 2025(9): 52–53.

[4] Ali H, Kalf H, Shaikhan M, et al., 2023, Investigating The Integration of Environmentally Friendly Practices and Green Materials Throughout the Construction Supply Chain. International Journal of Construction Supply Chain Management, 13(1): 276–288.

[5] Qian Y, Yu X, Shen Z, et al., 2023, Complexity Analysis and Control of Game Behavior of Subjects in Green Building Materials Supply Chain Considering Technology Subsidies. Expert Systems with Applications, 2023(214): 119052.

[6] Bashir M, Khan A, Khan M, et al., 2024, Evaluating the Implementation of Green Building Materials in the Construction Sector of Developing Nations. J. Hum. Earth Future, 5(3): 528–542.

[7] Che S, Li Y, 2026, Research on the Upgrading Path of Cross-border E-commerce Industry under the New Development Pattern of Dual Circulation. Business Observation, 12(3): 69–72.

[8] Tao Y, 2026, Research on the Mechanism and Effect of the Collaborative Development of Cross-border E-commerce and Supply Chain under the "Dual Circulation" Pattern. China Economic and Trade Herald, 2026(2): 97–99.

[9] Yousif Y, Misnan M, Ismail M, 2023, The Influence of Labelled Green Building Materials on the Performance of Green Construction Projects. IOP Conference Series: Earth and Environmental Science, 1274(1): 012028.

[10] Li X, He J, 2024, Mechanism of the Green Supply Chain Profit of Building Materials Considering the Duopoly Competition Model and Consumer Green Preference. International Journal of Systems Science: Operations & Logistics, 2024, 11(1): 2311283.

[11] Soufi M, Fadaei M, Homayounfar M, et al., 2025, Evaluating the Drivers of Green Supply Chain Management Adoption in Iran's Construction Industry. Management of Environmental Quality: An International Journal, 36(6): 1626–1649.

[12] Dong T, Yin S, Zhang N, 2023, The Interaction Mechanism and Dynamic Evolution of Digital Green Innovation in the Integrated Green Building Supply Chain. Systems, 11(3): 122.

[13] Mahmood S, Misra P, Sun H, et al., 2025, Sustainable Infrastructure, Energy Projects, and Economic Growth: Mediating Role of Sustainable Supply Chain Management. Annals of Operations Research, 355(1): 1099–1130.

[14] Khan T, Emon M, Siam S, 2024, Impact of Green Supply Chain Practices on Sustainable Development in Bangladesh. Malaysian Business Management Journal, 3(2): 10.26480.