



Practices and Challenges of Green Supply Chain Management in International Business

Zining Zhang

Liaoning Normal University, Dalian, China

3988996981@qq.com

Abstract. Under the background of promoting the global carbon neutrality goal and the green restructuring of international trade rules, green supply chain management has become the core direction of international business development. This article analyzes the in-depth characterization of the green supply chain in international business, and points out that its development faces practical problems such as the contradiction between transnational cost and technology adaptation, the fragmentation of international planning standards, and the difference in cognition and demand in the international green trade market. The study found that the green supply chain presents the characteristics of procurement green qualification binding, production full-cycle low-carbon transformation, logistics low-carbon circulation layout, trade green compliance adaptation, and industrial chain coordination and green ecological construction in international business. Its optimization needs to be based on technical coordination, consumer guidance, standard docking, and multi-subject risk prevention.

Keywords: Green supply chain management, International business, Low-carbon transformation

1 Introduction

Green supply chain management integrates environmentally friendly concepts and sustainable development goals into the whole life cycle of supply chain procurement, production, logistics, sales and recycling. Through technological innovation, process optimization and cooperation, it balances economic efficiency and environmental responsibility, and finally realizes the modernization of resource conservation, pollution reduction and low-carbon recycling. Supply chain operation mode. The closed-loop coverage of environmental responsibility in the whole chain, the operation mode of multi-party ecological operation, and the sustainable goal of building a win-win economy and environment constitute its core connotation. For this reason, under the condition of restructuring the global green supply chain, analyzing the core characterization of green supply in international business, the real dilemma and optimization countermeasures have become one of them.

2 The Deep Characterization of Green Supply in International Business

Green supply chain management is the inevitable result of the deepening of global environmental governance, the restructuring of international trade rules, the upgrading of green demand in the market and the sustainable transformation of enterprises. Its evolution follows the three-stage progressive logic of "budding-development-maturity": in the 1980s and 1990s, it was highlighted by global environmental problems and environmental protection promoted by regulations, multinational enterprises put forward basic environmental protection compliance requirements for upstream suppliers in order to avoid green trade barriers; from the beginning of the 21st century to the 2010s, green trade barriers were normalized, consumers' green demand increased, and the green supply chain changed from "single-point compliance" to "whole-chain coordination", and multinational enterprises took the lead in building a full The global green supply chain system realizes environmental protection coordination in all links. From the 2020s to now, driven by the goal of "carbon neutrality" and policies such as carbon tariffs, green supply chain management has changed from "cost center" to "value creation center", presenting the characteristics of "globalization, digitalization and coordination", promoting the global supply chain green reconstruction.

First, the green qualification binding of the procurement link. The traditional international business procurement link takes cost control, supply efficiency and product quality as the core decision-making dimension. Raw material procurement is also It is mainly based on conventional categories, and the environmental risks of the upstream supply chain are completely not included in the enterprise procurement consideration system [2]. This loose procurement model only focuses on short-term economic benefits, making the upstream of the supply chain an important source of environmental pollution, which is also contrary to the trend of global sustainable development. Multinational enterprises give priority to suppliers who have passed the ISO 14001 environmental management system certification and hold authoritative ecological labels of various countries, and directly eliminate partners who do not meet environmental protection standards from the qualification level; in the procurement contract, the carbon footprint ceiling, pollutant emission threshold and other rigid clauses are clearly delimited, and environmental responsibility and collection In-depth binding of procurement cooperation; greatly increase the procurement ratio of organic raw materials and recycled materials, reduce the environmental negative impact of the supply chain from the raw material selection end, and force upstream suppliers to carry out green transformation [3].

The second is the low-carbon transformation of the whole cycle of the production link. The traditional production link is often driven by fossil energy, and the production process is backward, resulting in high energy consumption per unit output value, high carbon emission intensity, and loose pollution control, which is easy to cause water, atmospheric and soil pollution. At the same time, product design fully follows the concept of the whole life cycle, abandons the traditional excessive packaging mode, adopts

degradable materials and simplifies packaging design, lays the foundation for subsequent product recycling and resource reuse, and makes low carbonization a core feature of international business production [4].

Third, the low-carbon and circular layout of logistics distribution links. The logistics distribution link breaks through the traditional single goal of focusing only on transportation efficiency - the traditional transportation efficiency here means that enterprises give priority to transportation speed, loading rate and cost control, and less consideration is given to the carbon emission intensity and environmental impact of the mode of transportation - turning to the dual layout of low carbonization and recycling [1]. Multinational enterprises give priority to low-carbon transportation modes such as sea transportation and railway transportation to replace high-carbon air transportation, reduce the empty load rate of transportation through intelligent path planning technology, and at the same time build cross-border packaging circulation systems and reverse logistics channels, promote the reuse of packaging materials and the recycling and reprocessing of waste products, and realize the resources of logistics links. Closed-loop flow [3].

Fourth, green compliance and standard adaptation of trade links. The trade link takes green compliance as the core ability of enterprises to participate in international business - in recent years, international green trade rules have moved from initiative to mandatory, and green compliance has become a rigid requirement for global market access - enterprises take the initiative to benchmark EU REACH regulations, carbon border adjustment mechanism (CBAM) and other international Green trade rules, complete carbon footprint accounting as required and disclose carbon footprint reports and environmental impact assessment documents [5][8]. Through carbon neutrality, organic products and other authoritative green certifications, we will break through the green trade barriers of various countries, transform the green compliance ability into an advantage of international market access, and make the adaptation of green standards a necessary prerequisite for international business trade [1].

Fifth, the collaborative green ecological construction of the industrial chain. Core multinational enterprises take the lead in promoting the collaborative green ecological construction of the industrial chain, promote global suppliers to carry out green upgrading synchronously through environmental protection training, green performance appraisal and other means, jointly build a green technology research and development platform with upstream and downstream enterprises, and share low-carbon production technology and carbon footprint accounting methods [1]. Finally, a green industry ecology of "leading core enterprises and multi-party collaborative participation" is formed, making environmental responsibility a key consideration dimension of international business cooperation and competition [3].

3 Risks and Challenges of Green Supply in International business

3.1 Cost and Technology Adaptation Risks of Transnational Green Supply Chain

The cost and technology adaptation risk of the transnational green supply chain is a prominent obstacle to the promotion of green transformation in the current international business. In terms of cost, green transformation not only requires additional investment in the whole chain, but also cannot form a closed loop of income in the short term. First of all, in the upstream raw material procurement link, the research and development and production threshold of low-carbon, environmentally friendly and renewable materials is relatively high, and its market price is generally 30%-50% higher than that of traditional materials. Multinational enterprises need to bear higher procurement costs to meet green standards; secondly, the green transformation of the production link involves clean production equipment. Update, energy-saving technology upgrade, etc., the investment in green transformation of a single production line is often as high as millions or even tens of millions of yuan, which is relatively expensive, especially for small and medium-sized enterprises. From the analysis of the dimension of technical adaptation, problems such as differences in technical standards and mismatches in technical application conditions under transnational scenarios are prominent.

3.2 International Planning and Standard Comparison of Green Supply Chain

There is a lack of unified coordination between the international planning and standards of the green supply chain, and there are significant differences in the planning orientation and standard systems in different countries and regions. The international development of the green supply chain has fallen into the dilemma of inefficient coordination due to the lack of a global unified coordination mechanism for planning and standards. The core syndrome is highlighted by the two major characteristics of the geographical differences of planning goals and the fragmentation of the standard system, and the two overlap each other to form multiple obstacles to development. The regional differences in planning goals are manifested in the fact that different countries form differentiated planning orientations based on their own development foundation and interests. Developed countries rely on their technological and industrial advantages to deeply bind carbon emission reduction and environmental protection responsibilities with international trade, and formulate high-standard and strictly constrained green supply chain planning to dominate the global supply chain. Bureau, developing countries pay more attention to the balance between green transformation, economic development and industrial employment, take gradual green upgrading as the core goal, and set relatively relaxed green standards. From the perspective of international planning, the green supply chain planning of different countries shows a distinct regional interest orientation.

3.3 Risks of Market Awareness and Demand Differences in International Green Trade

As a prominent problem facing the green supply chain in the transnational layout, the risk of market recognition and demand differences in international green trade is that there are obvious differences in the degree of cognition and demand preferences of consumers in different countries and regions on green products, which affects the market adaptability and promotion efficiency of the green supply chain. First of all, from the perspective of market cognition, consumers in different countries have different understandings of green concepts and environmental protection standards. In Europe and the United States and other areas where the green concept is relatively popular, consumers have a high degree of awareness of professional green indicators such as carbon footprint, ecological labels and degradable materials, and can clearly distinguish the environmental protection attributes of products. Secondly, there is a geographical differentiation between the intensity and preference of green demand. In some developed countries, consumers' green demand is stronger, willing to pay a 10%-30% premium for green products, and pay more attention to the environmental protection performance of the whole life cycle of products. [6]

4 The Optimization Path of Green Supply in International Business

4.1 Strengthen the Technical Coordination Mechanism of Green Supply Cost and Adaptation

Strengthening the technical coordination mechanism of green supply cost and adaptation is the core path to solve the problem of high cost and difficult technical adaptation in the transnational green supply chain. First, build a cross-border green technology sharing platform. Led by multinational enterprises, together with upstream and downstream suppliers, scientific research institutions and third-party technical service institutions to jointly build a technology sharing platform, integrate core technical resources such as low-carbon production technology, carbon footprint accounting methods, and green logistics optimization schemes, and realize cross-border sharing and rapid iteration of technological achievements. Secondly, establish a green cost sharing and benefit sharing mechanism. In view of the high cost of green transformation, we should build a cost-sharing mechanism of "led by core enterprises, shared by upstream and downstream enterprises, and supplemented by policies". Finally, promote the cross-border adaptation of green technology and infrastructure. [9]

4.2 Build a Consumer Guidance Mechanism for Green Supply Market Cognitive Training

Building a consumer guidance mechanism for green supply market cognitive training is the key path to crack the risk of market cognition and demand difference.[10] First

of all, carry out sub-regional green consumption education and cognitive training. Formulate differentiated education and training programs according to the cognitive status of consumers in different regions. Secondly, implement precise green marketing and demand guidance strategy. Finally, establish a trust guarantee system for green products. In response to the crisis of trust in some market consumers in green products, a trust guarantee mechanism of "certification endorsement + information transparency + after-sales traceability" is built. First, give priority to selecting green certification institutions with high recognition in the target market for product certification, and significantly mark the certification logo in product packaging and publicity materials to enhance product credibility.

4.3 Build a Rule Docking System for International Standard Coordination of Green Supply Chain

Building a rule docking system for international standard coordination in the green supply chain is the core path to solve the problem of international planning and standard fragmentation. First, promote the coordination and mutual recognition of regional green standards. Relying on regional trade agreements, we will promote the consultation, unification and mutual recognition of green standards among countries in the region. Secondly, strengthen the promotion and application of international common standards. With ISO, UNEP (United Nations Environment Program) and other international organizations as the core, promote the improvement and promotion of international general green standards. Encourage countries to incorporate ISO 14001, ISO 20400 and other general standards into their own green policies and regulations as the basic basis for the green transformation of enterprises; promote the formulation of industry-specific international general standards according to the characteristics of different industries, and finally, establish cross-border green rule docking and dispute resolution. Mechanism.

4.4 Build a Multi-subject Coordination Mechanism for Comprehensive Risk Response in the International Green Supply Chain

Building a multi-subject collaborative mechanism for comprehensive risk response in the international green supply chain is the core path to deal with cross-regional and cross-link comprehensive risks.[7] First of all, clarify the core functions and division of responsibilities of multiple subjects. The government takes the lead in promoting the coordination and docking of international green policies and regulations, and cracking down on "pseudo-green" products and green trade protection behavior; enterprises should establish cross-border green risk prevention and control awareness, build a big data risk early warning system, deepen upstream and downstream coordination, and realize risk information common Secondly, build a cross-border green risk information sharing and early warning platform. Led by the government, together with industry associations and core enterprises, integrate all-dimensional risk information such as green policies, technical standards and market demand of various countries to achieve real-time interoperability.

5 Conclusion

In summary, against the backdrop of global carbon neutrality and the restructuring of international green trade rules, green supply chain management has become an inevitable trend for the development of international business, featuring green qualification constraints in procurement, full-cycle low-carbon transformation in production, low-carbon circular layout in logistics, green compliance adaptation in trade, and collaborative green ecological development in industrial chains. Yet its transnational development still faces practical challenges such as conflicts between cross-border costs and technical adaptation, fragmented international standards, and disparities in green market cognition and demand, which call for systematic solutions through technical coordination, consumer guidance, standard alignment and multi-stakeholder risk prevention. Going forward, the green supply chain in international business will further advance toward full industrial chain collaboration and global green ecological co-construction. Empowered by digital technologies and driven by the joint efforts of the international community, it will achieve inclusive and sustainable development, serving as a core driving force for the green transformation of global economy and trade.

References

1. Shi Xianliang, Zhang Yaqi, Yang Xin. The development trend and prospects of green supply chain in the context of global carbon neutrality [J]. *China's Circulation Economy*, 2022,36 (09):3-13.
2. Huo Weidong, Wu Qian. The mechanism and path of the digital economy to empower the green supply chain to upgrade - based on the perspective of international trade [J]. *International Business Research*, 2023,44 (02):56-68.
3. Xu Dehui, Wang Chen. Practical dilemma and breakthrough path of green supply chain management of multinational enterprises [J]. *Business Economics Research*, 2024 (08):112-115.
4. Zhang Cheng, Li Mengya. Research on the green transformation of the supply chain of China's foreign trade enterprises under the green trade barrier [J]. *Foreign Economic and Trade Practice*, 2023 (11):45-49.
5. Li Jian, Fan Yanan. Adaptation strategy for the internationalization of the green supply chain of manufacturing under the background of carbon tariffs [J]. *Discussion on Modern Economy*, 2024 (05):89-97.
6. Qu Ruxiao, Jiang Quan, Li Jing. The impact of green supply chain management on the quality of enterprise export products [J]. *International Trade Issues*, 2022 (05): 65-82.
7. Liu Jiaguo, Zhou Ying, Zhou Baogang. Research on the path of improving the resilience of the green supply chain in the manufacturing industry under the goal of carbon neutrality [J]. *China Soft Science*, 2023 (03): 132-143.
8. Zhang Pioneer, Li Li, Yan Chao. The impact of the carbon border adjustment mechanism on the transformation of the green supply chain of China's export enterprises [J]. *International Economic and Trade Exploration*, 2024, 40 (02): 4-21.
9. Lin Weiming, Chen Qiushuang, Meng Fanchen. The driving mechanism and realization path of transnational supply chain greening [J]. *China Management Science*, 2021, 29 (07): 193-202.

10. Fang Jianwen, Sun Wenyuan. Consumer green preferences, supply chain coordination and enterprise green transformation [J]. Business Economics and Management, 2022 (10): 56-68.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

