

Research on the development of dual-channel green supply chain under dual-carbon background

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Abstract. This thesis constructs the green system of dual-channel green supply chain, and analyzes the key problems in the operation process of dual-channel green supply chain from the aspects of supplier selection, green technology, standardization and performance evaluation. This paper aims to explore the follow-up research direction of dual-channel green supply chain by combining the existing research basis, and further improve the research on dual-channel green supply chain.

Keywords: dual-carbon; dual-channel supply chain; green.

1. Introduction

China's economy has ushered in a new pattern and stage from a stage of high-speed growth to high-quality development, and the pursuit and realization of sustainable development, green and low-carbon transformation is the only way. "Modern supply chain" has risen to the national strategy, "upgrading the modernization level of industrial chain and supply chain" and "accelerating digital development" have pointed out the direction for the transformation and development of supply chain. Create a modern green smart supply chain management system with the features of green, digital, networked, intelligent, standardized and which is supported by the three business chains of intelligent procurement, digital logistics, and panoramic quality control, ensuring efficient internal and external collaboration, and actively serving the national carbon peak and carbon neutrality goals.

2. Development status and trend of green supply chain under dual-carbon background

Driven by national policies and the sustainable development of enterprises, China's green supply chain management practice is becoming more and more mature, contributing China's strength in the historical wave of global commitment to green transformation. Carbon peak and carbon neutrality are the common development goal of global enterprises. European and American multinational enterprises have taken the lead in carrying out innovative practices and transforming to a green supply chain management model. These transformations are mainly reflected in four aspects, namely, management objects, management motivation, management requirements and management methods.

The highest green requirement of the green supply chain starts from the source of the supply chain, extends to every node of the supply chain, takes the core enterprise as the leading enterprise, and all participating enterprises actively cooperate and work together to improve the green level of the entire supply chain. Although many enterprises pay attention to the selection and management of suppliers when practicing green supply chain, they do not pay enough attention to indirect suppliers, such as secondary and tertiary suppliers. Under the influence of the two-carbon background, the current situation of direct management has shifted from individual enterprises to the whole life cycle of products. As can be seen from product green design, carbon tax, green consumption and other strategies, the requirements of carbon management have been integrated into the whole life cycle of products. It can be seen that the management object of green supply chain has been broadened from "local" to "whole supply chain".

Active layout has gradually replaced policy-driven to become the main theme of enterprise green supply chain management[1]. In the early stage of green supply chain transformation, due to the

different management objectives, technical capabilities, financial capabilities and corporate risk bearing capacity of different enterprises, the speed and motivation of enterprises to implement green supply chain are different[2,3]. Some enterprises may want to practice their social responsibility through green supply chain, some may want to improve their competitiveness, some want to improve their brand image, and some may obtain corresponding preferential treatment or subsidies because of the transformation of green supply chain. In general, the political environment is closely related to the implementation motivation of the enterprise green supply chain. Therefore, the policy drive plays an important role in the early stage of the enterprise green supply chain transformation. Not only to legally constrain the behavior of enterprises, but also from the green procurement, financial incentives, pilot demonstration, green credit and other aspects to encourage. However, in the process of continuous improvement of the low-carbon legal policy system, long-term policy drive is not the lasting power for enterprises to build green supply chains. Therefore, in the context of dual-carbon, enterprises are actively extending social responsibility and actively building a zero-carbon supply chain.

Green supply chain is not only reflected in environmental protection, but also closely related to sustainable economic development[4,5]. In the early stage of green supply chain practice, many enterprises only stay on environmental compliance, and the meaning of green is too superficial. In the green supply chain, all behaviors conducive to reducing resource consumption, ecological impact, and maximizing renewable rate are included in the green path of the supply chain[6]. Therefore, with the promotion of the two-carbon target, the management requirements of the green supply chain have shifted from the surface to the deeper green level. Whether it is illegal and whether it damages the environment is no longer the only standard to evaluate the level of green supply chain management of enterprises. Environmental violations are the basis, and it is necessary to make requirements on whether enterprises can achieve energy conservation, emission reduction, water conservation, carbon reduction, green design[7], high recycling rate and high yield.

The supervision of enterprises' green behavior can not only rely on government agencies, but also accept extensive social supervision. In the traditional green supply chain, the environmental information of many enterprises is generally not open to the public except for the mandatory requirements of the law, so the environmental information is not transparent, and the flow of information is also a closed point-to-point flow. Driven by the dual-carbon goal, some enterprises have put forward the goal of zero emissions of the whole supply chain, leading the new trend of low-carbon transformation of the supply chain. In this kind of self-organized enterprise strategy, the voluntary emission reduction behavior is implemented with the guarantee of enterprise reputation. This behavior will promote the transformation of environmental information from a closed state to a transparent, measurable and verifiable state, prompting enterprises to disclose environmental information such as emission reduction and supplier lists in the supply chain, and accept the supervision of the government and society.

3. Construction of dual-channel green supply chain system under dual-carbon background

In the dual-channel green supply chain, industry, enterprise and product are the three important carriers of green technology. With the deepening of supply-side structural reform, innovation has achieved supply-side structural reform, and consumption and demand have achieved green upgrading, while driving the green production of enterprises and the green supply of factors. In the process of promoting the dual-carbon goal, it is necessary to take the lead role of the core enterprises in the supply chain and promote the green transformation of the entire supply chain. Therefore, from the perspective of the whole supply chain process, this thesis divides the system composition of dual-channel green supply chain into four parts, which are green factor supply, enterprise green production, green consumption upgrade and green logistics. As shown in Figure 1.

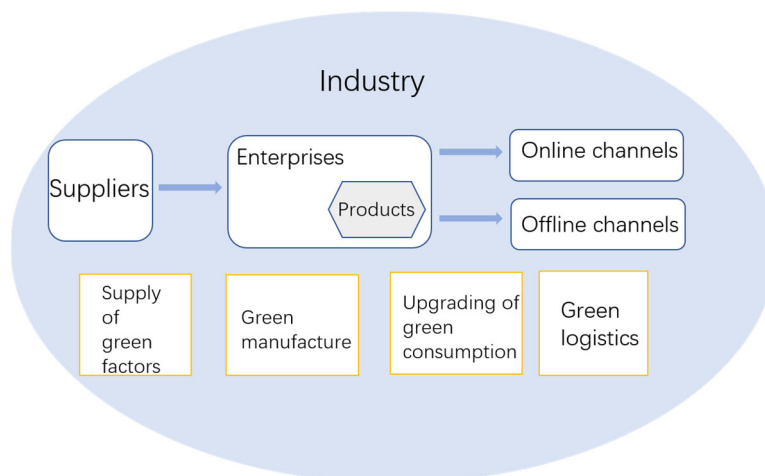


Figure 1 The green system of dual-channel green supply chain

3.1 Supply of green elements

Green procurement is the core link of the supply of green elements, which can force upstream suppliers to take energy-saving and environmental protection measures, and then carry out green transformation of product design, manufacturing, logistics and recycling, so as to achieve the unity of economic and social benefits. The promotion of dual-carbon target puts forward higher requirements for enterprises' green procurement. Green procurement covers the evaluation and selection of suppliers, product packaging, recycling of raw materials and so on. Green procurement system is the focus of promoting the construction of green manufacturing system and improving the green supply chain management system. Green procurement system should include green procurement management documents, green procurement objectives, key material control list, supplier management procedures and green procurement related personnel responsibilities and authority. Green procurement management documents can ensure the effective operation of green procurement system. Green procurement objectives should be consistent with laws and regulations, green requirements of users, and consistent with the green development strategy of enterprises. The material control list is an important basis for identifying the green properties of products and materials. The supplier management program can effectively identify the green risks of products or services, and at the same time monitor and evaluate the green behavior of suppliers. It is helpful to establish a scientific management assessment method by clarifying the responsibilities and rights of green procurement personnel.

3.2 Green production

Green development requires the formation of green production mode, green production mode is the embodiment of higher value level of production mode. Hashim et al. [8] believe that green production is more like a tool to improve the production management practice of enterprises and improve the competitiveness of organizations through green labeling. In terms of production, Chinese enterprises are implementing green requirements for energy conservation, reuse, low-carbon and emission reduction in four key areas around green products, green factories, green parks and green supply chains. As an effective strategy for resource optimization and pollution treatment, the core content of green production is to realize clean production, low-carbon production, sustainable production, intelligent production, circular production and lean production. The bottleneck of green product production is reflected in the two aspects of high cost and limited technology of research and development. As a result, many companies are constrained by immediate benefits and risks[9].

3.3 Green consumption upgrade

The dual-carbon goal has led all walks of life to transform and upgrade, and the green consumer[10] market has also developed rapidly. In the electrical appliance industry, trade-in has become a standard

service, and the user ratio is also increasing, among which young people have become the leader of the green consumption trend. Sales of appliances with first-level energy efficiency are also increasing, and green energy-saving appliances are gradually popularized. Support for green consumption needs to continue to expand the supply of low-carbon consumer products, form a market-oriented, household appliances, used cars and other industries need to continue to complete the recycling system, encourage the development of new business forms and new models.

3.4 Green Logistics

Logistics covers packaging, transportation, storage and processing and other links, which are also the parts that consume the most manpower, financial and material resources, therefore, the implementation of green logistics can better achieve the goal of reducing costs and increasing efficiency. For example, the introduction of green transport tools to reduce carbon emissions in the process of logistics transportation. Through the use of environmentally friendly materials to achieve green packaging, so as to achieve energy conservation and improve recycling efficiency. Through reasonable planning of logistics distribution routes, reduce logistics costs and maximize economic benefits. Green logistics covers many aspects, penetrating into green procurement, green production, green sales, green recycling and other aspects, and is a collaborative management of all related logistics activities from the perspective of the whole supply chain.

4. Analysis of key issues of dual-channel green supply chain management under the dual-carbon background

4.1 Supplier Selection

The choice of partners is an important part of the green supply chain and the key to its successful operation. Green supply chain is a multi-objective revenue subject and multi-objective strategy problem, therefore, in the practice process, it is easy to generate revenue disputes and conflicts due to the allocation of resources and income distribution. In addition, it is also necessary to consider whether the supply chain is willing to share knowledge and technology. The factors affecting decision-making between online and offline channels are not exactly the same, so the objective functions of the decision-making mechanism of income distribution involving suppliers need to be considered. How to evaluate, evaluate and select suppliers with the goal of maximizing online and offline benefits is an important issue in dual-channel green supply chain.

4.2 Green Technology

In the process of green transformation of supply chain, green technology innovation is one of the important contents, and also an important issue of sustainable development research. The content of green technology innovation includes two parts: technology innovation and management innovation, the main purpose is to coordinate the relationship between human and environment. Promote resource recycling and improve environmental governance through green technology innovation[11]. The core problem of green technology innovation is how to affect supply chain management decision, that is, the impact of green innovation technology application on supply chain performance and product price. At the same time, the impact of normal intensity of environmental regulations and subsidies on enterprises' green innovation technology are also the key research issue. The complexity of the participants in the dual-channel supply chain determines the different decision-making modes of online and offline channels. How to cooperate with green technology innovation, how to maximize the benefits of both, and the different incentive effects of different decision-making mechanisms on different channels are all issues that need to be considered in the follow-up research.

4.3 Standardization

Green supply chain in the development process of our country, has formed a relatively mature and perfect consciousness system based on the national conditions, and issued the relevant standards in line with China's national conditions and local characteristics. The green supply chain policy document covers every link in the supply chain, including supply chain management, green procurement, green production, green circulation, green consumption, green finance, recycling and treatment, green low-carbon and circular economy, and green manufacturing. These documents have become an effective management means to assist environmental authorities in the management and prevention of environmental pollution, while attracting more enterprises to understand and participate in the green supply chain, and also guiding the direction of many enterprises in the process of exploring green transformation. China's large enterprises and multinational enterprises in the practice of green supply chain model has achieved some results, but most of the small and medium-sized enterprises are still in the initial and exploratory stage, the existing green supply chain management standards only limited to electrical and electronic, automobile, machinery and other industries, while agriculture, service, retail and other industries outside the industry standards have not been introduced. The unified standard issued by the government is an important basis for the practice of green finance, green design, green consumption and so on. The most typical feature of the dual-channel supply chain channel is that the participants of the channel link are different, and it is more necessary to restrict their own behavior for the unified standard of the overall green benefit of the whole supply chain.

4.4 Performance Evaluation

Dual-channel green supply chain needs a set of scientific, objective and reasonable performance evaluation system to measure the implementation effect of both online and offline channels. On the one hand, it provides decision-making support for managers, and on the other hand, it encourages all participating members of the supply chain to pay attention to environmental issues in the process of operation and management. Thus, the performance evaluation system has great practical significance to enhance the competitive advantage of enterprises[12]. The construction of performance evaluation system needs to clarify the subject and object of evaluation, the evaluation template, the evaluation index system, the evaluation standard and the evaluation method. How to integrate online and offline channels and build a unified evaluation standard for dual-channel supply chain is actually a complicated problem. For example, usually the evaluation includes internal evaluation and external evaluation [13]. In the internal evaluation content, when analyzing green consumption, online channels need to analyze green network, green e-commerce and other issues, while offline channels may need to consider the green experience in the purchase process.

5. Summary

Dual-channel green supply chain has most of the characteristics of single-chain supply chain. Therefore, when building a green system, most of the existing research results can be used for reference in the macro perspective. However, due to the different sales channels of dual-channel supply chain, consumers' consumption behaviors are inconsistent. Therefore, in the dual-channel green supply chain, it is necessary to further explore the green supply chain operation management mechanism belonging to the characteristics of dual-channel supply chain from the aspects of supplier selection, green technology, standardization and performance evaluation.

Acknowledgments

This paper is supported by Philosophy and social science research project of Hubei Province (22G083) .

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