

Literature Review of Supply Chain Green Innovation

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Abstract

Based on the literature review of green innovation in supply chain in recent ten years, this paper generally divides the literature into four parts: definition of the connotation of green innovation in supply chain, driving factors, strategy selection and coordination mechanism. Further research finds that there are three main problems in the current research of green innovation in supply chain: firstly, most of them start from region or industry, lacking the perspective of micro-enterprises; secondly, from the perspective of market supply side, analyzing the driving mechanism of green innovation activities in supply chain from factors such as technological change and environmental regulation, lacking market demand side. Third, most of the research methods are case studies or empirical studies. In view of the above problems, this paper attempts to explore the impact of the reference price effect of consumers' green preferences on green innovation activities of supply chain node enterprises by constructing game theory model and solving it from the market demand side.

Keywords

Supply Chain; Green Innovation; Green Preference; Reference price effect.

1. Introduction

Driven by the legislative pressure of environmental protection and the huge economic benefits contained in the green innovation of products, as well as the enhancement of the awareness of environmental protection and sustainable development, more and more enterprises begin to cooperate with the upstream enterprises of the supply chain to carry out green innovation activities. HP's "energy efficiency plan" has covered more than 200 production supplier sites in China and Southeast Asia. It is estimated that by 2025, the intensity of greenhouse gas emissions related to HP's primary suppliers and product transportation will be reduced by 10% compared with that in 2015, and help suppliers reduce 2 million tons of carbon emissions by 2025 compared with that in 2010, which not only strengthens their green image, but also creates huge profit space and social and commercial value for enterprises [1,2]. The development of green economy from the perspective of environment has become the resonance of world economic development. Green innovation is not only the inevitable choice for enterprises to adapt to the requirements of green economic development and meet their own sustainable development needs, but also the internal requirements of ecological civilization construction and natural environment protection [3].

2. Connotation Definition

Supply chain green innovation refers to the innovation with low environmental impact compared with other relevant alternatives, which may be technical (products, processes, etc.) or non-technical (organizations, systems and markets), with the goal of reducing resource, pollution control or waste management costs and providing green products to the market, so

as to improve the environment, society and economy Possibility of multi win situation [4,5]. Compared with traditional innovation, green innovation not only has positive spillover effect, but also internalizes negative environmental effect. This dual externality makes the research on influencing factors and dynamic mechanism of green innovation more necessary [6].

3. Research Status

3.1. Strategic Choice of Green Innovation in Supply Chain

In the aspect of strategy selection of green innovation in supply chain, some studies have shown that in the second-order green supply chain composed of duopoly manufacturers and one retailer, cooperation and joint R & D strategy can make the manufacturer obtain the maximum profit, but it will not make the retailer gain the maximum profit. The intensified competition of joint R & D will damage the manufacturer, but the retailer can benefit from it, and the degree of competition and green degree are sensitive The sensitivity coefficient will affect the strategy choice of manufacturing and retailers [7]. The development of e-commerce urges green manufacturers to adopt a dual channel structure to sell their products, and the uncertainty of consumer demand encourages manufacturers to open their online channels [8]. Large enterprises can carry out strategic cooperation with key suppliers to achieve green innovation. Through green innovation, suppliers can be green, which has a significant contribution to the environmental performance and competitive advantage of enterprises [9]. In the dual supply chain composed of manufacturers and suppliers, the green degree of products and the overall performance level of the supply chain under the cooperative game have been improved [10].

3.2. Coordination Mechanism of Green Innovation in Supply Chain

In terms of the coordination mechanism of green innovation in the supply chain, some studies consider the dual supply chain of manufacturers and retailers. It is found that through cost sharing and wholesale price premium contract, retailers can achieve the goal of reducing carbon emissions together with manufacturers, so as to promote manufacturers to improve the carbon emission reduction rate and improve the profits of the supply chain [11]. Cost sharing contract can improve Pareto's profit of manufacturers, retailers and the whole supply chain system, but it does not reach the ideal situation of centralized decision [12]. Further research found that the green innovation investment, energy efficiency level and channel profit of the integrated channel are greater than those of the decentralized channel, but the sales price relationship under the two channel structures depends on the system parameters [13].

3.3. Driving Factors of Green Innovation in Supply Chain

3.3.1. Environmental Regulation and Technological Change

Among the external driving factors based on institutional theory, high-intensity pollution tax, low-intensity public environmental protection publicity and appropriate innovation incentive compensation have the most obvious effect on promoting green innovation of enterprises [14]. Policy orientation has played a significant role in promoting green product innovation and green process innovation, but the excessive promotion of green innovation technology by the government will reduce the diffusion efficiency of green innovation [15]. External environmental regulation pressure is an important driving force of green innovation, which can urge enterprises to take corresponding green measures to improve product quality and obtain competitive advantage in the same industry [16]. The internal environmental management, ecological design and cooperation with consumers in the green supply chain management activities of enterprises have a significant positive impact on the green product innovation and green process innovation of enterprises [17].

3.3.2. Consumer Green Preference

The consumption value of different consumers varies greatly. For consumers with green purchase or consumption experience or concept, the consumption value is higher [18]. Consumers' environmental awareness will affect the order quantity and channel coordination in the supply chain, and the order quantity of green products will increase with the increase of consumers' green preference [19]. The improvement of consumers' environmental awareness will encourage manufacturers to produce more green products, but this does not necessarily lead to higher profits [20]. Retailers and manufacturers with good environmental protection operation will benefit, while environmental protection enterprises at a disadvantage will tend to increase their profitability if their production competition level is low, and decrease their profitability if their production competition level is high [21]. Further discussion shows that, in the absence of external regulation and internal moral self-discipline, the output of eco-friendly enterprises may be less than that of traditional enterprises under certain conditions [22].

3.3.3. Reference Price Effect

Consumers use reference prices when choosing brands, and rely on past prices as part of the formation process of reference prices, which are more sensitive to "loss" than "gain" [23]. For consumers, if the actual price is consistent with the expected price, the relative thinking is standard, unless there is a zero price effect; if the actual price deviates from the expected price moderately, the relative thinking is better than any other effect [24]. For both sides of the competition, when the initial reference price is very high, the price of both sides will decrease due to the advertising commitment of both sides; when the initial reference price is very low, the other side will adopt penetration pricing strategy, which will stimulate the growth of our sales volume and the rapid rise of the price [25].

4. Current Problems

4.1. Lack of Micro Enterprise Perspective

At present, the research object of green innovation mainly involves the region or a specific industry, such as manufacturing industry, automobile industry, etc., but there is no research from the perspective of micro enterprises, such as the related discussion of green innovation activities of micro enterprises such as manufacturers, suppliers and even retailers. In fact, the green innovation activities of micro enterprises are very important for the development of green economy and the construction and cultivation of green innovation system.

4.2. Research Inclination of Supply Side and Demand Side

Previous studies mostly from the perspective of market supply side, analyze the driving mechanism of green innovation activities in supply chain from the internal technological change and environmental regulation. With the gradual deepening of consumers' preference for green products, consumers' demand for green products directly affects the green innovation activities of supply chain node enterprises. However, the current literature lacks in-depth discussion on the relationship between consumers' preference behavior and supply chain green innovation activities.

4.3. Single and Traditional Research Methods

Theoretical research and qualitative research are still widely used, but empirical research and case-based qualitative research are getting more and more attention. In recent years, empirical research has become the main research method in the field of green innovation. Based on the rapid development of green innovation activities in supply chain, we need to explore more ideas and methods to improve the efficiency of green innovation activities in supply chain in the future.

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