

Research on the Relationship between GSCM and Enterprise Performance: a Multidimensional Analysis based on Manufacturing Industry

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ABSTRACT

Green supply chain management (GSCM) refers to focusing on green environmental protection and reducing the pollution of the whole industrial chain in the process of enterprise production and cooperation with upstream and downstream, which helps to realize the coordinated development of the economy and the environment. With the increasing global environmental problems, GSCM has become an inevitable trend for the transformation and upgrading of manufacturing enterprises in China. However, the relationship between GSCM and enterprise performance has not yet reached a consensus. This paper adopted a multi-case study research method to analyze the GSCM performance of manufacturing enterprises from multiple dimensions. The results showed that GSCM enhances enterprise performance by improving economic, environmental and social performance. These performance improvements not only contribute to the long-term development of the enterprise, but also enhance the competitiveness of the enterprise and the sustainability of its development. This study would improve and enrich the theory of GSCM, and enhance the theoretical basis for enterprises to improve their competitiveness and realize sustainable development. At the same time, the study can provide reference for the government and relevant organizations to formulate and implement relevant policies, and provide important theoretical guidance and decision-making reference for realizing the high-quality development of China's economy.

KEYWORDS

GSCM; Business performance; Digital transformation; Green innovation

1. INTRODUCTION

Since the reform and opening up, the real economy, which is mainly based on manufacturing, has created enormous wealth for China and achieved world-renowned success [1]. However, its rough production and development mode has also brought about a large amount of energy and resource consumption and pollutant emissions, exacerbating environmental problems and posing a serious threat to people's health and life governance. In the "Made in China 2025" and other related documents, "strengthening the green management of the whole life cycle of the product" has become an important issue in the mainstream orientation of China's policies, and the GSCM has become an inevitable trend for the transformation and upgrading of China's manufacturing enterprises.

However, the academic community has not yet reached a consensus on the relationship between GSCM and enterprise performance. Some studies have shown that GSCM can improve business performance by reducing production costs and capturing a larger share of the market [2]. Other studies have shown that GSCM has a positive effect on economic and social performance, but does not have a significant effect on firms' environmental performance [3]. There are also studies that show that

GSCM tends to increase the additional costs of enterprises, thus negatively affecting their financial performance [4].

Based on the multi-dimensional perspective analysis, this paper studied the impact of GSCM on enterprise performance, so as to improve and enrich the theory of GSCM, and improve the theoretical basis for improving the competitiveness of enterprises and realizing sustainable development. Concurrently, it would provide reference for the government to formulate and implement relevant policies, and provide important theoretical guidance and decision-making reference for realizing the high-quality development of China's economy.

2. LITERATURE REVIEW

2.1. Theories and Development of GSCM

The concept of green supply chain was initially proposed by the Manufacturing Research Association of Michigan State University in 1996, and evolved from environmental supply chain. Beamon explained the meaning of green supply chain in detail [5]. Bin Dan and Fei Liu put forward the concept and practice of GSCM, and further proposed the future research and development direction of GSCM [6]. Chin and Hamid (2014) redefined GSCM from the perspective of manufacturing industry [7]. Lu Yin pointed out that GSCM can promote the coordinated growth of economic and environmental benefits of enterprises [8]. Shilin Li summarized the development and connotation of GSCM and enterprise performance, providing theoretical decision support for the transformation of enterprises from traditional supply chain management to GSCM [9].

From the above literature review, it can be seen that scholars from various countries have studied GSCM from different aspects, especially in terms of enterprise performance promotion. Referring to the studies of Islam and Qinghua Zhu [10], this paper divided GSCM into five segments: green design and R & D, green procurement, green production, green sales, and recycling and reuse.

2.2. Multidimensional Analysis of Enterprise Performance

The definition of enterprise performance is very broad, on the one hand, it can be analyzed by financial indicators such as enterprise solvency, profitability, operational capacity, so they are also referred to as financial performance, and in the study of performance, we can often see that scholars refer to enterprise performance through financial performance. Pei Liu measured the economic performance of enterprises from four aspects such as sales growth, profit growth, market share growth, and return on investment of the company compared to its competitors [12]. Huixin Yang and Qin Sun selected return on assets and return on net assets to measure corporate financial performance [13]. On the other hand, it is difficult to achieve significant results in a short period of time for some preliminary investments of enterprises. At the same time, investors have an outlook on the future profitability of the company, which cannot be measured solely on the basis of short-term available financial data. Therefore, it is more accurate to incorporate the use of non-financial indicators to measure corporate performance. With the increasing emphasis on the environment and the rise of the green economy, environmental protection is also included in corporate social responsibility. Therefore, the measurement of corporate performance also has two more dimensions - environmental performance and social performance. Chaofei Zhang explored the impact of corporate green innovation activities on economic, environmental and social performance in the long and short term [13]. Hong Tian and Yufei Wang explored the important impact of corporate environmental strategy on corporate economic, environmental and social performance [15].

Based on the above theories, this paper considered comprehensively and measured the impact of GSCM on enterprise performance from the perspectives of economic, environmental and social

performance respectively, and then finally adopted a comprehensive evaluation approach to measure the comprehensive overall performance of enterprises.

3. MUTI-DIMENSIONAL ANALYSIS OF GREEN CHAIN MANAGEMENT ENTERPRISE PERFORMANCE

3.1. Economic Performance Dimension: Haier Group

Haier Group, a leading global home appliance manufacturer, has been actively implementing GSCM for many years, running the development concept of ESG through the whole industry and all links of the enterprise, promoting a green, low-carbon and recycling economy, and realizing the harmonious coexistence of the enterprise itself with society and nature. Haier Group has realized significant improvement in economic performance under the implementation of GSCM. In 2023, Haier Group's performance continued to grow steadily, with global revenue reaching 371.8 billion yuan, up 6%, and global profit totaling 26.7 billion yuan, up 6%.

The implementation and performance of Haier Group's GSCM is analyzed below, specifically from the five links of GSCM. In the green design and R&D link, Haier Group focuses on integrating environmental protection concepts into the product design and R & D stage, and is committed to developing highly efficient, energy-saving, and environmentally friendly products. Meanwhile, Haier prioritizes environmentally friendly materials for product design, which improves material utilization efficiency, enabling products to better meet consumer demand for environmental protection and energy conservation, which helps increase market share and sales and improve economic performance. In green procurement, Haier has built a green procurement system, prioritizing suppliers that follow environmental standards, and working with them to promote environmentally friendly practices. This effectively reduces the cost of raw materials and obtains the cost-effectiveness of environmentally friendly materials. Moreover, working with suppliers with high environmental standards reduces product quality issues and returns, further improving economic performance. In the green production segment, Haier Group has created advanced energy-saving factories, adopting environmentally friendly technologies and processes in the production process to guarantee low-carbon and emission reduction in the production process. They also optimize the production process to improve productivity and reduce production costs, while reducing environmental fines and governance costs, thus enhancing economic performance. In the green sales segment, Haier Group adopts green marketing strategies to convey the environmental characteristics and advantages of its products to consumers through green packaging and green promotions. Concurrently, it emphasizes the promotion of a green service system and has constructed an Internet of Things digital service platform, which makes use of intelligent products, digital platforms, etc., thus enhancing the efficiency of the company's services. With the growing consumer demand for environmentally friendly products as well as smart services, the green marketing strategy can make Haier's products more competitive in the market, thus improving economic performance. In the recycling and reuse segment, Haier Group has established a comprehensive green recycling system of recovery-disposal-reclamation-remanufacturing, and has built the first connected factory for home appliance recycling. By recovering used products and reusing their valuable parts, Haier's product life cycle is extended, and Haier reduces production costs, resource costs and environmental management costs.

3.2. Environmental Performance Dimensions: Procter & Gamble

Procter & Gamble is one of the world's leading consumer goods companies. P & G actively implements GSCM and adheres to the long-term sustainable development strategy, and finally obtains better environmental performance. From 2010 to 2020, P & G has reduced absolute emissions from its global operations by 52 percent since 2010 through energy efficiency and renewable electricity use.

In green design and R & D, P&G focuses on environmental friendliness and sustainability, using renewable or recyclable materials as much as possible, optimizing product formulas to reduce environmental impact, and developing water-saving and energy-saving packaging designs. P & G uses LCA system to evaluate the whole life cycle of different packaging materials and product designs, which is used to guide the selection of materials and improvement of product design. All these actions help the product design to keep in line with the company's supply chain's green and sustainable development goals, and to be more in line with the needs of green and sustainable development. In the green procurement link, P & G strengthens green compliance as a prerequisite when selecting cooperative suppliers. This ensures that P & G reduces the environmental load from the source of supply chain, takes the lead in implementing GSCM, empowers upstream SMEs to participate in energy saving and emission reduction, and thus improves the overall environmental performance. In green production, P & G actively implements energy-saving measures, reduces waste emissions and optimizes production processes. Each of its factories in China adheres to an environmentally responsible attitude, pursues a win-win result between product manufacturing and environmental protection, and ensures that environmental protection, health and safety are emphasized in the construction and operation process. For example, P & G Taicang plant adopts 100% renewable electricity from wind energy to achieve zero CO₂ emissions; and through lean management, it realizes zero industrial wastewater discharge. In the green sales process, P & G adopts environmentally friendly packaging and reduces the use of unnecessary plastics. At the same time, logistics and distribution are optimized to reduce energy consumption and waste generation in the sales process, thus improving P & G's environmental performance. In the recycling segment, P & G launched and used the reusable recycled boxes it developed and designed, horizontally utilized P & G's supply chain resources, worked with suppliers and e-commerce platforms to build China's first recycled packaging recovery network for e-commerce channels, and encouraged consumers to recycle their used products or packaging.

3.3. Social Performance Dimension: Great Wall Motor

Great Wall Motor Company Limited (hereinafter referred to as "Great Wall Motor") is one of the largest manufacturers of sport utility vehicles (SUVs) and pickup trucks in China. Great Wall Motors has actively fulfilled its product, environmental and social responsibilities, created a frugal and environmentally friendly enterprise, and made progress in GSCM and achieved better social performance. It has won a number of honors, such as national "Green Factory", "Most Socially Responsible Enterprise in 2020" and "2020 China Corporate ESG Best Environmental Responsibility Award".

In terms of green design and R & D, Great Wall Motor focuses on "energy cleanliness, low-carbon technology and resource recycling", vigorously develops whole-chain technological innovation, constantly breaks through technological barriers, and pushes forward the green transformation of the enterprise. The company puts forward high technical requirements for its employees in the research and development of green technologies, creates jobs, increases the recruitment of high-skilled personnel and improves their treatment; Great Wall Motor has also made its self-developed patents, such as the Dayu battery technology, available free of charge to ensure the safety of every user while promoting the common progress and development of the entire industry. In the green procurement process, Great Wall Motor achieves energy saving, pollution control and environmental protection at source by strictly purchasing clean and low-carbon materials, giving preference to cooperating with green suppliers and increasing the rate of ISO14001 certification; it establishes good and stable cooperative relationships with green suppliers to realize the following benefits good faith operation, adhere to mutual benefits, and maintain a relatively stable accounts payable turnover rate. In terms of green production, Great Wall Motor has created low-carbon green factories, adopted digital tools for production energy management, and built a dual-carbon control platform to improve management efficiency, reduce management costs, and create more investment returns for shareholders; it also

provides employees with better production conditions and working environment, thus promoting the healthy and safe development of production. In the green sales link, through the third-party platform to publicize the concept of environmental protection and open up the upstream and downstream sales channels, to establish the public awareness of green consumption, and actively and positively disclose the CSR report to the outside world, to improve the enterprise's green image and reputation, so as to attract excellent partners; the green image can help to increase the degree of trust of the consumers, and at the same time to improve their satisfaction, and to promote the consumers to buy the green products, to increase the enterprise's Green image helps to increase consumer trust, improve their satisfaction, promote consumers to buy green products, increase enterprise sales revenue, and create investment returns for shareholders. In the recycling process, Great Wall relies on the CAMDS data platform and integrates digital technology into the recycling system to realize the recycling and efficient management of used vehicles and the harmless treatment of waste. For example, based on its mature sales and after-sales service network, Great Wall builds a new energy battery recycling network for the market to ensure that end-of-life power storage batteries are handled in a compliant manner, which reduces the impact of end-of-life automobiles on the ecological environment, and thus shapes the company's good social image.

3.4. A Multidimensional Comprehensive Analysis of GSCM Firm Performance

The above three cases of manufacturing companies respectively supported the positive impact of GSCM on economic, environmental and social performance. Through the implementation of GSCM, enterprises are able to reduce costs, improve efficiency and meet consumer demand for environmentally friendly products, thereby increasing market share and sales and improving economic performance. GSCM focuses on the reduction of environmental pollution, the use of environmentally friendly materials and the improvement of resource utilization efficiency, which helps enterprises to reduce the generation of waste, lower energy consumption and reduce carbon emissions, thus improving environmental performance. The implementation of GSCM could enhance the social image and reputation of enterprises, win the support and trust of the society and the government, and enhance the sense of social responsibility and sustainable development ability of enterprises, thus improving social performance. In summary, GSCM enhances enterprise performance by improving economic, environmental and social performance. Therefore, more and more enterprises should emphasize and implement GSCM to meet the increasingly severe environmental and social challenges.

4. CONCLUSION AND INSPIRATION

This paper attempted to explore the relationship of the implementation of GSCM on enterprise performance in manufacturing enterprises, and the results showed that GSCM enhances enterprise performance by improving economic, environmental and social performance. These performance improvements not only contribute to the long-term development of the enterprise, but also enhance the competitiveness of the enterprise and the sustainability of its development.

Firstly, from the enterprise level, manufacturing enterprises should enhance their awareness of GSCM, incorporate GSCM into their corporate sustainable development strategies, and actively cooperate with relevant information disclosure; they should strengthen investment in green innovation and R & D, increase the support of R & D personnel and R & D funds, and develop more environmentally friendly and efficient products and production technologies to meet the market and consumer demand; they should invest in and strengthen the use of digital technology to optimize production processes, reduce resource wastage, and improve productivity and flexibility. Secondly, from the governmental level, the government should raise the public's awareness of and attention to GSCM through publicity and education activities; it should introduce corresponding green policies, formulate and improve

relevant standards and evaluation systems for GSCM, and strengthen the regulatory role and leadership of policies.

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