

GSCM practices, financial and environmental performance of food industries in China: Basis for sustainable supply chain management framework

Xu, Nairu ✉

Graduate School, Lyceum of the Philippines University - Batangas, Philippines



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Abstract

This study determined the impact of GSCM practices on the finance and environment through assessment the financial performance and the environmental performance in terms of each dimensions. To improve financial performance, respondents revealed the importance of company competitiveness, ecological environmental protection design, internal environmental management, supply chain green cooperation, investment recovery. To improve environmental performance, respondents revealed the importance of internal environmental management, ecological environmental protection design, investment recovery, supply chain green cooperation. This study also shows that the computed rho-values indicate a moderate to strong relationship among sub variables of supply chain management practices and environmental performance & financial performance. It confirms that a statistically significant relationship between GSCM practices and environmental performance & financial performance. Finally, a framework was developed to show that leadership culture is the prime culture predictor towards innovation while culture commitment appeared negligible.

Keywords: environmental performance, financial performance, green supply chain, sustainable development

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1. Introduction

In the past forty years, China has achieved remarkable achievements in its economic development, established a comprehensive national economic system, and achieved significant development in agriculture, industry, and service industries, as well as extensive participation in international trade. The income level of the people has significantly increased, and China's per capita GDP has increased from 23 \$ in 1949 to 12720 \$ in 2022. At the same time, resource consumption and environmental pollution have become increasingly serious. China's per capita resource occupation is low, compared with developed countries, China has a lower resource utilization rate and a higher energy consumption per unit of GDP, and the environmental pollution problem caused by the business behavior of enterprises is becoming more and more prominent, which leads to the conflicts between economic development and the carrying capacity of the environment and resources.

At the same time, the informatization of economic and social has changed the enterprise management mode dramatically, and the competition between supply chain and supply chain has replaced the direct competition between enterprises. The concept of global sustainable development requires enterprises to pursue economic benefits and reduce the environmental harm caused by supply chain management in the process of production and operation, which is also a necessary measure for enterprises to face the "green barriers" in the international competition. Therefore, enterprises must integrate upstream and downstream partners, coordinate business behavior from the perspective of supply chain.

Green supply chain management(GSCM), starting from the concept of sustainable development, the overall operation of the supply chain is required to embody the concept of green development and minimize the impact and damage to the environment, so as to achieve the dual purpose of resource conservation and environmental protection. At present, the scholars and business practitioners have reached a consensus on the development direction of GSCM to recognize that there is no conflict between obtaining economic benefits and environmental protection, and that the two can be coordinated.

In the practice of GSCM, the current situation of green food supply chain management is not optimistic. Modern food industry, the operation of raw materials supplies, product production, circulation and other links, is no longer a single enterprise can be fully completed by the main body, the introduction of partners, supply chain management business model has been widely adopted by large food enterprises. Problems at any node in the supply chain will affect the entire supply chain. Take Three Squirrels Co., Ltd., the first snack stock in China's A-share market, which has received multiple consumer complaints about food quality issues, causing A serious impact on sales and the company's market value. The food industry is closely related to the end consumer, and the image of its own business behavior is very important in the public. In addition to achieving good economic performance, the food industry should also assume environmental responsibility, that is, the food industry should pay attention to both the level of both economic and environmental performance.

Although green food supply chain management is regarded as a new management mode that may achieve the coordinated development of corporate profits and environmental performance, its implementation effect is still controversial from the existing research literature. Therefore, starting from the current difficulties faced by enterprises, this paper studies whether green food supply chain can improve environmental performance as well as economic performance, through what kind of practice way to improve enterprise performance can obtain obvious effect, and what kind of practice way to improve environmental performance can obtained obvious effect. The research results can be used as a reference for the food industry to implement GSCM and can also contribute some strategies to the government's governance of environmental issues.

Objectives of the Study - The study aimed to describe the relationships between GSCM practices, financial performance, and environmental performance in food industry in China and will be the basis in developing a sustainable supply chain management model. Specifically, described the GSCM practices in terms of internal environment management, supply chain green cooperation, ecological environmental management and investment recovery; assessed the financial performance in terms of internal environmental management, supply chain green cooperation, ecological environmental protection design, and investment recovery and company competitiveness; assessed the environmental performance in terms of internal environmental management, supply chain green cooperation, ecological environmental protection design, investment recovery; identified the relationships between the three variables; developed a sustainable supply chain management framework for food industry.

2. Methods

Research Design - First, the relationship between the study subjects and the variables was assumed, then research framework was designed, and the scale was made. We designed the methods for processing the data, including the descriptive statistical design, the reliability and validity test design, normal distribution test. There are many differences in the assessment methods and dimensions used by scholars both domestically and internationally.

Participants of the Study - The questionnaire survey was conducted from March 2023 to May 2023, and a total of 324 questionnaires were distributed. 307 questionnaires were received, 7 of which were incomplete and 300 were available. There are three ways to distribute questionnaires: firstly, to distribute questionnaires to graduates of Anhui Xinhua University who are engaged in the food industry; The second is to contact the enterprise through the introduction of teachers and students and distribute the questionnaire in the form of QR code sent through WeChat. The third is to distribute questionnaires to member enterprises of the Food Supply Chain Committee of the Chinese Procurement and Supply Federation. The researcher used convenience sampling in the administration of questionnaire.

Table 1

Respondents Profiles

Ownership	Frequency	Percentage
state-owned	85	28.33%
private	168	56.00%
foreign capital	38	12.67%
Sino-foreign joint venture	9	3.00%
Number of employees		
Less than 20	20	6.67%
20-300	192	64.00%
300~1000	47	15.67%
More than 1000	41	13.67%
Position type		
general employee	128	42.67%
middle management	121	40.33%
senior management	51	17.00%
Educational attainment		
junior college	13	4.33%
bachelor	242	80.67%
Master	35	11.67%
Doctor	10	3.33%
Green supply chain practice time		
less than 1 year	55	18.33%
1 year to 3 years	137	45.67%
3 years to 5 years	86	28.67%
more than 5 years	22	7.33%

Table 1 shows the frequency distribution of the respondents' profiles in terms of the ownership of the

enterprise they work for, number of employees, position types, educational attainment, green supply chain practice time. As to ownership, 168 or 56.00% of the respondents work in private food enterprises. This shows that the private enterprises in the food industry accommodate more than half of the employees, and the education and management of the green supply chain for the food industry employees should focus on the employees of the private enterprises.

As to number of employees, 192 or 64.00% of the surveyed respondents' companies have employees between 20 and 300. The number of employees in large companies with over 1000 employees accounts for 13.67% of the total. This indicates that most companies engaged in the food industry are centrally sized enterprises, and the proportion of employees in large-scale enterprises in the food industry to the total number of employees in the industry is relatively small. As to position types, 128 or 42.67% of the respondents are general employees. 121 or 40.33% of the respondents belongs to middle management. And 17.00% of the respondents belongs to senior management. This is because the middle-level and grass-roots level staff have a more detailed and specific understanding of the enterprise GSCM practice, and they also have a more real understanding on effect of the GSCM practice.

As to educational attainment, the respondents are bachelor with a number of 242 or 80.67%. This can be said that having a bachelor's degree is the common and popular level of higher education. Only 4.33% have a college degree, indicating that employees in the food industry have a higher degree. A good educational background of employees helps to promote GSCM practices. As to green supply chain practice time, 137 or 45.67% of the respondents' companies have implemented GSCM practices for 1 year to 3 years. 86 or 28.67% of the respondents are implemented by the company for 3 to 5 years. Less than one year or more than five years accounted for 18.33% and 18.33% respectively. It indicates that It is not a long time for Chinese food enterprises to implement GSCM.

Data Gathering Instrument - A modified survey instrument was used to gather information needed to meet the need of objectives of this study. This includes three parts. The first part generated the profile of respondents in terms of ownership number of employees position types educational attainment green supply chain practice time. The second Part of the questionnaires is for GSCM practice. This part assesses the GSCM practices in terms of internal environment management, supply chain green cooperation, ecological environmental management, and investment recovery. There are twenty questions for the assessment of these categories. The third part of the questionnaire is the content on the financial performance of green supply chain. This part assesses the financial performance in terms of internal environmental management, supply chain green cooperation, ecological environmental protection design, and investment recovery and company competitiveness. There are twenty questions for this purpose. The fourth is the content on the environmental performance of green supply chain. This part assesses the environmental performance in terms of internal environmental management, supply chain green cooperation, ecological environmental protection design, investment recovery. There are sixteen questions for the assessment of the environmental performance of green supply chain. The measurements that were used for the GSCM practices, the financial performance and the environmental performance is the four-point scale from 1-4 rating to correspond to a very great extent to a light extent. The modified questionnaire was validated by experts and subjected to reliability test.

Data Gathering Procedure - A letter of permission addressed to the managers of food enterprises was sent via e-mail to obtain permission to conduct research. Approval is obtained in order to push through with the study for the researcher. Thereafter, the selected respondents were given enough time to answer the questions. The allocated time for distribution and collection of the survey questionnaire take weeks which will be sufficient for the researcher to gather the data needed for the study. The following were allotted for data tabulation.

Ethical Considerations - The surveyed university students have the right to know the purpose of this experiment and remain anonymous throughout the entire research process, voluntarily filling it out. The data collected from the questionnaire survey, the statistical data in this paper were all original data and had not been

revised. From the questionnaire survey, it can be seen that the statistical data in this paper were all correct. In addition, ethical practices were followed throughout the entire study.

Data Analysis - Weighted mean and rank were used to describe the GSCM practices in terms of internal environment management, supply chain green cooperation, ecological environmental management and investment recovery; to assess the financial performance in terms of internal environmental management, supply chain green cooperation, ecological environmental protection design, investment recovery and company competitiveness; to assess the environmental performance in terms of internal environmental management, supply chain green cooperation, ecological environmental protection design, investment recovery. The result of Shapiro-Wilk Test showed that p-values of all variables were less than 0.05 which means that the data set was not normally distributed. Therefore, Spearman rho was used as part of the non-parametric tests to determine the significant relationship. All analyses were performed using SPSS version 28.

3. Results and Discussion

Table 2

GSCM Practices

Key Result Areas	Composite Mean	VI	Rank
Internal Environment Management	3.17	Agree	4
Supply Chain Green Cooperation	3.26	Agree	2
Ecological Environmental Management	3.30	Agree	1
Investment Recovery	3.20	Agree	3
Grand Composite Mean	3.23	Agree	

Table 2 describes the evaluation of the impact of the survey subjects on the four dimensions of GSCM practices. The comprehensive average value of the four dimensions of impact evaluation is 3.23, indicating that these four dimensions have had a significant impact on GSCM practices, and have played a promoting role in promoting the green development of supply chain management in the food industry. Among these dimensions, the highest weighted average is ecological environmental management (3.30), indicating that corporate ecological environmental management actions have the greatest impact in GSCM practices. To promote green development of the supply chain, food companies must make effort in the following areas: pay more attention to reduce materials and energy consumption in product design, try to use the original ecological pollution-free materials, try to use recycled or renewable materials, Try to comprehensively utilize food ingredients and reduce material surplus and to opt for a green transportation and distribution plan At the same time, efforts may also be made in other dimensions and comprehensive measures may be taken to promote the green development of the food supply chain.

Table 3

Financial Performance

Key Result Areas	Composite Mean	VI	Rank
Internal Environmental Management	3.25	Agree	3.5
Supply Chain Green Cooperation	3.25	Agree	3.5
Ecological Environmental Protection Design	3.26	Agree	2
Investment Recovery	3.23	Agree	5
Company Competitiveness	3.28	Agree	1
Grand Composite Mean	3.25	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 3 describes the assessment of the impact of the survey subjects on the five dimensions of green supply chain financial performance. The comprehensive average value of the five dimensions assessment is 3.25, indicating that these five dimensions have a significant impact on the financial performance of the green supply chain, and have played a role in improving the financial performance of the green supply chain in the food industry. Among these dimensions, the highest overall average is company competitiveness (3.28), indicating that company competitiveness has the greatest impact on the financial performance of the green supply chain.

The green food supply chain should continuously improve its competitiveness, especially core competitiveness, around core enterprises. Each node enterprise should, based on its own conditions and comparative advantages, leverage its own strengths, form unique competitiveness, achieve strong alliances, and complement each other's advantages. In addition, continuous improvement should be made in the four dimensions of ecological environmental protection design, internal environmental management, supply chain green operation, and investment recovery.

Financial performance is a common goal for all profitable enterprises. Although the implementation of GSCM may increase costs in the early stages and may not yield any objective returns in the short term, such as the procurement of new equipment, employee training, and the purchase of "three wastes" treatment equipment, with the deepening of GSCM, fines for pollution accidents will be reduced, and the reputation of the enterprise will be improved, leading to an increase in product attractiveness, Investment recovery can also reduce business operating costs, ultimately leading to improved economic performance. Rao, (2005) conducted a questionnaire survey on companies in Southeast Asia and used structured modeling to study the impact of green supply chain on company economic performance and competitiveness. The results indicate that the implementation of GSCM can improve enterprise performance and competitive advantage.

Xu, et al., (2023) studied the performance of GSCM from the perspective of upstream and downstream cooperative relationships in the supply chain. He used structural equation modeling to analyze the relationship between corporate performance, economic performance, and environmental performance. Research has shown that companies can implement GSCM to improve their environmental and economic benefits. Fang Chencheng, (2017) analyzed existing literature on the impact of GSCM on enterprise performance and concluded that GSCM has varying degrees of impact on enterprise performance, with environmental performance having the highest impact, followed by economic performance, and operational performance having the weakest impact. The study also found that the GSCM of medium-sized enterprises has the most significant impact on enterprise performance. Zhang Jingsong, (2019) conducted a questionnaire survey on more than 200 domestic automobile manufacturers. The research results show that the environmental protection system is becoming more and more strict, prompting enterprises to introduce GSCM, a new management method. And it has a positive impact on the environmental, economic, and social benefits of enterprises.

Table 4

Environmental Performance

Key Result Areas	Composite Mean	VI	Rank
Internal Environmental Management	3.29	Agree	1
Supply Chain Green Cooperation	3.26	Agree	4
Ecological Environmental Protection Design	3.28	Agree	2.5
Investment Recovery	3.28	Agree	2.5
Grand Composite Mean	3.28	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 4 describes the evaluation of the impact of the survey subjects on the four dimensions of green supply chain environmental performance. The comprehensive average value of the four dimensions of impact evaluation is 3.28, indicating that these four dimensions have a significant impact on the overall environmental performance of the green supply chain and have played a role in improving the environmental performance of the food industry's green supply chain. Among these dimensions, the highest overall average is Internal Environmental Management (3.29), indicating that the company's internal environmental management has the greatest impact on the environmental performance of the green supply chain. Green food supply chain node enterprises should start from internal environmental management and implement the green development concept.

Ecological and environmental design and return on investment also have an impact on the environmental performance of green supply chains. In terms of ecological and environmental protection design, it is necessary to increase the proportion of reusable materials, improve the internal environmental conditions of enterprise

factories, better meet government environmental management requirements for production and operation, and increase the utilization rate of food raw materials in enterprises. In terms of return on investment, supply chain node enterprises should enhance environmental awareness. Enterprises should maintain active communication with environmental protection departments regarding environmental issues and play a greater role in improving the community environment. Strengthen publicity and enhance the environmental reputation of supply chain node enterprises among consumers.

Green cooperation in the supply chain also has an impact on the environmental performance of the green supply chain. For example, the joint development and application of green materials, the cooperative development of green design, and so on, can significantly improve the environmental performance. On the sales side, retailers are strengthening their efforts to sell green products and conducting more marketing activities. More green logistics activities should be carried out in the transportation and distribution links. Green procurement should be implemented for the procurement of food raw materials. Improve customer service level and reduce customer complaints.

Table 5

Relationship Between Supply Chain Management Practices and Financial Performance

Variables	rho-value	p-value	Interpretation
Internal Environment Management			
Internal Environmental Management	0.672**	0.000	Highly Significant
Supply Chain Green Cooperation	0.682**	0.000	Highly Significant
Ecological Environmental Protection Design	0.697**	0.000	Highly Significant
Investment Recovery	0.676**	0.000	Highly Significant
Company Competitiveness	0.621**	0.000	Highly Significant
Supply Chain Green Cooperation			
Internal Environmental Management	0.715**	0.000	Highly Significant
Supply Chain Green Cooperation	0.725**	0.000	Highly Significant
Ecological Environmental Protection Design	0.727**	0.000	Highly Significant
Investment Recovery	0.662**	0.000	Highly Significant
Company Competitiveness	0.665**	0.000	Highly Significant
Ecological Environmental Management			
Internal Environmental Management	0.675**	0.000	Highly Significant
Supply Chain Green Cooperation	0.687**	0.000	Highly Significant
Ecological Environmental Protection Design	0.692**	0.000	Highly Significant
Investment Recovery	0.632**	0.000	Highly Significant
Company Competitiveness	0.591**	0.000	Highly Significant
Investment Recovery			
Internal Environmental Management	0.742**	0.000	Highly Significant
Supply Chain Green Cooperation	0.719**	0.000	Highly Significant
Ecological Environmental Protection Design	0.739**	0.000	Highly Significant
Investment Recovery	0.672**	0.000	Highly Significant
Company Competitiveness	0.704**	0.000	Highly Significant

** . Correlation is significant at the 0.01 level

Table 5 presents relationship between supply chain management practices and financial performance. As shown in the table, the calculated rho values range from 0.591 to 0.742, indicating a moderate to strong relationship between sub variables of supply chain management practices and financial performance. There is a statistically significant relationship between supply chain management practices and financial performance, as the p-value obtained is less than 0.01.

The relationship between GSCM practices and financial performance also varies according to the different types of enterprise competition. Zhang, (2023) classified enterprises into three different types based on the degree of implementation of GSCM: leading enterprises, catching up enterprises, and backward enterprises; the author analyzed the performance of GSCM in these three types of enterprises and found significant differences in improving environmental, operational, and economic performance, indicating that the impact of green supply chain management practices on economic, environmental, and operational performance is related to the type of enterprise. Wen Lingyu (2009) believes that a company committed to improving the environment and taking

relevant measures can improve its environmental performance, which is consistent with the views of other scholars that implementing environmental protection measures can improve environmental performance. Frosch RA (2008) surveyed more than 30 companies and found that supply chain cooperation can significantly improve the environmental performance of both parties.

This study breaks through the boundaries of individual enterprises and explores the impact of environmental cooperation between node enterprises on environmental performance from the perspective of supply chain cooperation, expanding the research scope. Diabat and Govindan K (2011) explored the relationship between green supply chains in Indian manufacturing and corporate performance, and the results showed that GSCM has a significant improvement effect on environmental performance. Curkovic and Troufe (2011) believe that GSCM's practices have little impact on the economic performance of enterprises in the short term. This viewpoint overturns the long-standing understanding of the practical role of global supply chain management. This viewpoint is novel and provides inspiration for subsequent research, namely whether the impact of GSCM practice on corporate economic performance is related to the time dimension, and what are the impact mechanisms of GSCM practice on corporate economic performance in the short and long term, respectively.

De Giovanni and Vinzi (2012) argued that implementing GSCM within enterprises can better leverage the role of GSCM and improve environmental performance. Zhang et al. (2018), in their study of enterprise performance in GSCM, linked the enterprise with upstream and downstream cooperative enterprises and analyzed the relationship between different performance using structural equation models. Nureen, et al. (2023) mainly discussed the relationship between GSCM and technological innovation. The research results showed that internal environmental management, green recycling, and ecological environmental design can promote enterprises to improve their research and development capabilities of new technologies, while the impact of green procurement and customer cooperation on green management practices is not significant. Green procurement had a positive effect on economic performance, and reverse logistics also had an improving effect on enterprise social performance.

Mafini et al. (2017) used South African enterprises as a sample to discuss the relationship between GSCM, supply chain cooperation, and the economic performance of small and medium-sized enterprises. The results showed that green procurement, green manufacturing, and green physics have a positive effect on environmental cooperation, with green manufacturing being the most important. At the same time, environmental cooperation also has an improvement effect on the economic performance of enterprises. Zhang Jingsong (2019) conducted a questionnaire survey on more than 200 domestic automobile manufacturers. The research results indicate that after applying regulatory pressure, enterprises will actively carry out green supply chain management practices and strive to improve enterprise efficiency. Enterprise GSCM not only improves environmental benefits, but also has a positive impact on economic and operational performance.

Fan Xueru and Yao Guanxin (2020) studied the impact of green management practices on small and medium-sized enterprises and found that the impact of green design and green procurement on enterprise performance is not significant. This conflicts with the research of other scholars. While green manufacturing, green marketing and green recycling can improve enterprise performance, and their positive effects rank as follows: green marketing, green manufacturing, and green recycling. Chen, etv al., (2021) used listed companies on the main boards of the Shanghai and Shenzhen stock markets from 2012 to 2017 as research samples to reveal the role and impact mechanism of green management in corporate financial performance. He found that the implementation of green management strategies can significantly improve the level of corporate financial performance.

Table 6 presents relationship between supply chain management practices and environmental performance. As seen in the table, the computed rho-values ranging from 0.549 to 0.658 indicate a moderate to strong relationship among sub variables of supply chain management practices and environmental performance. There was a statistically significant relationship between supply chain management and environmental performance

because the obtained p-values were less than 0.01.

Table 6

Relationship Between Supply Chain Management Practices and Environmental Practices

Variables	rho-value	p-value	Interpretation
Internal Environment Management			
Internal Environmental Management	0.610**	0.000	Highly Significant
Supply Chain Green Cooperation	0.549**	0.000	Highly Significant
Ecological Environmental Protection Design	0.592**	0.000	Highly Significant
Investment Recovery	0.652**	0.000	Highly Significant
Supply Chain Green Cooperation			
Internal Environmental Management	0.629**	0.000	Highly Significant
Supply Chain Green Cooperation	0.613**	0.000	Highly Significant
Ecological Environmental Protection Design	0.623**	0.000	Highly Significant
Investment Recovery	0.658**	0.000	Highly Significant
Ecological Environmental Management			
Internal Environmental Management	0.612**	0.000	Highly Significant
Supply Chain Green Cooperation	0.555**	0.000	Highly Significant
Ecological Environmental Protection Design	0.560**	0.000	Highly Significant
Investment Recovery	0.596**	0.000	Highly Significant
Investment Recovery			
Internal Environmental Management	0.600**	0.000	Highly Significant
Supply Chain Green Cooperation	0.571**	0.000	Highly Significant
Ecological Environmental Protection Design	0.571**	0.000	Highly Significant
Investment Recovery	0.592**	0.000	Highly Significant

** . Correlation is significant at the 0.01 level

While many multinational enterprises prioritize the practice of GSCM, the exploration of its performance evaluation perspective has also become a research hotspot, which can be said to be at its peak. The use of network analysis to measure the relevant strategies of GSCM and obtained the following conclusion: GSCM can significantly improve the competitiveness of enterprises, maintain pro environmental behavior, reduce production costs, and ultimately achieve improvement in enterprise performance. Scott D. Johnson (1998) used a balanced scorecard to identify environmental performance indicators. By studying the balanced scorecard methods of Kaplan and Norton, improving, and changing them, a balanced scorecard method that is more in line with the actual operating conditions of enterprises was obtained, which can effectively evaluate the environmental performance of enterprises.

Nagel (2003) conducted a study on GSCM in enterprises, selecting electronic enterprises for environmental performance evaluation, and found that the emphasis on environmental quality issues has seriously lagged the development of enterprises. Nagel envisioned a brand-new environmental enterprise and used a new management model of benchmarking enterprise environmental performance to evaluate and analyze enterprise environmental performance. Other scholars have chosen to study and evaluate the impact of GSCM on the overall module, but there are still divergent opinions on whether it significantly improves corporate environmental performance. Green (1998) discussed the effectiveness of GSCM and its impact on environmental performance but did not reach effective conclusions. Cordiero and Sarkis (1997) evaluated the benefits of GSCM but found contradictory differences in their research findings on corporate economic performance and corporate environmental performance.

Sanket (2017) used Wal Mart as an analysis case, and the most intuitive conclusion is that the implementation of GSCM practice can greatly improve the corporate image, so as to achieve the purpose of improving corporate environmental performance. At the same time, increasing evidence suggests a positive correlation between GSCM in the industry and its environmental performance. Zhang Jingsong et al. (2019) used empirical methods to divide GSCM into three entry points, namely internal GSCM practice, external GSCM practice and post GSCM practice, and discussed their positive impact on environmental performance. However, in summary, scholars and relevant enterprises still generally believe that implementing GSCM can improve their environmental performance, thereby promoting the comprehensive development of enterprises.

Performance improvement is the main motivation for enterprises to implement GSCM practices, including environmental performance and economic performance. (Zhu et al., 2010; Zhu, Sarkis, & Lai, 2008b). Some experts believe that implementing environmental management practices can improve company performance (Dechant & Altman, 1994). By implementing green management, it can reduce or even eliminate environmental damage, reduce environmental governance costs, and achieve environmental performance. On this basis, environmental products can be developed to meet customer environmental needs, increase market share, and improve economic benefits.

More and more people are beginning to recognize the systematic and comprehensive mechanisms of GSCM practices in achieving excellent environments and performance (Liu, et al., 2023). Due to cross functional and cross enterprise collaboration, such as between suppliers and customers, it helps to identify and solve environmental issues faced by the entire supply chain at the system level and take measures to address them. The implementation of GSCM can reduce the damage to the environment (Novitasari, et al., 2023). Through the cooperation between node enterprises, the supply chain can reduce energy waste and emissions in the production and transportation process and implement Ecological design and ecological packaging products. Zhu and Sarkis (2004) first proposed a positive correlation between GSCM and environmental performance, stating that implementing GSCM helps improve environmental performance.

Dzikriansyah et al. (2023) also found that the implementation of sustainable packaging has a significant positive impact on environmental performance. Green et al. (2012) proposed that GSCM typically improves environmental performance, especially in environmental cooperation with clients. For example, providing environmentally friendly packaging to customers and carrying out environmentally friendly design according to customer requirements. Collaborating with customers on environmental protection can effectively clarify their preferences for environmental protection and the costs they are willing to pay, thereby better carrying out appropriate environmental product design.

Table 7

Relationship Between Financial Performance and Environmental Performance

Variables	rho-value	p-value	Interpretation
Internal Environmental Management			
Internal Environmental Management	0.651**	0.000	Highly Significant
Supply Chain Green Cooperation	0.654**	0.000	Highly Significant
Ecological Environmental Protection Design	0.610**	0.000	Highly Significant
Investment Recovery	0.620**	0.000	Highly Significant
Supply Chain Green Cooperation			
Internal Environmental Management	0.651**	0.000	Highly Significant
Supply Chain Green Cooperation	0.579**	0.000	Highly Significant
Ecological Environmental Protection Design	0.621**	0.000	Highly Significant
Investment Recovery	0.654**	0.000	Highly Significant
Ecological Environmental Protection Design			
Internal Environmental Management	0.672**	0.000	Highly Significant
Supply Chain Green Cooperation	0.642**	0.000	Highly Significant
Ecological Environmental Protection Design	0.671**	0.000	Highly Significant
Investment Recovery	0.669**	0.000	Highly Significant
Investment Recovery			
Internal Environmental Management	0.697**	0.000	Highly Significant
Supply Chain Green Cooperation	0.674**	0.000	Highly Significant
Ecological Environmental Protection Design	0.657**	0.000	Highly Significant
Investment Recovery	0.652**	0.000	Highly Significant
Company Competitiveness			
Internal Environmental Management	0.740**	0.000	Highly Significant
Supply Chain Green Cooperation	0.686**	0.000	Highly Significant
Ecological Environmental Protection Design	0.706**	0.000	Highly Significant
Investment Recovery	0.715**	0.000	Highly Significant

** . Correlation is significant at the 0.01 level

Table 7 presents relationship between financial performance and environmental performance. As shown in the table, the calculated rho values range from 0.579 to 0.740, indicating a moderate to strong relationship between the sub variables of financial performance and environmental performance. There is a statistically significant relationship between financial performance and environmental performance, as the p-value obtained is less than 0.01. From previous literature, research on enterprise performance evaluation indicators has been very in-depth, and there is a basic consensus on the selection of enterprise performance indicators. Tsai, et al., (2023) explored the evaluation indicators and methods of GSCM from a theoretical perspective. Khan, (2023) proposed a new GSCM analysis method based on leverage management based on the traditional GSCM analysis model.

This method introduces an improved balanced scorecard system, analyzes evaluation indicators using triangular fuzzy functions and leverage management ideas, and emphasizes evaluation results more. Tsai, et al., (2023) proposed a fuzzy goal planning method to solve the problem of cost and performance evaluation in the process of GSCM practice. This method combines Activity-based costing and performance evaluation indicators into the value chain structure, which is conducive to enterprises to better monitor changes in enterprise performance. Nirmal, et al., (2023) mainly discussed the performance discrimination method of GSCM. This focuses on the core performance that plays an important role and introduced Data envelopment analysis into the evaluation system. It has been proved that this method is reasonable to evaluate the indicators of GSCM.

GSCM (GSCM) is a comprehensive consideration of resource impact and resource efficiency in the whole supply chain, aiming to minimize the negative impact of products on the environment in the whole process, and achieve the highest resource utilization rate. Afterwards, countries such as Canada and the United Kingdom took the lead in focusing on research on GSCM. He, et al., (1923) considered the environmental considerations reflected in the supplier selection process and explored the positive effects of green procurement: it effectively helps reduce waste output. However, these two scholars have not yet considered the overall impact of the supply chain and are still part of their research. Sarkis (1998) began a comprehensive study on the definition of green supply chain, proposing that it should include five modules: internal logistics and procurement, external logistics, material management, packaging, and return logistics.

Based on previous the used of sales growth rate, profit growth rate, and market share growth rate to represent a company's financial performance. Previous studies (such as Green et al., 2012) show that improving operational Resource efficiency and environmental benefits can help improve the overall financial performance of enterprises. The improvement of operational Resource efficiency helps to reduce operational costs, improve resource utilization, increase output, and thus improve the financial performance of enterprises. The improvement of environmental benefits can improve the image of a company, enhance its reputation, increase marketing highlights, and gain public favor.

In this study, environmental performance refers to the reduction in the number of environmental pollutants. For example, the reduction of exhaust gas, wastewater, and solid waste, as well as the reduction of hazardous/harmful/toxic substance consumption, and fewer environmental accidents (Zhu et al., 2017). Better environmental performance can provide legitimacy or even better profit margins for enterprise operations by setting new industry standards (Hart, 1996). When competitors find it difficult to pursue high standards, companies utilize environmentally friendly production processes to provide environmentally friendly products and gain greater market share.

Better financial performance can be achieved through cost control and Resource efficiency management. For example, optimizing procurement prices and reducing procurement costs through appropriate procurement strategies. Improve the utilization rate of raw materials, reduce waste, and reduce the proportion of defective products and product rework rate, thereby improving resource utilization and comprehensive production costs of products. By implementing pollution prevention and control technologies, companies can achieve better environmental performance, achieve zero waste emissions, and reduce pollution treatment costs (Klassen & Mc

Laughlin, 1996). The lower the cost for energy and raw material consumption. Improve profit margins and market share at lower costs through better environmental performance.

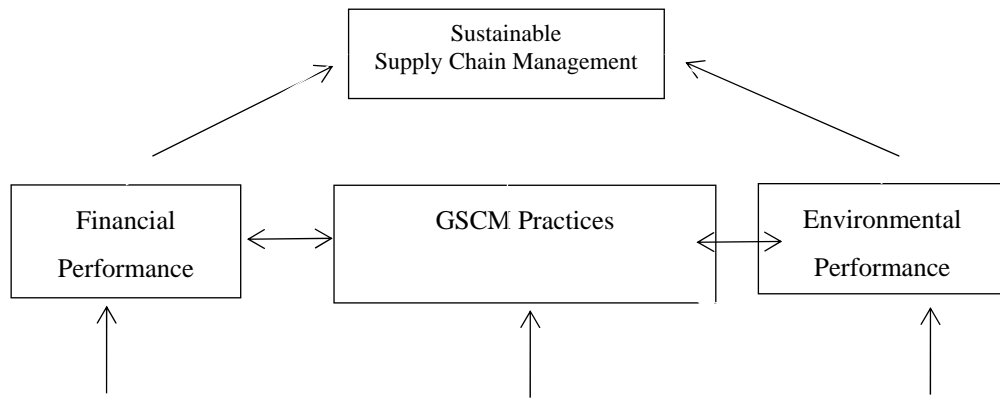


Figure 1 Sustainable Supply Chain Management Framework

Above is the GSCM practice, financial performance and environmental performance have a significant correlation with each other, jointly promote the sustainable development of the supply chain. GSCM practices directly improve the environmental performance of the supply chain, at the same time, directly or indirectly promote the economic performance of the supply chain. Environmental performance and economic performance will be improved together to ensure the sustainable development of the green supply chain.

4. Conclusions and Recommendations

Based on the findings, the following conclusions were drawn. The respondents agreed that GSCM is being practiced in terms of internal environment management, supply chain green cooperation, ecological environmental management, and investment recovery. The respondents agreed that GSCM practices improved the financial performance in terms of internal environmental management, supply chain green cooperation, ecological environmental protection design, and investment recovery and company competitiveness. The respondents agreed that GSCM practices improved the environmental performance in terms of internal environmental management, supply chain green cooperation, ecological environmental protection design, investment recovery. There are significant relationships between the three variables, namely GSCM practices, financial performance, environmental performance.

The researcher develops a framework that can be used by green supply chain manager to improve financial performance and environmental performance for green sustainability. For the recommendation, it suggests that the implement activities in the dimension of ecological environment management, such as green product design. Improve the level of internal environmental management, such as developing and implementing GSCM strategies. Expand the scale of green food consumers, increase the market share of green food. Meanwhile, accelerate capital turnover, control costs, and improve investment return. More so, improve internal environmental management, control waste and noise, reduce energy consumption, and improve environmental performance. On the other hand, the research model can provide reference for green supply chain managers and decision-makers in food industry regulatory departments to improve the performance of GSCM. In the future research, due to scholars currently have inconsistent opinions on the impact of green supply chain management practices on economic performance, further research is needed on the mechanisms by which green supply chain management practices can improve economic performance, including driving forces, limiting conditions, and principles of action and so on.

5. References

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