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# A Literature Review on Green Supply Chain Management (GSCM)

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## Abstract

**Under the background of global warming and ecological environment destruction, the concept of green development has attracted the attention of various countries and regions as well as enterprises. As a new type of supply chain management mode, the green supply chain management (GSCM) consider and incorporate the environmental factor, and can reduce the pressure on the environment and promote efficient utilization of resources, therefore attaches great importance to the government, enterprises and academic circles, is becoming a current research hot spot. The purpose of this literature review is to review the domestic and foreign literature related to GSCM from 2018 to 2022, classify the main research directions and perspectives of the literature, and summarize the main viewpoints and achievements of scholars' research on GSCM. This literature review searched for articles related to GSCM by searching keywords in domestic and foreign databases, and divided the relevant literature into four research directions: the connotation and development of GSCM, the methodology and model of GSCM, the practices and influence of GSCM, and the obstacles and solutions in the process of GSCM practices, and summarized the methods, viewpoints and conclusions of these papers. The study found that the proper use of methods and models in the GSCM process can effectively help decision-makers make decisions, and GSCM practices can have a positive impact on enterprise performance. In addition, obstacles to GSCM implementation include deficiencies in information technology, high cost of waste disposal, market uncertainty and competition, employee resistance to change, and opposition from top management.**

## Keywords

**GSCM; Make Decisions; Enterprise Performance; The Methodology and Model of GSCM; The Obstacles and Solutions in the Process of GSCM Practices.**

## 1. Introduction

In recent years, new environmental problems and resource exhaustion have posed great challenges to enterprises and even the whole human society. Most countries have to deal with the environmental and pollution problems that come along with the rapid economic growth. There is also a need to monitor the economic activities of enterprises and their impact on the environment, which cause a huge risk of environmental pollution, such as traffic congestion, toxic gas emissions, large amounts of packaging waste, the use of toxic chemicals and various pollutants.

At the same time, the increasing public awareness of environmental protection, and the implementation of government environmental protection policies and regulations and other factors force enterprises to adopt environmental protection practices, environmental issues and sustainable development concepts have become important issues of concern to enterprises in various industries, and GSCM has gradually been paid attention to and widely promoted. Green supply chain management is conducive to environmental protection. It is frequently used

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in the manufacturing industry to help enterprises achieve green operations, and it is also recognized as an effective management method. It aims to solve the negative environmental impacts such as pollution, destruction and waste of production resources, drive enterprises in the whole supply chain to continuously improve the level of green development and effectively improve green performance (Tseng 2019).

This paper summarizes the literature on green supply chain management in the recent five years from 2018 to 2022, and divides the research directions and perspectives of these literatures into four categories: 1.Research on the connotation and development of green supply chain and green supply chain management, 2. Research on methodology and model of GSCM, 3. Research on the practice and influence of GSCM, 4. Research on the problems encountered in the practice of GSCM, and summarize and summarize from these four perspectives in the body part, so that readers can clearly understand the research direction and achievements of GSCM in recent years, and provide support for further research in the future.

## 2. The Connotation and Development of Green Supply Chain and Green Supply Chain Management

For the concept of 'green supply chain' and 'green supply chain management', many scholars and professionals have put forward their own opinions. The concept of green supply chain was first formally proposed by Manufacturing Research Association (MRC) of Michigan State University in 1996, which is described as: supply chain management should take environmental factors into account, and make the principle of environmental protection run through all links of the supply chain, such as product design, procurement, manufacturing, assembly, packaging, logistics and distribution, so as to achieve the purpose of not only reducing the environmental damage of the manufacturing industry, but also promoting the optimal allocation of resources.

The concept of green supply chain management can be traced back to the 1990s, and it begins with 'green purchasing'. In 1994, Webb suggested that enterprises should apply environmental standards to select appropriate raw materials and pay attention to their recycling, thus putting forward the term 'green procurement'.

Later after unceasing popularization and development, more scholars have put forward their views on the concepts of GSC and GSCM. In general, there is no clear definition of the two, but in essence, GSC is the integration of green procurement, reverse logistics and process cycle (involving suppliers, manufacturers and customers) into the supply chain, in which the process cycle includes the reverse chain and forward chain in supply chain operation, or also known as 'closing cycle' (De Oliveira et al. 2018). In the process of manufacturing products, the important role of GSCM is to minimize the impact on the environment. In fact, many scholars have different definitions of GSCM, but they all focus on internal environmental management, green procurement, customer environmental cooperation and reverse logistics.

It should be noted that green supply chain management (GSCM) and sustainable supply chain management (SSCM) are two different concepts. GSCM emphasizes the environmental characteristics of the management process and is closely related to environmental practices. While the SSCM is concerned with economic, social and environmental stakeholders (Tronnebati & Jawab 2020), the SSCM is an extension of the GSCM.

## 3. Methodology and Models of Green Supply Chain Management

Green supply chain management is strategically important in organizations, so decision-makers need effective methods and tools to help them make decisions. Many studies in the GSCM literature propose different approaches and models to identify problems, monitor phenomena, and prescribe solutions.

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## 3.1. Macro Decision-making

Sun and Zhu (2018) developed fuzzy-grey tools by using a mixed group decision making model, which is used to evaluate the GSCM capability of an enterprise or an organization and promote the decision performance and benchmarking evaluation related to GSC. The tools have applicability. As an enterprise evaluates its GSCM capabilities, it can also evaluate its supply chain partners, help identify weaknesses in each and make continuous improvements to improve the green level of the entire supply chain. On this basis, Wiguna et al. (2021) conducted a questionnaire survey on GSCM of Indonesian construction industry. They used PWC and TOPSIS methods to carry out weight analysis on variables of the green supply chain. They developed a framework that can be used by the decision makers and stakeholders in the decision-making of GSCM, to determine green practices in GSCM and their weight and priority, used to guide the organization's GSCM activities, effectively reduce the negative effects on the environment.

## 3.2. Micro Decision-making

**Table 1.** Relevant literature to help decision makers make decisions

| Main content | Title | Authors | Time | Methods | Conclusion |
|---|---|---|---|---|---|
| Help decision-makers make macro decisions | Organizational Green Supply Chain Management Capability Assessment: A Hybrid Group Decision Making Model Application | Sun, J & Zhu, Q | 2018 | Mixed group decision making model | Fuzzy-grey tools can assess an enterprise or organization's ability to manage its green supply chain |
| | A Framework for Green Supply Chain Management in the Construction Sector: A Case Study in Indonesia | Wiguna et al. | 2021 | PWC and TOPSIS | Develop a green supply chain management framework that can be used by organizational decision makers and stakeholders to guide GSCM practices |
| Help decision makers make micro decisions | An integrated fuzzy sustainable supplier evaluation and selection framework for green supply chains in reverse logistics | Tavana et al. | 2021 | Fuzzy hierarchy best-worst method and TOPSIS | A supplier selection model of green supply chain in reverse logistics is proposed |
| | Evaluation of Logistic Flows in Green Supply Chains Based on the Combined Dematel-Anp Method | Osintsev, Rakhmangulov and Baginova | 2021 | Dematel-anp combination method | Developed a method for ranking logistics flow indicators to be used in GSCM to help decision makers make logistics choices |

Selecting appropriate suppliers and logistics is one of the crucial decisions in GSCM. Tavana et al. (2021) proposed a supplier selection model for GSC in reverse logistics. They use a hierarchical fuzzy best-worst method to determine the importance of the selection criteria weights, and using TOPSIS method to rank the capabilities of suppliers in reverse logistics, and the supplier's ranking can help decision makers to make decisions, to choose the best suppliers, thus further optimizing the GSCM, promote enterprise's sustainable development. In addition, Osintsev, Rakhmangulov and Baginova (2021) use the Dematel-ANP combination method to develop a method to rank the indicators of logistics flows, and propose a common logistics parameters and indicator system for global supply chain management. In green supply chain management, it can adjust the actual parameters of logistics flow and help decision-makers to make decisions.

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## 4. Green Supply Chain Management Practices and Influences

This section classifies papers dealing with the assessment of GSCM practices and the influences.

### 4.1. Influences on Enterprise Performance

First, GSCM practices research conducted in developing countries. Zaid et al. (2018) studied the manufacturing sector in Palestine and found that GSCM practices play a mediating role between enterprises' green human resource management practices and environmental sustainable performance, and have a positive impact on both. Kalpande and Toke (2020) evaluated the GSCM practices of Indian manufacturers, and concluded that GSCM has a positive impact on the operation, environment and economic performance of Indian enterprises. Rupa and Saif (2022) studied the impact of GSCM practices in Bangladesh on corporate performance and environmental sustainability. They believed that GSCM practices had a positive impact on corporate costs, waste treatment, resource and energy consumption, and greenhouse gas emissions, but had a small impact on corporate profits.

In addition, Samad et al. (2021) and Hilal (2022) conducted research on the background of developed countries, and believed that the implementation of GSCM in environmentally friendly enterprises could improve the financial and operational performance by saving production, packaging, transportation and office costs, and reduce the pressure on the ecosystem in the production and sales process to achieve environmental benefits. It can also improve the competitiveness and economic benefits of enterprises through positive corporate image. Besides, Muhammad et al. (2022) believe that GSCM can not only have a positive impact on the business performance of enterprises, but also effectively promote the technological innovation of enterprises.

Secondly, some scholars have studied the impact of specific GSCM practices. Al-sheyadi et al. (2019), Kalyar et al. (2020) and Sahoo et al. (2021) further subdivided GSCM practices into five dimensions, explored the impact of internal environmental management, green procurement, cooperation with customers, ecological design and investment recovery on an organization's environmental, economic and operational performance. Research shows that cooperation with customers, ecological design and investment recovery have a significant impact on at least one dimension of organizational performance, investment recovery has an impact on the environmental performance of enterprises, and ecological design has a key impact on the operational performance of enterprises. However, GSCM cannot directly affect the economic performance of enterprises, but indirectly improve it. Liu et al. (2020) divides GSCM practices into behavioural practices and technical practices on this basis. Behavioural practices refer to human practices, such as the relationship between enterprise and its customers and suppliers, while technical practices refer to tangible practical activities, such as green design, green manufacturing and reverse logistics. Liu et al. believe that technical practices play a mediating role between behavioural practices and organizational performance, so enterprises should first focus on GSCM behavioural practices, and take technical practices as auxiliary, to maximize the economic, environmental and operational performance of enterprises.

Cousins and Lawson (2019) studied the role of two special variables in GSCM practice, ecocentricity and supply chain traceability. It is found that the high level of ecocentricity and supply chain traceability of green supply chain can effectively reduce the cost of enterprises, but has a negative impact on the environmental performance of enterprises.

### 4.2. Influences on Enterprise Image

Aslam, Waseem and Khurram (2019) found that external GSCM practices of enterprises, such as green procurement, customer cooperation and investment recovery, are significantly related to creating a good corporate image and have a positive impact on it. Therefore, enterprises need

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to continuously implement GSCM, and convey the green initiatives to customers to reinforce the good enterprise image.

## 4.3. Influences on Society and Economy

The study of Ali et al. (2019) on the China-Pakistan Economic Corridor (CPEC) shows that the adoption of GSCM can benefit the development of socio-cultural and economic conditions in Pakistan, thus significantly increasing the benefits of CPEC project without causing environmental damage.

**Table 2.** Literature on the social and economic impact of GSCM

| Main Content | Title | Authors | Time | Conclusion |
|---|---|---|---|---|
| Influences on enterprise performance | The impact of green human resource management and green supply chain management practices on sustainable performance: An empirical study | Zaid et al. | 2018 | GSCM practices play an intermediary role between green human resource management practices and environmental sustainable performance |
| | Assessment of green supply chain management practices, performance, pressure and barriers amongst Indian manufacturer to achieve sustainable development | Kalpande and Toke | 2020 | GSCM has a positive impact on the operational, environmental and economic performance of Indian companies |
| | Impact of Green Supply Chain Management (GSCM) on Business Performance and Environmental Sustainability: Case of a Developing Country | Rupa and Saif | 2022 | GSCM practices have a positive impact on enterprise costs, waste disposal, resource and energy consumption, and greenhouse gas emissions |
| | Green Supply Chain Management practices and impact on firm performance: The moderating effect of collaborative capability | Samad et al. | 2021 | The implementation of GSCM in environment-friendly enterprises can improve the financial and operational performance of enterprises, environmental benefits |
| | The Effect of Green Supply Chain Management Practices and Competitive Advantage on Financial Performance | Hilal | 2022 | |
| | Green Supply Chain Management Practices' Impact on Operational Performance with the Mediation of Technological Innovation | Muhammad et al. | 2022 | GSCM can effectively promote the technological innovation of enterprises |
| | The complementarity of green supply chain management practices and the impact on environmental performance | Al-Sheyadi et al. | 2019 | The GSCM practices are subdivided into five dimensions of internal environmental management, green procurement, collaboration with customers, ecological design and investment recovery and the impact is discussed |
| | Enhancing firms' environmental performance and financial performance through green supply chain management practices and institutional pressures | Kalyar et al. | 2020 | |

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| | Green supply chain management practices and its impact on organizational performance: evidence from Indian manufacturers | Sahoo et al. | 2021 | |
| | Behavioral and technical perspectives of green supply chain management practices: Empirical evidence from an emerging market | Liu et al. | 2020 | Divide GSCM practices into behavioral and technical practices and discuss the implications |
| | Investigating green supply chain management practices and performance: The moderating roles of supply chain ecocentricity and traceability | Cousins and Lawson | 2019 | Investigate the role of two special variables in GSCM practice, ecological centrality and supply chain traceability |
| Influences on enterprise image | Impact of Green Supply Chain Management Practices on Corporate Image: Mediating role of Green Communications | Aslam, Waseem and Khurram | 2019 | External GSCM practices are significantly associated with creating a positive corporate image |
| Influences on society and economy | Integration of green supply chain management practices in construction supply chain of CPEC | Ali et al. | 2019 | The adoption of GSCM is beneficial to the development of socio-cultural and economic conditions in Pakistan |

## 5. Problems Encountered in Green Supply Chain Management Practices and Solutions

This section classifies the papers related to the problems and obstacles encountered in the implementation process of GSCM and the corresponding solutions.

**Table 3.** Literature on obstacles encountered in GSCM

| Title | Authors | Time | Obstacles to GSCM |
|---|---|---|---|
| Assessment of green supply chain management practices, performance, pressure and barriers amongst Indian manufacturer to achieve sustainable development | Kalpande and Toke | 2020 | The company's employees did not understand the importance of GSCM and the top management did not support it |
| Drivers and barriers in the adoption of green supply chain management in construction projects: A case of Indonesia | Naniek, Dyah and Theolisa | 2021 | Lack of green supply chain management experts and suppliers |
| Developing the structural model based on analyzing the relationship between the barriers of green supply chain management using TOPSIS approach | Lamba and Thareja | 2021 | Government policies, laws and regulations |
| Impact of Green Supply Chain Management (GSCM) on Business Performance and Environmental Sustainability: Case of a Developing Country | Rupa and Saif | 2022 | Defects in information technology, high cost of waste disposal, uncertainty and competition in the market, resistance to change among employees and opposition from top management |

Kalpande and Toke (2020) studied the GSCM practices of Indian companies and found that the employees did not understand the importance of GSCM, and the top managers gave very poor support to the implementation of GSCM, which was a major obstacle to the implementation of GSCM. Therefore, it is necessary to continuously publicize GSCM knowledge and strengthen employees' understanding of the importance of GSCM. In particular, senior managers should

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actively promote GSCM practices and encourage the use of environmentally friendly products and services. On this basis, Naniek, Dyah and Theolisa (2021) believe that in addition to employees' insufficient understanding of the impact of enterprise activities on the environment, the lack of GSCM experts and suppliers is also a factor hinders the implementation of GSCM. Therefore, decision-makers should train employees, focus on cultivating talents good at GSCM, and actively seek and select GSC suppliers. Lamba and Thareja (2021) confirmed the factors hindering the implementation of GSCM by using TOPSIS method and ranked their influence degree, and concluded that government policies, laws and regulations are the main factors hindering the effective implementation of GSCM.

In addition, Rupa and Saif (2022) believe that defects in information technology, high cost of waste disposal and market uncertainty and competition are all major obstacles to the GSCM practices. Therefore, enterprises should start from these aspects, improve the practice efficiency of GSCM and promote the sustainable development of enterprises.

## 6. Methodology

The resources used in this literature review were obtained by searching some keywords, such as green supply chain, green supply chain management, GSCM practices and enterprise performance on VU Library and Google Scholar, and referred to the peer-reviewed journal literature on GSCM from 2018 to 2022. Twenty-two articles were collected from Emerald, ScienceDirect, ProQuest, Springer and other databases.

## 7. Conclusion

Green supply chain management is an important method to improve the performance of enterprises and the efficiency of environmental management. Although it has not been proposed for a long time, it has been concerned and studied by the academic and business circles. GSCM not only has important strategic significance for enterprises to achieve the harmony and unity of economic profits, social benefits and environmental benefits, but also has a profound impact on the construction of ''resource-saving and environment-friendly' society. In the context of green economic globalization, GSC based on low energy consumption and low pollution will become a hot research direction of supply chain research in the future. By reducing emissions in supply chain and optimizing supply chain structure through various methods, sustainable development with low energy consumption and high profits will be finally achieved.

This paper makes a literature study on GSCM and introduces the research progress of GSCM at home and abroad, but there are still some limitations. First, because the search scope was limited to a few databases and journal articles published between 2018 and 2022, many papers were excluded, affecting the representativeness and universality of the study. In addition, this study searched relevant keywords to find literature from an objective perspective, which led to an inability to collect relevant literature comprehensively, resulting in incomplete and imperfect research results. Therefore, future research can use different databases and various channels to conduct further research and analysis on GSCM from more perspectives and directions.

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