

Green Supply Chain Management: A Review based on Functionality

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Abstract

The purpose of this paper is to review the relationships between environmental consciousness of the consumers and its effect on green purchasing, green operations and green marketing. It provides a classification based on functionalities in green supply chain management. Customers are today more and more environment-conscious and they want environment-friendly products. To this end, they influence purchasing, operations and marketing, thus resulting in green purchasing, green operations and green marketing. Reverse logistics is also an attempt to meet these needs. The paper reviews green purchasing, green operations and green marketing for the past twenty years and arrives at the conclusion that environmental consciousness has grown among consumers and they are willing to purchase environmentally-safe products.

Keywords: green supply chain management, green purchasing, green operations, green marketing, sustainability

Introduction

Green supply chain management refers to the use of green techniques at every area and every aspect in the supply chain. Green techniques can range from reducing wastages at each stage, using cleaner technologies to reverse logistics. Reverse logistics refers to a reverse channel for inventories compared to the forward direction. In the reverse direction, either returned products flow or scrap from the used products flow. Green supply chain management is a philosophy which has emerged in the last twenty to thirty years in a major way and several authors have come forward to define green supply chain management. Zhu and Sarkis (2004) claim that green supply chain management includes reverse logistics apart from including green purchasing, green operations and reducing wastages. Green supply chain management makes sure that the operations throughout the supply chain are sustainable.

In this paper, green supply chain management is considered in terms of five functional areas: green purchasing, green operations, green marketing and reverse logistics. Green purchasing refers to considering effects of purchasing activities on the environment. Green operations reduce wastages and use cleaner technologies in the operations process. Green marketing involves using green arguments and green techniques while marketing the products. Reverse Logistics refers to the reverse channel for inventory as discussed above.

Green Purchasing

Purchasing professionals are considering the inclusion of “green” aspects more and more in their purchasing activities (Min and Galle, 1997). Importance is given to suppliers who consider “green” aspects while selling like environmental impacts. Chen and Chung-Chiang (2004) claim that not many firms are adopting green purchasing despite its positive effect on business performance and productivity. A firm has to integrate the entire supply chain apart from its traditional operations activities like cost reduction, quality assurance, timely delivery, etc. According to Chen (2005), green purchasing is being seen as a means to bring competitive advantage for the organizations. The paper discusses the role of green purchasing and ISO 14000 for organizations in bringing about sustainable development. Day (2005) in her paper discusses the announcement of the European commission to encourage public authorities from smallest to national levels to procure “green”. The announcement indicates a handbook which explains in clear and non-technical terms how green criteria can be introduced in the public procurements.

Zhu and Geng (2006) discuss that green purchasing is important for large and medium scale organizations in China since it is relevant to marketing. Also, they include the following factors in green purchasing: (i) the framework of the organization (ii) the method used to select suppliers (iii) factors influencing selection of suppliers (iv) creation of supplier-buyer relationships. Lastly the paper also discusses the difficulties that could be faced by the organizations in implementing green purchasing. Zhu and Sarkis (2007) state that organizations facing environmental pressures generally adopted eco-design and green purchasing. Bin et al (2008) claim that green purchasing has an important effect on environmental performance of organizations. Based on a survey, the authors identify the main factors required for green purchasing. H'Mida (2009) says that environmental consciousness plays a crucial role in green purchasing decisions. According to Eltayeb and Zailani (2010), green purchasing is an environmentally-conscious activity which reduces wastages and also recycles and reuses inventory. The authors also discuss the drivers of green purchasing in the manufacturing industries in Malaysia. Bjorklund (2011) states that factors which are involved in green purchasing of products are different from those of green purchasing of services. Lin et al (2012) claim that environmental awareness of consumers has arisen and these consumers want to purchase green products. Vazifehdoust et al (2013) argue that attitude and intention positively influence green purchasing behaviour. According to Dagher and Itani (2014), consumers are increasingly involving themselves in green activities because of the perceived danger to the environment and atmosphere. Green purchasing is also one such activity. Ji et al (2015) consider a game theory model for green purchasing behaviour. They consider the behaviour of multiple stakeholders when going for supplier selection where recycling the products is considered as an important option for green purchasing. The study performed by Gonzalez-Benito et al (2016) finds that green purchasing improves purchasing performance and the effect is more pronounced in the presence of permanent alliances with suppliers. Seyrek and Gul (2017) analyze the factors influencing the green purchasing behaviour in Turkey and find that age and income level had an influence on the green purchasing behaviour, whereas gender did not play a part in it. The paper by Yook et al (2018) studies the effect of green purchasing capabilities: both operational capabilities and dynamic capabilities on firm performance and finds positive relationships between green purchasing capabilities and firm performance.

Sheng et al (2019) state that consumers have become more and more conscious of environmental harm done by fossil fuels and industrial wastes, and thus they are tending to adopt green purchasing. They also state that cultures have a significant role to play in adopting green purchasing. Sharma et al (2020) discuss green purchasing from a different perspective, that of the effect of green self-concept and green identity on green purchasing. They perform a path analysis and find a significant relationship in the mentioned constructs. Al-Swidi and Saleh (2021) through their study find that green purchasing is influenced by green social influence, green attitudes and green perceived behavioral control. The study by Yang et al (2022) reveals that coercive pressures by the suppliers towards adopting green purchasing decisions by the manufacturer will lead to more green purchasing decisions and the resulting positive operational performance as well as environmental performance. Khan et al (2023) study the impact of green capabilities on green purchasing behaviour and through structural equations modelling find positive relationships between the same.

Green Operations

Kleindorfer et al (2005) claim that operations management becomes more important by integrating green and sustainable operations, and closed loop supply chains in the same. According to Srivastava (2007) green operations refers to manufacturing and remanufacturing of products while reducing ecological burden by choosing the right material. While manufacturing refers to production for the first time, remanufacturing refers to manufacturing using recycled products. Nunes and Bennett (2008) describe the effect of modular production systems on green operations practices. They opine that modular production systems have a positive effect on green operations practices and environmental performance. Bergmiller and McCright (2009) claim that green operations with waste reducing techniques (WRT) have led to improved business results. The authors claim that lean operations also have led to improved business results. Nunes and Bennett (2010) are of the view that three major car manufacturers in the world adopt various green operations techniques. The paper investigates and benchmarks green operations initiatives in the automotive industry. Liu and Jiang (2011) are of the view that there is more scope for integration of environmental and social objectives into operations management. Nunes et al (2012) talk

about integrating green technology and operations management and the resulting sustainability benefits of triple bottom line. Agrawal and Ulku (2013) argue that modular design can be a very useful technique for reducing wastages and hence improving sustainability and green operations.

Gunasekaran et al (2014) review the sustainable operations management literature and also discuss operations management with their effect on both economic and environmental entities. Yu and Ramanathan (2015) through their paper put forth their view that stakeholder pressures for adopting green operations has a positive influence on the same and also has an influence on environmental performance. Jabbour et al (2016) find through their paper that internal barriers are more significant in determining the green operations practices than the external barriers. Liu et al (2017) study the effect of supply chain capabilities on green operations and also explore whether the mentioned relationship is contingent on corporate environmental proactivity. The study performed by Migdadi and Omari (2019) finds the following significant components of green operations: electrical power management, waste management and emissions management.

According to Migdadi (2020)'s study, the airlines industry adopts three taxonomies for the purpose of green operations: low-effect, low-to-moderate effect and high-effect strategic patterns. Oladimeji et al (2021) discuss that green operations are important for optimal usage of resources and sustainable management. The study by Hong et al (2022) makes an attempt to analyze interactive relationships between firm, regulator and consumer in attaining sustainable and green operations. Kitsis and Chen (2023) claim that environmental proactivity has a positive effect on green operations and collaboration with suppliers and customers mediates the above effect.

Green Marketing

The research paper by Fernandez and Bhandarkar (2004) explores green marketing concept and finds out how organizations can become more competitive by adopting green marketing strategies. The study by Jahdi (2006) claims that green marketing is a component of marketing ethics and marketing ethics itself is a component of corporate social responsibility. Camino (2007) studies the effect of stakeholders on green marketing and finds significant relationship of the effect of stakeholders on green marketing which in turn creates environmental performance for firms. According to Peattie (2008), the oil shock and the accidents that happened in the 1970's brought about the advent of green and ecological marketing which resulted in increased awareness of environmental issues. As a result, consumers were ready to adopt green products. Vaccaro (2009) uses innovation theory to design green marketing strategies to meet sustainability goals. He develops five hypotheses in his paper to relate green marketing strategies with competitive advantage and types of innovations.

Vermillion and Peart (2010) in his paper talks about the importance of persuasive communication for green marketing. According to Cronin et al (2011), green marketing is becoming increasingly more important for organizations for sustainability and the related effects. Sarkar (2012) explores the challenges and opportunities organizations have with respect to green marketing. He also explores the reason organizations are adopting green marketing and concludes that green marketing is something that will continuously keep growing. Choudhary and Gokarn (2013) argue that people are more concerned about the requirement of a good environment to live and hence organizations can capitalize on this requirement and employ green marketing. Arseculeratne and Yazdanifard (2014) are of the view that green marketing can act as a source of competitive advantage. Green marketing has benefited by a great way with the revival of environmental consciousness among customers.

Garg (2015) reveals that both there is concern for environment among both private-sector and public-sector companies. Both these entities believe that green marketing is relevant for sustainable development. Also, green marketing is used as a means to build customer trust. The study by Zhu and Sarkis (2016) makes an analysis on the number of papers present on green marketing with respect to China as there is growing pressure on Chinese companies for controlling their ecological footprints due to their heavy growth. According to Wahab (2018), consumers like to buy from organizations that are eco-friendly. Marketers are responsible for making the information about the green products reach the public. Papadas et al (2019) argue that organizations can fulfill

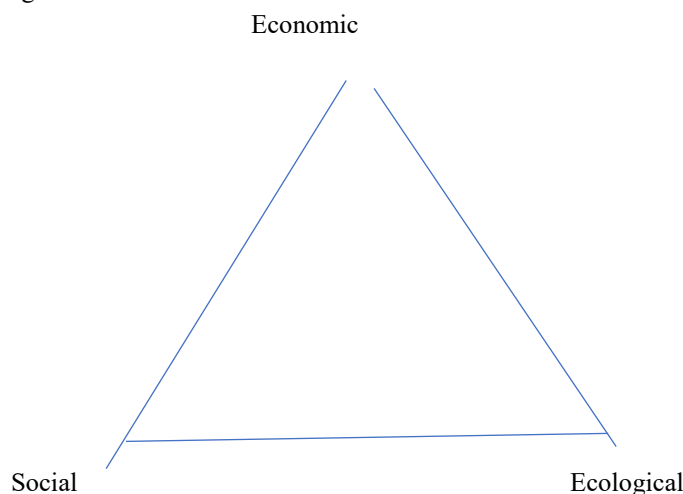
environmental performance and be competitive at the same time through green marketing. Green marketing has a positive influence on competitive advantage of a firm.

The paper by Mukonza et al (2021) explains how the concept of green marketing can be conceived and implemented in developing countries. It also claims that green marketing has gained prominence in the recent years due to the increased environmental consciousness. Sedky and Abdelraheem (2022) conduct a study on green marketing in emerging economies and conclude that customers can be encouraged to buy green products if they feel that such products are beneficial for their health. This has increasingly come from an environmental consciousness of the benefit of green marketing. The paper by Alkhatib et al (2023) provides valuable insights in decision-making and sustainability due to green marketing. It provides evidence from a review of the papers discussed during ten years from 2012 to 2022.

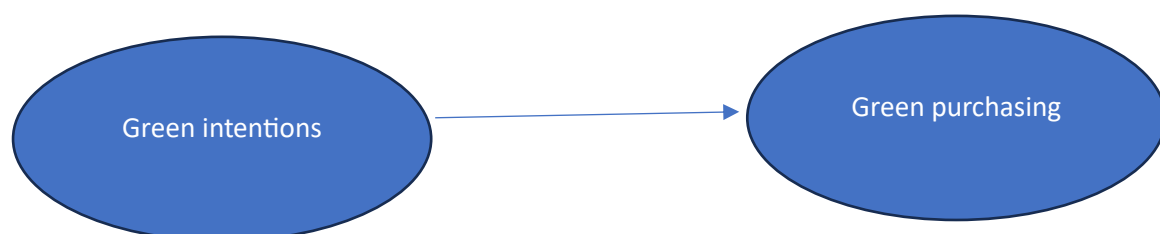
Reverse logistics provides for return of damaged goods and used inventory for reuse after remanufacturing. It is a measure towards preventing wastage of resources. It also contributes towards sustainability.

A framework of green intentions and green purchasing to green marketing

According to the authors discussed in the above sections, it is clear that the environmental consciousness has grown and people want to purchase green products. That is, the products should be beneficial to the health and should be environmentally safe. In other words, the products should be environmentally sustainable. Sustainability can be seen along three dimensions: economic, social and ecological. Any project or new activity should be beneficial along all these three dimensions.

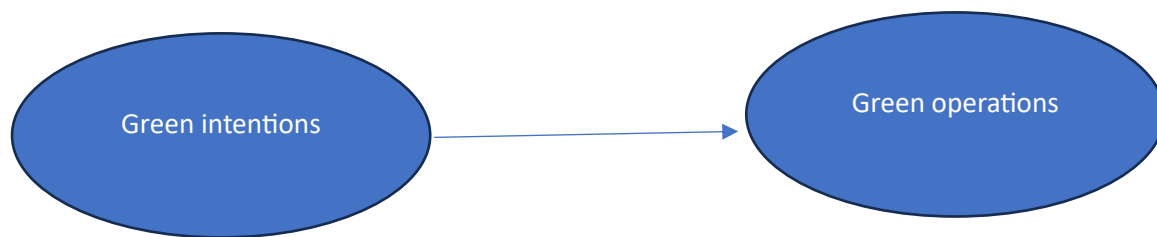


According to the authors, due to increased environmental consciousness, organizations are going for green purchasing which may involve avoiding hazardous substances and also reducing wastages. This has mainly emerged from the requirements of the customers at the other end of the supply chain who have become more environmentally conscious and are demanding cleaner and environmentally-safe products. It can be concluded that green intentions are leading to green purchasing.

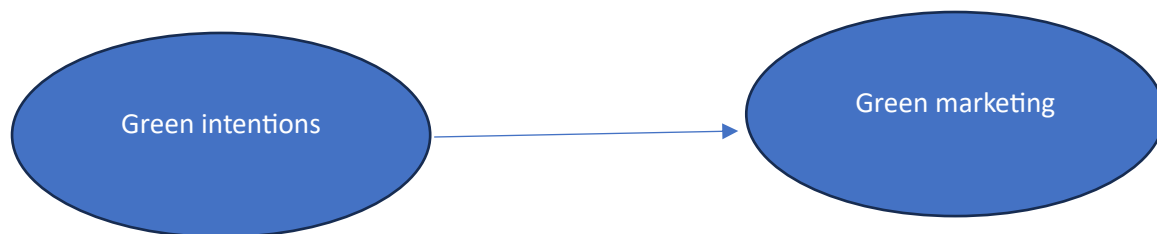


It can also be said that operations have been made green due to the requirements of the customers. According to the authors discussed in the above sections of the paper, consumers have now become more environment-

conscious and as a result, they require products are produced in an environment-friendly way. The discussions can be summed thus as in the below diagram.



Due to the increased consciousness of the consumers about the environment, the organizations are now adopting environment-friendly arguments in their marketing efforts thus contributing to green marketing. Thus, the relationship can be summed up in this manner.



Conclusion

Consumers today, are more conscious of the environment and demanding green products which are beneficial for their health and environmentally-safe. Therefore, there is need for environment-friendly processes and organizations adopting such processes are gaining prominence in the market. To address the concerns of the consumers, green supply chain management performance measurement tools could be introduced (Hervani et al, 2005). This could effectively measure how well the organization and the entire supply chain is performing with respect to green performance. Tseng et al (2019) find that there is a great growth in the number of research papers published in the area of green supply chain management after 2010. This indicates a growing interest in the area among the public during this time. According to Zhu et al (2005), green supply chain management has emerged as an important factor for environmental sustainability for the organizations.

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