

Firm's Obstructions on the Way to a Green Supply Chain

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Abstract

This report focuses on the area of Green Supply Chain. The purpose is to investigate which main barriers that firms and supply chains encounter in their work towards an environmentally responsive supply chain. The articles were used to find connections and similarities to get a result and draw conclusions. The result is divided into two main headings: internal and external barriers. The primary internal barriers are resources and technical issues. The barrier that consists of resources is divided into financial resources and resources in the form of competence. The primary external barriers are suppliers, regulations, and competitiveness, and consumers. Finally, a conclusion was made that there is a possibility for companies to change potential barriers to drivers and enhance their competitive advantage while having a sustainable supply chain.

Keywords

Supply Chain Management, Green Supply Chain, Barriers, Drivers

1. Introduction

In recent decades, environmental sustainability has become an important topic and issue, not only to companies but also to consumers and governments. Within sustainability, there are three main perspectives: environmental, economic, and social, where environmental sustainability focuses on how to minimize the negative impact on the environment by, for example, reducing emissions (Wisner et al. 2019).

Companies use different methods and approaches to satisfy consumers and comply with regulations, for example, by attempting to establish a sustainable or green supply chain. One approach to this is Green Supply Chain Management (GSCM), which is an adaptation of supply chain management, where the focus lies on being environmentally sustainable, or "green" (Dhull and Narwal 2016). Furthermore, by having a well-developed GSCM, environmental accountability can be spread along the entire supply chain. Moreover, also encourage environmentally beneficial practices and help reduce the negative effect on the environment. Nevertheless, the main goal of a GSCM is to adequately form a policy that cultivates environmental practices and works for the entire supply chain (Wisner et al. 2019). There is also Sustainable Supply Chain Management (SSCM), which is similar to GSCM, but instead focuses on all three aspects within sustainability (environmental, economic, and social) (Sajjad et al. 2015). Both of these adaptations involve the entire supply chain, from the choice of suppliers and materials to packaging and transportation options. However, within industries such as the textile industry, this has not always been the main priority since the focus has been on creating products with the right quality and at the right cost, which often results in choices that are not environmentally friendly. Nevertheless, recently, companies have discovered that making decisions in favor of the environment can lead to a competitive advantage. This is due to the fact that it is becoming more and more important from a consumer perspective to purchase products with a less negative environmental impact (Majumdar and Sinha 2018).

When doing research on companies that are going green, or simply the process of becoming environmentally sustainable, there tends to be more focus on the positive aspects, the drivers. These are different factors that motivate

the choice of developing a green supply chain and minimizing adverse environmental effects. However, there aren't only positive aspects from a company perspective. There are also barriers that have to be taken into account when developing a sustainable business. These barriers are different factors that can complicate and sometimes even result in not going through with an implementation of an environmental supply chain (Dhull and Narwal 2016). Depending on which industry, the drivers and barriers can vary, and they can also be placed into different categories. One common way to categorize the drivers and barriers is internal and external, where the internal could include management engagement and costs, while the external could include government regulations and customer demand (Sajjad et al. 2015).

This work will conceptually explore the different barriers that commonly occur within producing companies, both internal and external. This was studied within both GSCM and SSCM since both focus on becoming environmentally sustainable. Therefore, these two terms will be interchanged throughout the report. To make sure that the outcome is accurate and relevant, we chose to use peer-reviewed articles that were published after 2010. These articles were then studied and compared to see what conclusions could be taken when it comes to barriers to an environmentally sustainable supply chain. However, it is important to consider the fact that the given results are based on a limited number of articles, and if others or more had been used different results might have been acquired. Therefore, it is difficult to generalize the results since it may vary in different industries. The research question we had in focus was: What are the main obstructions that firms encounter in their work towards a greener supply chain?

2. Obstruction Analysis

Components of figure 1 are discussed in this paper.

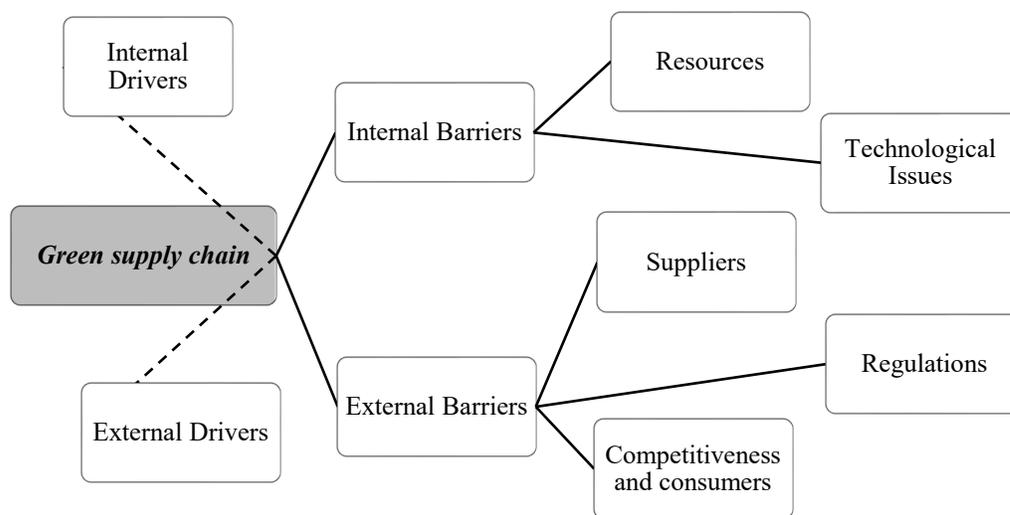


Figure 1. Obstructions of green supply chain

2.1 Internal Barriers

In this conceptual study, the internal barriers refer to the influencing factors found within the main company and its associated supply chain. It is important to be aware that the barriers can differ from different types of industries and also that some of the influential factors can be considered both as barriers and drivers depending on the context and circumstances. Based on seven scientific articles, the most recurring internal barriers can be divided into two main categories, which are Resources and Technological issues. To begin with, the issue of an environmentally sustainable supply chain is a big challenge, especially for complex supply chains with many suppliers located in different locations around the globe (Sajjad et al. 2015). The complex supply chains can cause a lack of collaboration among the supply chain partners (Tumpa et al. 2019). Despite the communication and collaboration challenges that a dispersed supply chain causes, it also complicates the possibilities to measure environmental standards which in turn leads to the lack of a reward system for the suppliers. The challenges continue to become even more complex as today's markets move

towards becoming increasingly dynamic, which in turn places high demands on flexibility (Majumdar and Sinha 2018).

2.1.1 Resources

The first internal factor that seems to be extremely important to develop an environmentally sustainable supply chain is several types of internal resources, and especially two types of resources seem to be most crucial. The first one is resources in the form of employees with well-adapted education related to environmental sustainability and SSCM. The degree of education and knowledge about environmental sustainability in combination with the company's access to employees with the right attitude and commitment is one of the most important factors (Carter and Rogers 2008). This is a recurring barrier in several of the articles included in this study, e.g., it is also found in the article written by Dhull and Narwal (2015). In this article, two of the internal barriers can be considered as related to education and knowledge within environmental sustainability; these barriers are "Lack of training" and "Lack of understanding to incorporate green buying."

Overall, pursuing a reorganization or making changes within a company or even through an entire supply chain is challenging. Driving green and environmentally related changes requires proper and prior knowledge; prior experience is also preferable or even required as this work is challenging and complex to work with. The second one is the financial resources since the work towards a greener supply chain often requires high investments, and in addition, it is difficult to measure the actual benefits of the specific investments (Perotti et al. 2015). The financial resources of the company and supplier partners throughout the supply chain are thus a decisive factor in the development of GSCM. According to Dhull and Narwal (2015), in US firms, the cost of environmental aspects is a hindrance for employing these aspects in mainly the purchasing process of the supply chain. This indicates that up to this day, companies continue to be profit-driven in the first place, and therefore profits are often considered before the environmental sustainability aspect. And as already mentioned, the work towards a green supply chain often relates to high investment and low economic benefits in the short period of time (Majumdar and Sinha 2018).

What actually seems to drive companies and supply chains to apply green methods are mainly external factors. These are, for example, laws and regulations and increased customer awareness. The increased customer awareness forces the companies actually to make a change to stay competitive.

2.1.2 Technological issues

The other major internal barrier is technical issues. This means that companies seem to have difficulty applying and implementing the development of more advanced technology in the work towards a greener supply chain. The technical barrier can be an obstacle in several different ways, both from a production technical perspective but also from an information system perspective. The importance of a well-functioning information system has become increasingly important with the increasing degree of outsourcing, not only of manufacturing activities but also of executive activities. Without a well-functioning exchange of information between the parties, it will be challenging to keep track of and follow up the supply chain and make sure that it is environmentally sustainable (Govindan et al. 2012).

In one of the included articles in this work, the technological hindrance seems to mostly concern small to medium-sized companies, that these companies are reluctant to implement advanced technology in their way of working (Dhull and Narwal 2015). The technical part of the supply chain is a vital part in the way to develop a GSCM. This is because without a proper and well-adapted technology, it will be very difficult or even impossible to adapt some of the important green methods, such as reverse logistics or effective environmental measures (Govindan et al. 2012). According to Govindan et al. (2012), the explanation for the technique to be a major hindrance is that it requires constant updates on new trends and technology since it is a constantly changing area that needs new technical resources. A more specific example of this is India, the lack of adequate technology training is a major obstacle. Furthermore, the complexity of the design of the product/products is also obstetrically related to the technology, since a complex product design is often related to a lesser degree of flexibility and can be difficult to adapt to new technological innovations.

2.1.3 Internal drivers

The internal drivers are the pushing factors that drive companies to adopt GSCM practices; the drivers that come from within the organization are known as internal drivers. However, it seems that barriers and drivers have a strong connection. There are some indications that several barriers can also be considered drivers (Dhull and Narwal 2016); This is probably heavily dependent on the industry. One quintessential factor that forces companies to work towards a more environmentally sustainable supply chain is an increased customer awareness, which forces companies to take

their environmental responsibility to stay competitive. In some industries, the increased customer awareness seems to be required since this forces the companies actually to make a change to remain competitive (Perotti et al. 2015). Lately, international standardizations and certifications, such as ISO 14 000, have gained much popularity within the global supply chain management. These certifications are international standards for environmental sustainability within companies and supply chains (Wisner et al. 2019). In other words, a certification in one of the standards related to the environment can be very profitable by marketing that their business and operations are meeting the international environmental standards. The standardization covers all from the design of the product to the choice of raw materials and ensures the possibility of recycling the products. In that way, it enables a circular economy, which is beneficial both financially and environmentally (Wisner et al. 2019).

2.2 External Barriers

One segment of barriers of SSCM found in the literature could be described as external barriers; External barriers can be defined as barriers that have an origin outside the company. The external barriers can then be divided into smaller segments, e.g., external barriers concerning customers, suppliers, or governments. External barriers can be difficult for the company to overcome just because they are coming from outside the company, and it can be hard to have any influence over the barriers and how to overcome them (Rauer and Kaufmann 2015).

2.2.1 Suppliers

A set of external barriers found in the literature has to do with the suppliers and their willingness to change to more sustainable manufacturing. To have a sustainable supply chain, the suppliers also need to have a sustainable way of producing and manufacturing the goods. One crucial barrier seems to be the lack of information sharing between the different parties in a supply chain. This is illustrated in a study by Tumpa et al. (2019) that found that complex supply chains can make the collaboration between different parties in the chain act as an essential barrier for implementing a GSCM. Tumpa et al. (2019) also mention that the producer responsibility can act as a barrier, proving that it can be hard to pinpoint who has the responsibility to act towards making the collaboration better between the parties in the chain. Moreover, this could make it hard to act as one cohesive chain instead of individual parts. A similar thing is also brought up by Panigrahi and Rao (2018); they mean that one barrier is that it is difficult to measure how different suppliers adapt to environmental standards. It may indicate that it can be hard to measure that the environmental standards are equivalent between suppliers throughout the chain. This could be connected to what Tumpa et al. (2019) discussed with collaboration problems between suppliers under complex chains—suggesting that an important tool to overcome barriers concerning suppliers is adequate communication between parties.

Another vital barrier regarding suppliers is brought up by Perotti et al. (2015), that suppliers do not always seem to have a great interest in green products. Perhaps this could be due to the barrier Majumdar and Sinha (2018) found that there is an absence of incentives or rewards for the suppliers to adapt to a more sustainable supply chain. There is also the problem of lack of knowledge (Oelze 2017); do they have adequate knowledge to change. All these underlying problems may lead to an essential barrier that Sajjad et al. (2015) brought up, the issue of there not being enough suppliers; alternatively, that the commitment from the suppliers is low (Dhull and Narwal 2016). There also seem to exist barriers that have to do with the material used in the production. Majumdar and Sinha (2018) mean that one problem can be the lack of green materials, e.g., as for in the textile industry, there are enough sustainable raw materials. Can the demand be filled by the supply of green materials such as, e.g., organic cotton? Another barrier aspect of a more sustainable supply chain is that of the cost of green material and packaging (Dhull and Narwal 2016), that suppliers may have higher prices for green material (Sajjad et al. 2015).

2.2.2 Regulations

One prominent segment of external barriers seems to do with authorities and regulations. The results indicate that governments and other authorities have an essential role in the existing barriers to why the implementation of a sustainable supply chain can be problematic. According to a study by Majumdar and Sinha (2018) on small and medium enterprises in the clothing industry in India, one of the most critical barriers to why it is hard to change to a more GSCM is the lack of support given by the authorities that are in charge of the regulations. Also, Oelze (2017) shows that regulations by themselves are an essential external barrier within the textile industry. A similar result is shown by Panigrahi and Rao (2018), where they indicate that one vital barrier is the government's absence of rules and regulations regarding sustainable manufacturing and supply chains. Tumpa et al. (2019) also points out the importance of clear rules, regulations, and laws in connection with the implementation of a sustainable supply chain but also that the importance of incentives and encouragement coming from the government (Tumpa et al. 2019). Besides that, abstains of support from authorities (Dhull and Narwal 2016) and clear leadership from the government

(Sajjad et al. 2015). According to Dhull and Narwal (2016), a dearth of corporate social responsibility (CSR) and ethical standards also act as barriers. This shows that authorities' clear rules and regulations could perhaps be one of the more critical countermeasures against not implementing a more sustainable supply chain.

Other barriers that maybe could be linked to the authorities are increased costs for the disposal of hazardous waste in connection with manufacturing (Panigrahi and Rao 2018). However, also the likely cost of the infrastructure development that may be needed to achieve a more sustainable supply chain (ibid.). There are further barriers concerning regulations than those created by authorities; one such barrier is that it can be challenging to know how to measure environmental standards (Panigrahi and Rao 2018). This could be interpreted as that it can be hard to establish a standard of what counts as environmental both inside and outside the company. However, Majumdar and Sinha (2018) further discuss the barrier that the lack of flexibility when one switches over to more sustainable processes may cause companies not to choose to go with a greener chain.

2.2.3 Competitiveness and consumers

The third segment of external barriers that was found has to do with competitiveness and customers. In the study by Majumdar and Sinha (2018), it was found that one significant barrier was the abstains of support coming from consumers, where they found that customers were not believed to support companies in the transaction to a GSCM. Furthermore, customers' interest in green products seems to be relatively low (Perotti et al. 2015). This can perhaps be due to one of the barriers Tumpa et al. (2019) mention, that lack of customer awareness was the reason for that green textile products had a low demand (Tumpa et al. 2019). Furthermore, it may make it less attractive for the manufacturing companies to produce, possibly causing a lack of demand and awareness in customers, a vital barrier for adapting a SSCM. This is also supported by Majumdar and Sinha (2018) findings which showed that the uncertainty of green products acts as a crucial barrier. Panigrahi and Rao (2018) also mention another barrier that has to do with customer satisfaction, and moreover the importance of capability to be able to deliver the products (Sajjad et al. 2015). So, it seems essential that the more sustainable products or services need to be equal in customer satisfaction compared to the prior product so that the company does not lose customers due to dissatisfaction. Another barrier that is important is the pressure of being able to compete with competitors (Oelze 2017) and being able to handle market competition and uncertainty (Majumdar and Sinha 2018).

2.2.4 External drivers

In several of the included studies, it could be noticed that some of the barriers also can act as drivers, depending on what industry, company, and specific situation. Below these can be explored within the same fields as the ones mentioned regarding the external barriers. When it comes to the segment regarding suppliers, the relationship between a company and its suppliers does not have to indicate complications due to sustainability. According to Dhull and Narwal (2016), a high-grade collaboration with suppliers can act as a driver for the implementation of green practices. This can be both between the focal company and supplier, as well as between different suppliers. This is supported by Oelze (2017), who emphasizes the importance of trust and transparency in a supplier relationship when trying to achieve a sustainable supply chain.

Concerning the section of barriers due to regulations, there are also those that can act as drivers. For example, contrary to what has been mentioned previously regarding barriers, Dhull and Narwal (2016) discuss the positive effects that government regulations may have regarding the implementation of a sustainable supply chain. They argue that certain types of regulations, in many cases, are the main driver. However, this can, in some cases, be forced upon companies, which then might be seen as less positive from their standpoint. However, Bey et al. (2013) illustrate that regulations often are a driver, not only regarding the implementation but also regarding maintaining a sustainable supply chain. When it comes to competitiveness and customers, it can be seen in the research done by Perotti et al. (2015) that one of the most critical factors for many companies is to be perceived as green. Dhull and Narwall (2016) also argue that the competition between core competitors actually can motivate sustainability practices as it pushes the companies towards becoming greener. They also mention that consumers play a vital role since they put pressure on companies to produce products that are environmentally friendly. This is supported by Bey et al. (2013), who discovered that customer demand was one of the most influential factors regarding the implementation of a green supply chain.

6. Conclusion

Based on the different articles used in this work it was noticed that most of the barriers were recurring throughout the articles and could be found across different industries. And even though they can be divided into internal and external, some of them can occur within both categories. What could be detected is that one major internal barrier is the lack of resources, which relates to both physical and financial. This is often due to a short-term perspective where the high

costs of investments as well as the low economic benefits are put in focus. Here it is important for companies to see the implementation of an environmentally sustainable supply chain as a long-term investment instead, since it most likely will benefit the company in the long run due to consumer satisfaction. However, it was also noticed that consumers can act as a barrier when there is a low interest in green products. This derives from the fact that consumers want the same products and services as they have known since before, and therefore the consumers might be unwilling to stick with a company who is going green. For this reason, it is essential to be transparent and informative as a company. Another conclusion based on the result is that the barriers have certain connections and affect each other, for example if the customer awareness is raised there may be a greater chance that rules and regulations will change to be more strict and thereby making it necessary for firms to implement GSCM. This in turn can have the opposite effect since laws and regulations can help more consumers become aware of the meaning and importance of consuming sustainably, which then puts pressure on companies to deliver what the customers want in order to increase the demand and thereby maintain competitiveness. However, to overcome some of the external barriers concerning government and regulations, it seems necessary that the government and agencies support and promote green supply chains by, e.g., setting stricter environmental regulations or changing laws. Moreover, these changes may pull or force companies to change to stay in the market. Also, the competition between various companies can act as a barrier by hindering change due to fear of losing customers. However, if the customers ask for greener products, the competition can be reversed into a driver, driving and pushing companies to change to stay competitive on the market.

Another barrier that was found common is supplier compliance, as well as the information sharing between different parties. In order for a company to become fully sustainable, so do its partners. And this can become a problem when suppliers do not live up to the focal company's sustainability guidelines. There can be several reasons for this, but by creating strong relationships and upholding good communication, there is a possibility that this can be avoided. To manage this, technology and information systems play an important role, and for some companies, this can act as a barrier. Without sufficient technology there is a risk of poor supplier relationships which in its turn can lead to competitive disadvantages. It is known that consumer satisfaction plays a significant role in achieving competitive advantages, and therefore it is of great importance to increase the consumer awareness regarding sustainability since they are the gateway to a profit-driven company. From the different reasonings mentioned there can be a conclusion made that there is a possibility for companies to change potential barriers to drivers and enhance their competitive advantage while having a sustainable supply chain.

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