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Green Supply Chain Management in the Context of Sustainability

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A BST R AC T

For centuries, humanity has seen nature as an unlimited resource, despised it, they polluted it. Hence, that caused environmental problems. On the one hand, the rapidly increasing population phenomenon, the existence of natural resources that are running out has made it necessary to seek new solutions for humanity. The solution put forward in this framework is the understanding of sustainable development, which can be summarized as ensuring that natural resources are transferred to future generations without completely consuming them. The priority in sustainable development approach has been the sustainability of the natural environment. With the increasing awareness of the international community and states, production systems and processes are revised and transition to green practices that will minimize environmental damage has rapidly gained importance. A traditional supply chain is a one-way process that involves production-related activities from raw material procurement to delivery of the final product. Due to environmental requirements affecting production operations today, an increasing emphasis is placed on the development of environmental management strategies for the supply chain. In this study, green approaches, and green supply chain management (GSCM) are considered conceptually, and the green activities implemented and the obstacles in front of them are evaluated. A general perspective is put forward to ensure and maintain the green supply chain.

Keywords: Sustainability, Green applications, Green supply chain management, GSCM, Sustainable Development

1 Introduction

The concept of sustainability was first included in the World Charter of Nature approved by International Union for Conservation of Natural Life and Natural Resources in 1982 (Kassas, 1983). Sustainability is a multidimensional, complex concept that contains many elements. It means the balanced and planned use of resources before they reach the point of exhaustion and the possibility of self-renewal is eliminated. Societies have now taken a stand against population growth and the increasing overconsumption of natural resources, realizing that there is a limit to the consumption of the environment and growth. Excessive and unconscious consumption, which is one of the most important habits of today, has made it necessary to establish a balance between growth, environment, and human needs. For this reason, sustainability is not a desired goal; on the contrary, it is a search process in terms of social security.

Similar to sustainability, sustainable development (SD) was introduced in 1980 with the “World Conservation Strategy (WCS)” which gained popularity with the "Brundland Report" (Brundtland et al., 1987). In that report, SD is defined as “meeting the needs of today without compromising the ability of future generations to

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meet their own needs". SD has different meanings in different countries and non-governmental organizations. While developed countries regard sustainable development primarily as the protection of the environment, it means the continuation of development to reduce famine and reach a modern society structure for developing countries. In its most general definition, SD will satisfy the economic, social, and aesthetic needs of the people and tourists in the region where cultural integrity, environmental processes, biodiversity, and life-sustaining systems are maintained, and at the same time, all resources will satisfy the economic, social and aesthetic needs of the people and tourists in the region, by protecting the environment with or without human interaction from deterioration or change. It is a development that is managed in a way that the future generations can meet the same needs. It has become evident as a standard by many sectors today, and the processes that make up economic activities and their management must be reconsidered. Undoubtedly, as well as the approaches of the developed world states on the subject, the increased sensitivity of the consumers, who are in the last ring as customers, has also encouraged the transformation. Thus, it has become important for businesses to adopt the understanding of environmental awareness in the process starting from the raw material procurement stage required to produce goods and services to sales and after-sales services (Gungor and Gupta, 1999; Vachon and Klassen, 2006; Zhu et al., 2007).

When we look at the green management approaches based on sustainability, it is seen that generally three strategies come to the fore (Kopicki et al., 1993). These are reactive, proactive and value creating approaches. Green practices that prioritize the environment are minimal in companies that adopt a reactive approach. Companies start purchasing products that are partially suitable for recycling, green labeling and using filters to reduce the environmental damage of production. Naturally, most of these measures can also be considered as an effort to fulfill the conditions laid down by official legislation. Proactive approach, on the other hand, includes practices stemming from the businesses that want to gain advantage over their competitors with SD. In this approach, environmental problems are not seen as problems that need to be solved after they arise, but as problems that need to be taken before they occur. An example of this approach is that companies design their products to be reusable and recyclable. Companies that adopt the most comprehensive approach, value creating approaches, integrate green activities directly into their business strategies, declare the environmental decisions they take regarding processes and share them with all partners in the supply chain. As can be understood, in this approach, all processes are managed in the context of a strategy that puts the environment in the foreground. Table 1 provides more detailed features of these green management approaches (Van Hoek, 1999).

The basic ideology behind the green is to increase environmental sustainability. However, today, companies tend to this concept with an approach such as "hitting two birds with one stone". With green approaches, it is possible to reduce environmental pollution and reduce production costs. Increasing customer satisfaction, giving a positive image, reputation, and increasing the preference of products in the country's markets where the environmentalist approach is rapidly increasing, are among the main benefits that we can count with green approaches (Khan and Qianli, 2017). Green approach is known in the context of environmental sustainability; Corporate social responsibility is constantly expanding with some innovations and techniques such as green production, waste reduction, recycling and re-production, sustainable/environmentally friendly supply chain, and GSCM.

This study brings together the important features of GSCM and SD that can be considered together to aid supply chain managers and researchers. Firstly, it identifies the main concepts of GSCM and SD and reveals obstacles related to GSCM transition by talking about the advantages and disadvantages. The decision for the transition to the GSCM will be dependent on those advantages and disadvantages. This paper begins with an introduction section in which relevant issues to GSCM and SD are presented in general. In the second section, GSCM concepts, activities, success factors and barriers are given. As a conclusion, discussions on the topic are summarized in the discussion and conclusions section.

2 Green Supply Chain Management

Today's technological developments, globalization and the blurring of borders and the change in the needs of customers have brought with it an unprecedented difficulty in competition conditions. Customers all over the world have become a potential target with the production getting out of the national and narrow frame over time and gaining an international dimension. Now, companies have begun to give more importance to determining different strategies and to cooperating with all their stakeholders in the supply chain to survive and develop in a challenging competitive environment. Supply chain, as a concept that reveals how interconnected businesses are with each other, is a process formed by all activities, systems and people involved in the process from the supply of raw materials to the formation of the product, reaching the customer, maintenance, disposal, or recycling of waste generated from the product. Cooperation of enterprises in the supply chain to strengthen their strategic positions and improve their business activities is called "supply chain management" (M. Bixby Cooper

Donald Bowersox, 2005). Production logistics marketing etc. in supply chain management. It is possible to see this integrated structure in which functions and all stakeholders in the process are integrated in Figure 1.

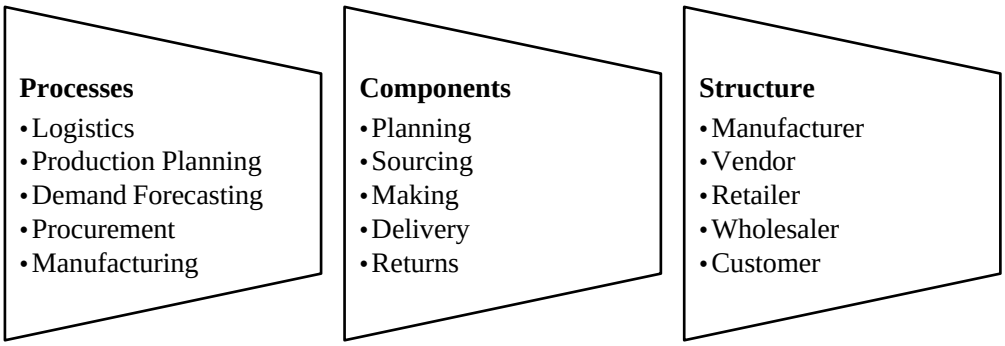

Figure 1. Integration of Supply Chain (Lambert & Cooper, 2000)

The term green supply chain refers to the integration of sustainable environmental processes into the traditional supply chain structure. The green supply chain includes processes such as purchasing the material by selecting the supplier, product design, manufacturing and assembly of the product, distribution and management of the material that completes its life cycle. The green supply chain requires not reducing the harmful effects of business and supply chain operations but creating added value or creating value through operations in the whole chain. The main goal of the green supply chain is undeniably to reduce air, water, and waste pollution. However, thanks to green operations, the performance of companies in producing less waste, reusing, and recycling products, decreasing production costs, efficient use of resources, creating a good image and more customer satisfaction.

If the GSCM is compared with the traditional supply chain, it is seen that it has three distinct features which are being green, closed loop and integration (Wang Shuwang et al., 2005). GSCM, which basically addresses the supply chain theory and the green approaches we have previously discussed, is a modern management model that comprehensively increases resource efficiency throughout the supply chain and reduces environmental impact (Tajbakhsh and Hassini, 2015).

As can be seen in Figure 2, while businesses have access to many advantages with GSCM, the disadvantages of green applications are quite few like increase in raw material costs, trial costs, and investment amount.

Developing GSCM policies may add some advantages to the companies as follows (Çapan, 2008):

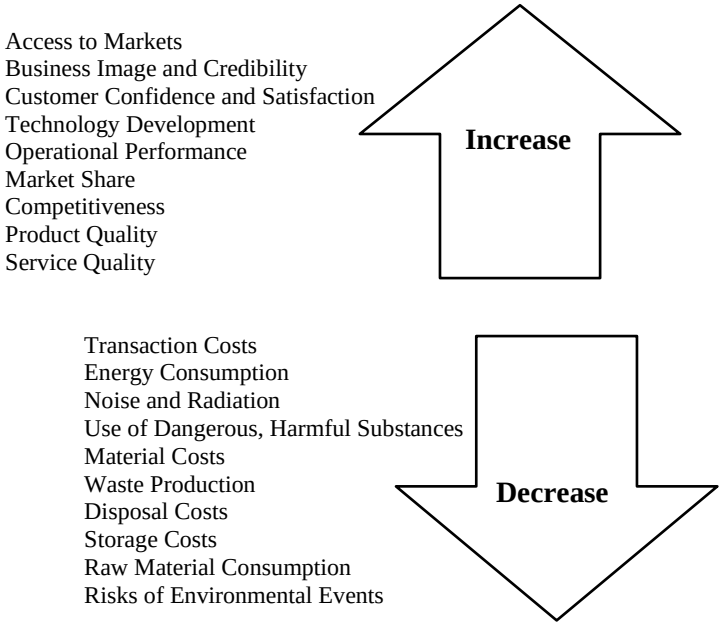

Figure 2. Main advantages of GSCM (Çapan, 2008)

2.1 Green Supply Chain Management Activities

Today, companies have increased their own productivity as well as providing better environmental growth in their business and supply chain activities with the many green practices they have adopted. Some of the green practices well known as green trade chain management activities are given in Figure 3.

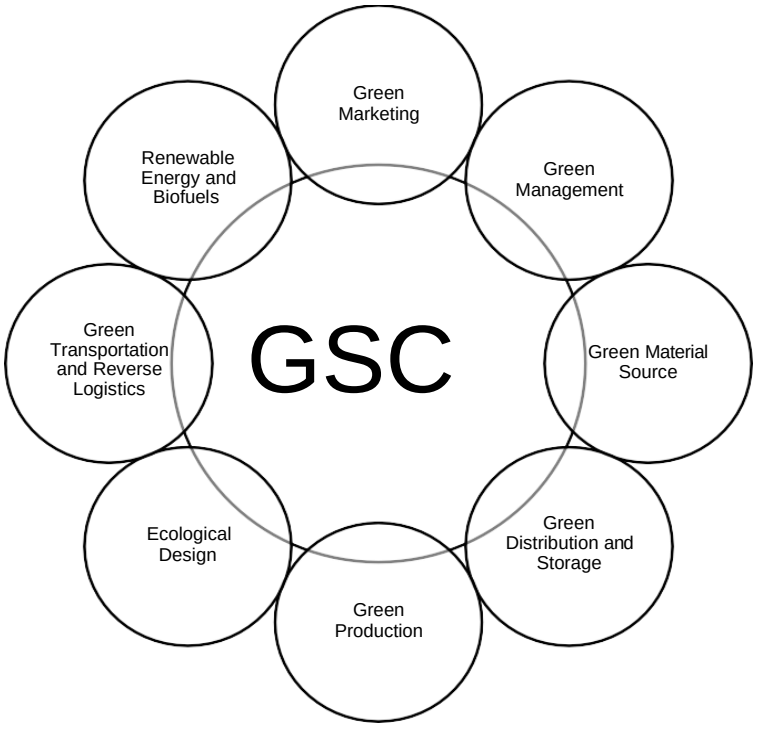

Figure 3. GSCM Activities (Saada, 2020)

2.1.1 Green Material Source

The use of green resources means the procurement or purchase of reusable, recyclable, hazardous and hazardous chemicals and components (Eltayeb et al., 2011). This stage in GSCM is also called "green purchasing". More concerns about environmental protection in society have encouraged purchasing experts to reconsider the impact of existing resources and purchasing strategies on environmental sustainability (Govindan et al., 2015; Handfield et al., 2002). At this stage, the most important role of environmentally friendly purchasing is to include recycling and re-production in the process. It improves recycling of green sourcing, reproduction and other activities in the supply chain that support waste reduction (Min and Galle, 2001).

Carter and Rogers (2008), who investigated the effect of green resource use on the environmental and financial performance of companies, concluded that the green purchasing strategy successfully adopted reduced production costs and increased both environmental and financial performance of companies thanks to the positive reputation achieved in the market. Again, Zailani et al. (2015) emphasize that environmentally friendly purchasing has a positive relationship with the operational and environmental performance of companies.

Confirming that green purchasing improves the overall performance of firms, Yang et al. (2010) divided green purchasing into five main directions: design operations management, supply chain management, environmental documentation, ecological and external environmental management. The adoption of green purchasing in the supply chain and business operations is a reliable means of reducing waste, air, and water pollution.

2.1.2 Green Marketing

Green marketing includes a wide variety of marketing activities (planning, production, process, price, incentives, after- sales, etc.) designed to demonstrate the goal of reducing the harmful effects of the organization's products in actions towards all components and consumers (Groening et al., 2018). In green marketing practice, products with environmentally friendly features are encouraged. Activities that support people's environmental concerns and desires about the environment and that will affect this least negatively are carried out. In addition, green marketing increases the competitive power, financial and environmental performance of companies by creating a positive corporate reputation and image (Chen et al., 2012; Ko et al.,

2013).

2.1.3 Green Management

Green management practices offer supportive information resources to a firm that can achieve its business and environmental goals (Pane Haden et al., 2009). The adoption of green management practices helps improve the image of the company, increase efficiency, improve environmental compliance, save costs, ensure social commitment, and reduce carbon emissions, etc. (Kang et al., 2010; Luthra et al., 2016).

2.1.4 Green Distribution and Storage

Green distribution and storage reduce waste and plays an important role in reducing energy consumption. The added value of green products in storage significantly improves the overall performance of the organization by creating a better corporate image (Rehman Khan et al., 2018). Green distribution has an important contribution to the superior financial and environmental performance of businesses (Baines et al., 2012).

2.1.5 Green Production

Green production is the design and development of production activities in a way that minimizes waste, energy, and raw material consumption by using inputs that minimize environmental damages at all stages of production activities. Effective and efficient use of new environmental technologies and production inputs is the evaluation of recycling, reproduction, and reuse opportunities (Gungor and Gupta, 1999; Menzel et al., 2010; Sarkis, 2003; Sarkis and Rasheed, 1995). The main purpose is to design environmentally friendly production systems and to prevent possible environmental damages because of production activities (Ninlawan, 2010).

2.1.6 Ecological Design

Luthra et al. (2016) emphasized that by adopting ecological/green design in supply chain management, product and process-related environmental impacts can be controlled by 80%. It includes ideas such as ecological design, cleaner technology processes, using green raw materials and components (Eltayeb et al., 2011; Gungor and Gupta, 1999). The green design of the products reduces the ecological impact they will cause throughout their lifecycle, not only helps companies improve their environmental performance by supporting the reuse, recycling and re-production of products, but also provides the opportunity to reduce their costs(Khan and Qianli, 2017).

2.1.7 Green Transportation and Reverse Logistics

For a supply chain to be defined as green, it must include reverse logistics issues, which is also the phenomenon that turns supply chain management into a closed loop (Sarkis, 1999). Green transportation and reverse logistics applications provide organizations with the opportunity to improve their image and reduce their costs (Rehman Khan et al., 2018). By increasing the efficiency of the transportation system, general logistics costs can be saved, and more profitability can be achieved by improving customer partnership (Luthra et al., 2016). Integrated logistics activities with rehabilitation (reinstatement) include reverse logistics (reuse, recycling, and re-production) that can produce products that can be reused for customers (Eltayeb et al., 2011). Green logistics helps companies reduce their environmental impact with better quality and lower costs.

2.1.8 Renewable Energy and Biofuels

Global logistics and supply chain operations undoubtedly depend mainly on energy and naturally using fossil fuels, which are the main cause of climate change, global warming, and pollution due to carbon and greenhouse gas emissions (Rehman Khan et al., 2018). In this respect, it is necessary to use renewable energy sources and biofuels in supply chain operations for sustainable development (Wu and Barnes, 2016). Renewable energy sources and the use of biofuels both improve the economic performance of companies while reducing carbon emissions. Today, businesses that prioritize activities aimed at reducing carbon footprint create a good image and provide competitive advantage by being preferred by conscious consumers. Some steps taken by the world states regarding sustainable development also legally force companies in this regard.

2.2 Success Factors in Green Supply Chain Management

As it is known, the green supply chain is a modern idea that gains popularity in the context of environmental sustainability, based on the idea of improving environmental performance throughout the whole chain (Sarkis et al., 2011). There are six critical success factors in GSCM for better environmental sustainability.

2.2.1 Ethical Leadership / Internal Management

Internal management, which requires leadership and includes the support and encouragement of senior executives, is an important critical success factor for businesses to adopt green practices. Pressure, incentives, and support from environmental protection motivate senior management. A good perception of environmental risks related to activities creates a positive effect on the adoption of green practices (Holt and Ghobadian, 2009; Luthra et al., 2016).

2.2.2 Customer Management

Customers play an important and influential role in green supply chains. Indeed, companies from developing countries are facing heavy pressure to adopt green practices in their supply chain business operations to compete in the market and meet the demands of their customers. The success of the companies in responding to these demands and requests due to these pressures, which are directly caused by the sensitivity of customers to environmental issues and are effective in their purchasing decisions, also determines their place in the competitive environment. Collaboration with customers is very beneficial to gain gains and benefits from GSCM (Zhu et al., 2007).

2.2.3 Supplier Management

Green supply chain practices cannot be adopted without the active participation of customers and suppliers. Strong cooperation with suppliers improves incentive systems, strengthens the adoption and development of innovative environmentally friendly ideas.

2.2.4 Competition Power

Some studies have revealed that competence and related factors can play a role in implementing green approaches in supply chains (Kim and Rhee, 2012; Wang and Sarkis, 2013). Competitiveness is viewed as an important factor in ensuring green practices, rather than companies' desire to protect environmental sustainability. Firms' implementation of green practices in business operations may also be based on additional requests for competitive factors (Luthra et al., 2016). In today's markets where the competitive environment is very brutal, companies doing business with GSCM can be more successful thanks to their competitive advantage.

2.2.5 Social Factors

Some researchers emphasize that social factors are important to achieve environmentally friendly implementation goals (Wang and Sarkis, 2013). With the growing interest of regulators and customers' awareness of the environment, firms must exchange end-to-end information on the impact of supply chain operations on local communities and people's lives. In addition, electronic and social media have become more effective tools in applying pressure to companies to adopt green practices.

2.2.6 Regulatory Factors

The increasing priority of environmental concerns has forced regulatory authorities to stringent environmental laws and policies (Luthra et al., 2016). Many governments today implement strict environmental laws to control climate change, global warming, and pollution. In this context, companies need to reduce the negative impact of their supply chains on environmental sustainability. Therefore, it is increasingly important for companies in the supply chain to comply with regulations to execute environmentally friendly strategies.

2.3 Transition to Green Supply Chain Management

The effects of production processes on the environment are generally discussed under three categories which are waste, energy use and resource use. For the green supply chain, companies must first be adapted to the

determined basic principles. Organizations need to develop procedures that focus on analyzing their operations, continuous improvement, measurement, and targets at every stage. We can list the procedures to be applied to transform a supply chain into an extended supply chain as seen in Figure 4 (Beamon, 1999).

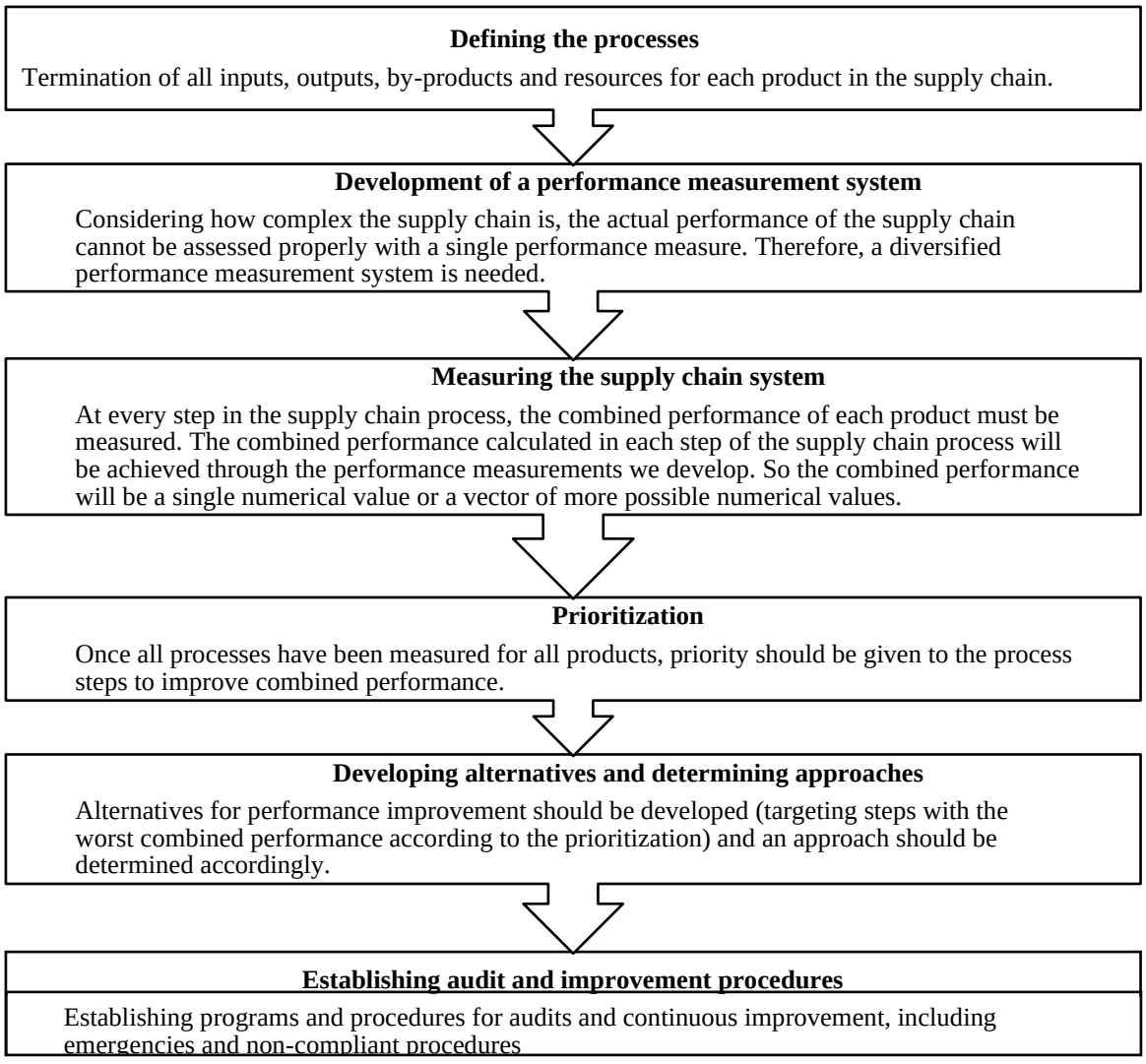

Figure 4. Transition to GSCM (Beamon, 1999)

Although the green supply chain implementation is necessary for a sustainable environment, many factors that prevent businesses from transitioning to green practices. It can be said that these barriers change depending on the micro and macro environmental conditions in which an enterprise is located (Doğan and Yaprak, 2019). It is possible to consider these obstacles as internal obstacles caused by the enterprise itself and external obstacles encountered with the effect of environmental conditions (Güzel and Demirdöğen, 2015). However, sometimes the obstacles encountered contain both internal and external features together. Doğan and Yaprak (2019), who conducted a literature study on the subject, evaluated these obstacles under 10 titles where the most research was done which are, lack of knowledge and experience, lack of technological infrastructure, government policies and deficiencies in laws, administrative deficiencies, application costs, financial insufficiency, uncertainty and competition in the market, lack of awareness of consumers, lack of qualified human resources, suppliers' resilience and reluctance.

Here are some of the applications of GSCM for business in the literature. Mitrega et al. (2017) proposed the concept of networking for the management of supplier relationships. They have done an experimental study for this concept. The study is an experimental study carried out in the Iranian automotive industry.The developed model is used to explore the concept of network capacity to manage dynamics and relationships with suppliers to take advantage of product innovation. Udomleartprasert (2004) took into account 5 factors, which material, process, packaging, working environment and waste system, and demonstrated the importance of implementing

green management. This practice has been carried out in an electronics industry. Yu et al. (2014) introduced the concept of integrated green supply chain management (iGSCM) and introduced a multidimensional approach to GSCM performance. The relevant study was supported by the results of surveys with 126 automotive manufacturers in China.

3 Discussion and Conclusion

The concept of supply chain arose from the recognition that the process of converting raw materials into final products and delivering those products to customers is becoming more complex. Therefore, it has become increasingly clear that the analysis (and subsequent improvement) of individual supply chain stages does not lead to improvement of the chain. Thus, the concept of supply chain emerged to describe all production stages from raw material acquisition to final product delivery. As the effects of the environmental problems faced by the world reach a noticeable level by the whole humanity, the understanding of SD has started to be discussed more frequently in international platforms, environmental sensitivities have started to take place in the lives of all individuals and naturally, the awareness of consumers has increased. On the other hand, changes leading to public pressure and environmental legislation necessitated a radical change in manufacturing and business practices.

Nowadays it is no longer acceptable or cost effective to only consider local and immediate effects of products and processes; It is now imperative to analyze all life cycle impacts of all products and processes. Therefore, the traditional structure of the supply chain should be expanded to include product recovery mechanisms, considering green approaches in line with the nature of sustainability. This expansion, created by green approaches integrated into the supply chain at all processes and stages, provides an additional level of complexity for supply chain design and analysis; More specifically, the addition of a product improvement mechanism leads to a multitude of issues that affect strategic and operational supply chain decisions.

As a result, the expansion of the traditional supply chain requires the establishment and implementation of new performance measurement systems. These new measurement systems will serve as a central part of environmentally sound implementation plans based on continuous improvement that will ensure organizations to be competitive while achieving sustainable processes and provide a competitive advantage in the market.

In green supply chain management, enterprises act by paying attention to environmental sensitivities in all elements of the value chain, from the supply of raw materials and materials required for production activities to the waste generated at the end of the product use of the end consumer. This approach contributes to the efficient and effective use of resources of enterprises, to reduce costs, to increase profitability, to gain competitive advantage, to create a green image, and to increase customer satisfaction. Beyond these, adopting GSCM practices aimed at protecting the natural environment is an important social responsibility that businesses should fulfill to leave a more livable world for future generations.

The suitable conditions for transition to GSCM and the obstacles that may be encountered should be analyzed well. It is necessary to identify the problems and obstacles that may arise from the inside or outside of the business, the local environment or the global market, and the policies to be implemented should be addressed accordingly, where policy makers also have a role as businesses. For example, financial and moral incentives that can be provided in transition to green supply chain management, which brings many advantages such as lowering costs for the business in the long term, will shorten the decision-making processes and accelerate the transformation.

One of the most important factors that has forced businesses in transition to green trade chain management has been the awareness of customers about green practices. Because customers in developed countries mostly prefer green products, the importance of increasing consumer awareness in developing countries and raising public awareness about green practices becomes clear once again. As a conclusion, it is an effective method for all stakeholders in the supply chain to integrate green practices into all their activities in line with a common goal of reducing environmental impact and ensuring sustainable development.

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