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REVIEW ARTICLE

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GREEN SUPPLY CHAIN MANAGEMENT AND SAMPLE APPLICATIONS*

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ABSTRACT

It has become inevitable to develop new distribution strategies with the depletion of natural resources, global warming, increased environmental pollution due to the increasing competition conditions in recent years. In addition, the concepts of green supply chain and green logistics come into effect the literature with the awareness of both non-governmental organizations and national and international administrations about this danger. Green supply chain includes all activities, carried out in the design process of the product, the selection of the machinery, raw materials and semi-finished products used in the manufacture of the product to the retailer and/or the end customer, and the recycling of the product from the customer after the economic life and function is completed, and recycling. In this study, firstly, the emergence of green supply chain management and green logistics concepts are discussed within the literature review, taking into account the current developments. Later, green supply chain management and new concepts that emerged with this approach were discussed. In the continuation of the study, examplary green supply chain studies in Turkey were mentioned and suggestions were made to guide companies that will implement this approach.

Keywords: *Green Supply Chain, Green Logistics, Sustainability, Recycling.*

YEŞİL TEDARİK ZİNCİRİ YÖNETİMİ VE ÖRNEK UYGULAMALAR

ÖZ

Son yıllarda artan rekabet şartlarıyla beraber doğal kaynakların tükenmesi, küresel ısınma, çevre kirliliğinin artmasıyla beraber yeni dağıtım stratejilerinin geliştirilmesi kaçınılmaz olmuştur. Ayrıca gerek sivil toplum kuruluşlarının gerekse ulusal ve uluslararası yönetimlerin tehlikenin farkına varmasıyla birlikte yeşil tedarik zinciri ve yeşil lojistik kavramları literatüre girmeye başlamıştır. Yeşil tedarik zinciri, ürünün tasarım sürecinden, üretiminde kullanılan makine, hammadde ve yarı mamulün seçimi, üretilen ürünün perakendeciye ve/veya son müşteriye ulaştırılması ile ürünün ekonomik ömrü ve işlevi tamamlandıktan sonra müşteriden toplanarak, geri dönüştürülmesiyle yeniden üretime kazandırılması faaliyetlerinin tümü olarak tanımlanabilir. Bu çalışmada da öncelikle yeşil tedarik zinciri yönetimi ile yeşil lojistik kavramlarının ortaya çıkışı, günümüzdeki gelişmeler de dikkate alınarak literatür taraması içerisinde ele alınmıştır. Sonrasında yeşil tedarik zinciri yönetimi ile bu yaklaşımla ortaya çıkan yeni kavramlar incelenmiştir. Çalışmanın devamında ise Türkiye'deki örnek yeşil tedarik zinciri çalışmalarından bahsedilmiş ve bu yaklaşımı uygulayacak firmalara yol göstermesi amacıyla önerilerde bulunulmuştur.

Anahtar Kelimeler: *Yeşil Tedarik Zinciri, Yeşil Lojistik, Sürdürülebilirlik, Geri Dönüşüm.*

1. INTRODUCTION

In the globalizing world, companies need to develop new strategies to compete with each other, to increase their sales figures in the market or to find a place in different markets. Today, logistics management practices, which ensure the rapid supply of customers' demands, are among the most important strategies that companies apply to achieve this goal. Although the term logistics used to describe only distribution activities in the past, today the term of logistics defines the process that includes all activities from the process of the product to the delivery to the customer, as well as the transportation. Logistics can be defined as ensuring and controlling the allocation and control of the resources required for the realization of production, distribution and supply activities. As can be seen, logistics does not only include distribution activities, it includes all activities from the production stage of the product to the delivery to the customer. Logistics management, on the other hand, is to ensure the management and control of the activities that need to be done from the production stage to the delivery of the products and services to the customer. Another term that comes up with logistics management is Supply Chain Management (SCM). SCM covers all processes from collecting raw materials, semi-finished products and resources together in the manufacturing of a product or service to the manufacturing and supplying at the minimum cost, and to the delivery of the products to the customer (Timur et al., 2013).

Increased production activities have caused negative effects such as unconscious use of natural resources, climate change, global warming, air pollution, cutting down trees and depletion of natural resources. These negative developments started to attract the attention of environmentalists and they argued that new regulations should be introduced to prevent this situation. With the increasing awareness of people about the environment, a new term of sustainability has begun to enter the literature. Sustainability is to make development sustainable by ensuring that the daily needs of humanity are met without jeopardizing the situation of meeting the needs of future generations. With the implementation of the sustainability approach, people's sensitivity to the environment has started to increase, and with these developments, green logistics and green supply chain management (GSCM) approaches have emerged. Researchers state that green approaches

provide savings in the use of companies' resources and are beneficial in disposal of their wastes and increase in production efficiency (Porter and van der Linde, 1995).

2. DEVELOPMENT OF GREEN SUPPLY CHAIN MANAGEMENT APPROACH

The depletion of natural resources and the increase in environmental pollution started to attract the attention of environmentalists and the concept of sustainability entered the literature with the thought of taking precautions against these negativities. The concept of sustainability was first included in the "Our Common Future" report of the World Commission of Environment and Development published by the United Nations in 1987. Accordingly, sustainable development is the ability of the environment to make development sustainable by ensuring that the daily needs of humanity are met without jeopardizing the situation of meeting the needs of future generations (WCED, 1987). With the use of the concept of sustainability, GSCM and green logistics approaches have become a subject that attracts the attention of researchers.

Wilkerson states that GSCM which provides success from tactical decisions to strategic decisions also provides an opportunity for the effective use of recycling and activates the use of resources in his study. In addition, it was argued in the study that both the supply chain can be effective and environmental awareness is provided with GSCM (Wilkerson, 2005). Sarkis defines GSCM as the processes that include all of green production, green purchasing, green distribution and reverse logistics activities (Sarkis, 1998). Blanchard (2017) points out that GSCM is an approach aimed at reducing the carbon footprint while implementing SCM activities.

GSCM is an approach that aims to increase the profit and market share of the company by reducing the damage to the environment while performing the production / distribution activities of the companies. In GSCM, companies should prefer environmentally friendly materials in raw materials and semi-products used in the production process, and aim to minimize the environmental damage by carrying out the transportation of the materials used inside or outside the facility within a plan. In addition, it is important

to use recyclable materials in the packaging of products. With the proper packaging of the product, it is aimed to reduce the material used in packaging to a minimum (Zhu, Sarkis and Lai, 2007). Büyüközkan and Vardaroğlu (2008) discussed in detail the green approaches in the literature and the activities for GSCM in their study.

When the studies about GSCM are examined, it is noteworthy that researchers generally focus on GSCM applications and the effects of these applications on business performance. Kopicki et al. (1993) argued that proactive, reactive and value-creating approaches should be applied to achieve environmental management. In their study, Zhu, Sarkis, and Geng (2005) examined how businesses in China apply the GSCM approach and the effects of these practices on business performance. In another study, the researchers evaluated the operational performance of companies in the chemical, electrical / electronics, automotive and energy sectors in China after applying the GSCM activities. In another study conducted in the same year, the researchers examined how companies in the automotive industry in China implement GSCM activities and how the performance of the company is affected by these practices (Zhu, Sarkis and Lai, 2007a; 2007b). Another study examining the effects of GSCM applications on performance was conducted by Green, Zelbst, Meacham, and Bhadauria (2012). Researchers stated in this study that GSCM practices increase the economic environmental performance of companies.

Yang, Hu, Haider and Marlow (2013) examined the GSCM practices of companies engaged in transportation in Taiwan and tried to analyze the environmental and green transportation performance of these practices. In the research, they found that these practices positively affect the performance of companies. Mahmood, Rahman, Deros et al. (2013) tried to analyze the effects of GSCM applications on production performance. In the study, the practices of 242 businesses in Malaysia were examined, but it could not be proven that there was a strong correlation that these practices had a positive effect on business performance.

While GSCM approaches are applied, deciding on the companies from which raw materials or products will be supplied becomes an important

issue. For this reason, they prefer the company that gives the least harm to the environment, not the one that offers the lowest price when choosing a supplier (Ozyoruk, 2018). The green supplier selection approach includes monitoring the environmental awareness of suppliers and working only with suppliers that aim to cause little damage to the environment (Arimura et al., 2011). In determining the green supplier, criteria such as using recycled or recyclable materials of the company, reducing the consumption of harmful substances to the environment, and using environmentally friendly transportation methods can be used. In GSCM, the selection of the supplier has become an issue that has attracted the attention of researchers in recent years. Ozyoruk (2018) examined in detail the studies on green supplier selection in her study.

In the study, Lipmann gave information about the work to be done to establish an effective GSCM and examined how to communicate with suppliers (Lipmann, 1999). Wycherley (1999) discussed what stages should be considered in GSCM and the difficulties encountered as a result of implementation. Geffen and Rothenberg (2000) determined that the success of GSCM can only be achieved by the success of their suppliers.

It is noteworthy that researchers have focused on more specific applications on GSCM. There are studies in the literature that aim to increase the efficiency of the supply chain and reduce carbon emissions by applying sustainable development and various green activities (Zhen et al., 2019; Mardani et al., 2020). There are also studies in the literature that suggest a mathematical model for the green supply chain (Bai and Sarkis, 2018; Sarkis et al., 2019). In the research conducted, it has been determined that many studies in GSCM in recent years have been carried out on green product design, the effects of this approach on foreign policy and the supply chain focusing on the environment (Louly et al., 2008; Rao et al., 2015; 2020; Beemsterboer et al., 2017; Moktadir et al., 2019; Zhang and Yousaf, 2020).

Tunc (2020) mentioned green practices in Turkey by using qualitative research methods in his study. The researcher examined 18 companies that are in the ISO 500 list in Turkey and attach importance to green practices

and 4 companies with foreign capital and serving in Turkey. In the study, analyzes were made by conducting a questionnaire with employees to evaluate the green practices in companies (Tunç, 2020).

3. GREEN SUPPLY CHAIN MANAGEMENT

GSCM covers the management of all supply chain activities, including the process of returning the product from the supplier to the manufacturer, from the manufacturer to the customer, and from the customer to the manufacturer, starting from the purchasing stage, throughout the life cycle (Zhua et al., 2008). GSCM includes all of the following stages:

- Making the products included in an environmentally friendly process throughout their life cycle;
- Minimizing the amount of harmful waste that the product gives to the environment from the raw material to the depletion stage;
- Implementation of production activities with environmental and quality certificates (Ozyoruk, 2018).

Green logistics also includes activities for the use of renewable resources in production, distribution, taking measures to protect natural resources, reducing air pollution and carbon emissions, and minimizing the amount of waste. Green logistics is the realization of all processes within the logistics of the product or service in an environmentally friendly manner. Green logistics aims to minimize the negative effects on the environment (Temur et al., 2015). GSCM consists of a combination of green purchasing, green production, green distribution, reverse logistics and green packaging activities. These concepts need to be defined in order to understand GSCM approaches.

Green Purchasing: Green purchasing covers activities in the process of purchasing recycled materials, recyclable or reusable products (Zhua et al., 2008). Thus, it is tried to reduce the damage to the environment for purchased materials.

Green Production: It is the realization of activities without harming the environment at all stages of the manufacturing of a product. Green production also includes the process of remanufacturing from recycled products. In green production, it is aimed to use recyclable products, reduce the consumption of natural resources, and satisfy the needs of the customer without harming the environment and people (Büyüközkan and Vardaroğlu, 2008). Green production includes zero waste or reduction of waste, green product design and recycling.

Green Distribution: Green distribution includes the activities of determining the locations to which the products will be transported, realizing both forward and backward transports with just-in-time production, determining the characteristics (capacity, type, etc.) of the vehicles on which the transportation will be carried out, and realizing the distribution operations in a way that aims to reduce carbon emissions. The type of vehicle used, fuel type, capacity, round trip transportation frequency, the distance between customer positions affect the performance of green distribution (Sarkis, 2003).

Green Packaging: The materials used in the packaging of the products can also affect the effectiveness of GSCM. In order for packaging operations to be carried out in an environmentally friendly manner, it is necessary to use environmentally friendly materials or recycled materials and to consider the size of the packages. In addition, the fact that the packages used are designed to be recyclable also provides benefits on the performance of the company (Büyüközkan and Vardaroğlu, 2008). When the packaging strategy is created in this way, it ensures that less material is used and the space is used more efficiently by placing the products in the warehouse in a more orderly manner. In addition, with a good packaging, the products can be placed on the trucks more properly and the product capacity of the truck / transport vehicle can be increased. Thus, by reducing the number of trips for distribution, less fuel consumption is achieved and carbon emissions are reduced (Sarkis, 2003).

Reverse Logistics: Reverse logistics is all the activities applied for the reuse of materials or products. Normally, logistics includes processes from the

manufacturing of the product to its delivery to the customer. In reverse logistics, products are sent from the customer to the distributor or directly to the manufacturer. For example, if the product is defective, the customer sends it back to the factory. The factory, on the other hand, must carry out the collection activity of the defective product, detect the defect by breaking the product, repair it, and if it cannot be repaired, it must be separated into parts and recycle some or all of it. The defective product can travel backward from the customer to the factory. These activities are included in reverse logistics activities.

The reverse logistics flow is seen in Figure 1. In forward logistics, the flow is from the factory to the customer, while in reverse logistics, the flow is from the customer to the factory, as seen in Figure 1.

Figure 1. The flows of reverse logistics.

Reverse Logistics activities can be classified as follow:

1. Recycling
2. Reproduction
3. Reuse
4. Disposal

Recycling: Reverse logistics can generally be considered as processes making the product included in recycling. Recycling involves the collection of reusable wastes such as metal, plastic, glass, paper-cardboard, and reuse by chemical and/or physical processes (Özhesen, 2009). It is noteworthy that in recent years, recycled material is used in product packaging. Additionally, about 98% of the materials used in the electronics and household appliances industry are also recyclable. In our country, companies working in this sector collect products that have expired from customers with various campaigns to recycle. Thus, with the recycling of the products, both energy savings are achieved, and the negative effects on the environment are minimized by reusing these products as raw materials, and it is prevented that these products are collected without being thrown into the environment as waste and causing environmental pollution.

Reproduction: The reproduction process begins with the redelivery of the products that have completed their functions to the factory for recycling. These products are separated into their parts and it is determined whether the parts meet the expected properties for reuse or not. As a result of these processes, it is decided that some parts shall become waste, while others can be reused. These used parts and some new parts are combined by reassembly to recover the original product or create a new product. Remanufactured products generally have the same or similar performance characteristics and quality standards as new parts. Sending of aircraft which are used in the Turkish Armed Forces, to relevant companies due to technology change or renewal, and subsequently being examined by engineers, implementation of necessary modernization and reuse of aircraft can be given as an example of reproduction activities.

Reuse: It is the repeated use of the products throughout their economic life without any processing other than collecting and cleaning the products from the customers. Reuse occurs in many sectors and provides companies with a great advantage in terms of cost.

Disposal: In the disposal activities, it is checked whether the product contains harmful substances. Disposal is all of the activities carried out for the destruction of hazardous wastes generated during the manufacturing of the product itself, using appropriate technology, without harming the environment (Sarkis, 1998).

4. SAMPLE APPLICATIONS

It is noteworthy that the studies in the literature, researchers generally examine the green supply chain activities implemented by logistics companies. For this reason, in this study, in order to create a perspective for other sectors, GSCM activities implemented by companies in different sectors are examined. In this study, the studies of Arçelik brand, which produces electronics and household appliances, a grocery chain operating in the retail sector, the studies of Tofaş, an automobile brand, and the GSCM activities implemented by Sütaş, which produces perishable products in the retail sector, are discussed. The data used in this section are obtained from the sustainability reports published by the relevant companies once a year or every two years.

Migros is one of the leading companies that have been effectively implementing GSCM activities in our country for years. The company tries to reduce its negative effects on the environment both in production applications and in chain markets. In this context, it tries to reduce carbon gas emission and water consumption, reduces the use of paper and attaches importance to the use of recycled materials, and also adopts the zero waste principle in production and sends the wastes generated during production to licensed recycling facilities for recycling. In order to reduce paper and plastic consumption, the company uses recyclable materials in the packaging of its own products and carries out the transportation of fruits and vegetables with reusable plastic crates. In addition, it collects waste oil and waste batteries from its customers through both the “Sanal Market”

application and the boxes in its stores and sends them to licensed facilities. The company also works to increase efficiency in logistics and distribution areas in order to save energy and reduce carbon emissions. It tries to determine the optimum routes for the vehicles used in distribution by calculating the distances between the distribution centers and the stores and accordingly determines the location of the future distribution centers (Migros Sustainability Report, 2019).

Another company that attaches importance to GSCM applications in our country is Arçelik. The company attaches importance to renewable energy investments to combat global warming, reduces CO_2 emissions with the production of energy-efficient household appliances, and tries to reduce carbon emissions by preferring rail and sea transportation instead of road transport in logistics. In the packaging of products, it attaches importance to the use of recyclable / recycled materials and tries to minimize the negative impact on the environment by minimizing volume and weight of the packaging materials of the products. In addition, by applying the zero waste principle, the company reduces the waste generated as a result of production and provides recycling by separating the waste according to their classes. The company tries to reduce the damage to the environment, especially by using recyclable materials. Arçelik conducts various campaigns to collect end-of-life electrical and electronic items from its customers. With the Waste Electrical and Electronic Equipment facilities established in Bolu and Eskişehir, it separates the products it collects into materials such as metal, iron, plastic, aluminum and recycles them. In addition, it tries to reduce the negative effects on the environment by sending the wastes outside these categories to licensed recycling facilities (Arçelik Sustainability Report, 2020).

It is noteworthy that, in Tofaş, which is in the automotive sector, importance is given to GSCM activities. The company works to reduce global warming and carbon emission. For this purpose, it tries to reduce the amount of emission occurring in production stages, to increase the emission and global warming awareness of its suppliers in SCM and to ensure energy efficiency by using alternative fuel in vehicles. In addition to these studies, the company tries to reduce the amount of volatile organic compounds

occurring in dyeing operations and implements projects that will reduce the amount of CO_2 generated. In addition, the company aims to achieve minimum water consumption by ensuring the proper management of water and wastewater processes (Tofaş Sustainability Report, 2020).

Sütaş, which is involved in the production of perishable products, also has important studies on GSCM. Sütaş tries to reduce the distance covered and carbon emission by creating appropriate routes for the transportation of milk from suppliers located in different locations. In addition, it aims to reduce carbon emission and fuel consumption by ensuring that vehicles transporting products from factories to product distribution points also transport products to factories with a reverse flow. The company turns towards efforts to reduce greenhouse gases generated due to its production activities, to generate renewable energy from waste and to increase energy efficiency. In order to achieve this, the company has established an energy production facility where animal wastes are used as fuel. In addition, Sütaş makes product packaging by using recyclable materials in order to realize the zero waste strategy, and collects and recycles product packaging materials in cooperation with licensed companies (Sütaş, 2020).

In this section, the activities of four different companies in different sectors within the scope of GSCM and green logistics were discussed. Figure 2 has been created in order to determine which activities the companies mostly concentrate on, by taking into account the practices made by the companies.

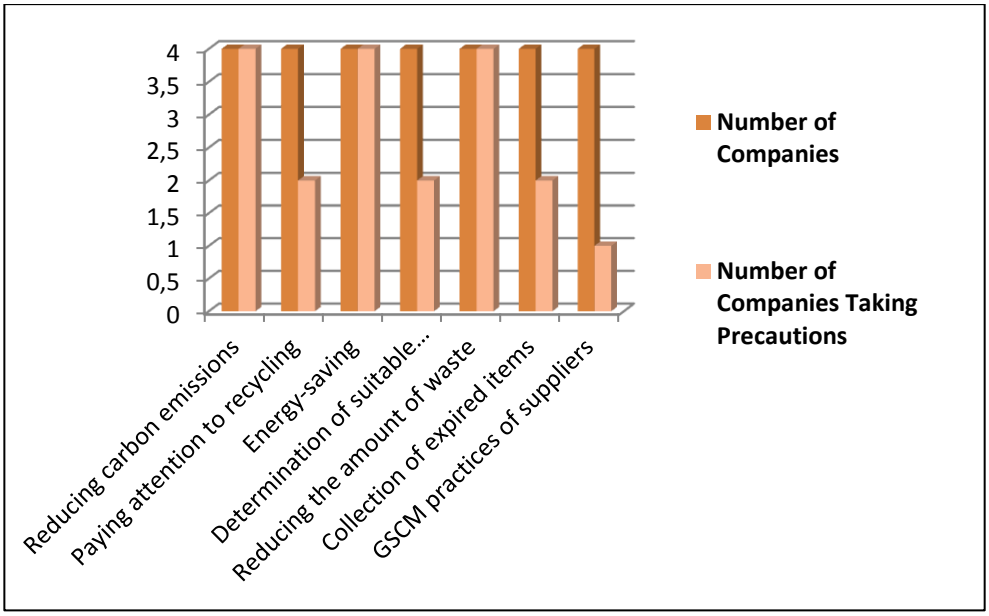

Figure 2. Comparison of the activities implemented by firms within the scope of the green supply chain.

When Figure 2 is examined, it is noteworthy that all companies implement activities to reduce carbon emission, energy saving and reduce waste amount within the scope of GSCM. Half of the companies attach importance to the use of recycled or recyclable materials in their packaging or products. In addition, 2 out of 4 companies are trying to reduce carbon emission and fuel consumption by trying to create appropriate routes while delivering their products to their customers or collecting their products from their suppliers. In addition to these, companies ensure that half of the end-of-life products are collected for recycling. Only one of the four companies works with suppliers who attach importance to GSCM activities and tries to implement green practices together with their suppliers.

In recent years, both legal regulations and customers' preference of companies that implement green policies have led many companies to turn to green policies. In the coming years, it is thought that companies will turn

to green activities in more areas, taking into account the green policies implemented in other countries.

5. SUGGESTIONS

It is noteworthy that in studies on GSCM, researchers generally examine companies in the logistics sector. Therefore, in this study, the activities implemented by leading companies in different sectors in our country to realize GSCM are discussed. In the study, the sustainability reports published by the companies were examined and their GSCM practices were discussed. In this section, based on the GSCM activities implemented in our country, GSCM activities that can be applied by companies in different sectors are mentioned with the aim of guiding these companies.

Green activities that companies in different sectors can implement during the transition to GSCM can be listed as follows:

- Companies should improve their operations and produce without damaging the environment.
- They should carry out studies to ensure reducing energy and water use.
- They should establish the facilities that will ensure the recycling of water.
- They should focus on the use of renewable energy sources.
- Studies should be made to reduce greenhouse gas emissions.
- They should use recyclable materials in production stage.
- They should ensure that recycled / recyclable materials are used in the packaging of the products.
- They should minimize the material used in the packaging of the products.
- They should ensure that the products are packaged properly.
- It should be ensured that the packaged products are properly loaded on the vehicles.
- Vehicles used in logistics activities should be operated at full capacity.

- It should be ensured that the amount of waste is kept to a minimum by working with the zero waste principle during production.
- Wastes generated during production should be separated and sent to appropriate recycling facilities.
- In the transportation of products, sea or rail should be preferred instead of road.
- Necessary efforts should be made to collect recyclable materials from customers or employees.
- If the company has customers/branches or stores in different locations, it should be ensured that appropriate routes are created for distribution to these locations.
- Fuel consumption and carbon emission should be reduced with an additional effort by transporting materials or recycled products to the factory with the vehicles used in distribution activities.
- They should establish recycling facilities within its own structure or deliver the products and wastes which they collect to licensed recycling facilities.

6. CONCLUSION

With the development of technology, the increase of competition and the unconscious use of resources in production activities for years; they caused the depletion of natural resources, the occurrence of global warming with the increase of carbon emissions and the deterioration of the environmental order. Countries and non-governmental organizations that have become aware of this situation have started to draw attention to the implementation of new environmentally sensitive approaches. Nowadays, businesses have started to apply GSCM approaches in their production and distribution activities with the effect of legal obligations, pressures of non-governmental organizations and the assumption that environmentally sensitive companies are preferred by customers. In this context, companies try to carry out environmentally friendly production/distribution activities such as performing recycling operations, using recycled/recyclable products, reducing carbon emissions, and decreasing energy consumption.

In this study, firstly, it was stated how the concepts of GSCM and green logistics emerged, and a literature review on these issues was included. In the scope of the study, brief information was given about the green approaches that emerged with GSCM. When the studies conducted in recent years are examined, it is noteworthy that the researchers examined the activities of GSCM in more detail. In recent studies, it is seen that researchers focus on topics such as supplier selection, reduction of carbon emission, and determination of appropriate routes to reduce energy consumption, reverse logistics and collecting recyclable products in GSCM.

In the following parts of the study, information was given about the concepts that entered the literature with GSCM. When the previous studies are examined, it has been determined that the researchers generally studied the green practices in the logistics sector. Therefore, in this study, the practices of companies in different sectors were examined in order to have information about green practices in different sectors. Within the scope of this study, the green activities of a market chain serving in the retail sector in our country, a company that produces electrical and electronic equipment, a brand that conducts automotive production and a company that manufactures perishable dairy products was examined. This information has been obtained from the sustainability reports published by the companies every year or every two years via their internet addresses. Green practices of these companies have been examined in detail in order to set an example for companies in different sectors. Subsequently, the joint activities implemented by these four companies within the scope of GSCM and other unique activities were determined. When the studies carried out by four companies within the scope of GSCM are examined, it is seen that all of them are conducting studies for energy saving, reducing carbon emission and reducing the amount of waste. In the last part of the study, suggestions were made in order to guide the companies that will turn to GSCM activities based on the activities implemented by the companies.

Green supply chain and green logistics are among the issues that have attracted attention both in the world and in our country in recent years. In this study, companies that attach importance to GSCM approaches in our country and take part in different sectors were examined. In this context, it

is seen that companies turn to renewable energy sources, implement practices to reduce carbon emissions, try to use environmentally friendly recyclable materials and attach importance to recycling activities. In particular, companies producing electronics and household appliances collect electronic products from their customers with reverse logistics from the facilities they have established, and recycle the products at a rate of 98%. For example, Arçelik conducts campaigns to collect end-of-life products with a reverse logistics approach by gathering old products from customers who will buy new products for a certain fee. With the Waste Electrical and Electronic Equipment facilities established in Bolu and Eskişehir, it separates the products it collects into materials such as metal, iron, plastic, aluminum and recycles them. In addition, it tries to reduce the negative effects on the environment by sending the wastes outside these categories to licensed recycling facilities. In the last few years, with the "Zero Waste" project of the Ministry of Environment and Urbanization, companies and individuals have raised awareness about recycling with environmentally sensitive approaches. This project has been implemented in places such as many universities and shopping centers, especially public institutions and organizations. Although GSCM approaches have been among the remarkable issues in our country in recent years, they are still not widely applied. In the coming years, green supply chain and green logistics activities will gain more importance with the increase of legal obligations and awareness of companies and people. It is thought that the suggestions made in this study will guide companies in different sectors.

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