Chapter 17
Defining Reverse and Green Supplier Selection Criteria with a Strategic Management Approach

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17.1 Introduction

With the emergence of the industrial revolution in the 1800s, the industrialization process showed a great increase. This development and change process has brought many important problems, and the environmental problems that have emerged over time and the depletion of natural resources have forced businesses and managers to consider environmental factors while determining their management styles. The preference for environmentally friendly products has made supply chains environmentally sensitive. Environmental inputs such as reducing the use of natural resources, using environmentally friendly raw materials, eliminating the resulting wastes without harming the environment, attaching importance to remanufacturing and recycling processes, and making the best network design in logistics activities have revealed the concept of green supply chain (Rodrigue et al., 2017).

Green supply chain management is generally defined as planning, organizing, executing, and controlling the activities of supply chain members who act in accordance with environmental standards or care about their environmental performance. The green supplier selection approach, on the other hand, envisages monitoring suppliers that develop environmentally friendly product and service strategies, relying on environmental performance, and cooperating only with green suppliers that meet environmental standards. In this respect, companies require to improve some strategies to select suppliers which attach importance to reverse and green activities (Wang et al., 2020).

Green supplier selection is a strategy that improves the performance of the supply chain. Choosing the right supplier and ensuring its sustainability helps reduce costs

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and remain competitive by meeting the expectations of stakeholders in the supply chain efficiently. Another aim here is to increase ecological efficiency, increase market share and financial capacity by minimizing environmental negative effects. For the environmental benefit, remanufacturing preserves raw materials and energy for the future and reduces carbon emissions (Fang et al., 2021; Kayacık et al., 2022; Eti et al., 2022; Dinçer et al., 2023). From the economic and social point of view, remanufacturing create jobs, reduces cost, and increase the company's reputation (Sarkar & Bhuniya, 2022).

In addition to the green management approach, the contribution of reverse logistics to recycling is important in terms of environmental sustainability. Reverse logistics is the reorganization of supply chain activities to use, recycle, replace, reuse, or dispose of resources effectively. As a result of ensuring efficiency in reverse logistics application, customer satisfaction is achieved by increasing the trust of customers in businesses. The purchasing costs of the business decrease and its profitability increases. Producers gain economic advantage as reverse logistics will reduce the costs of obtaining new products by reprocessing the surplus stock products that are idle and cannot be sold, making them usable and presenting them to the market (De Oliveira et al., 2021).

In this context, the purpose of this study is to reveal the criteria that should be considered when choosing reverse and green suppliers by benefiting from the current literature and to shed light on the strategies that companies should develop when choosing suppliers. In the first part of the study after the introduction, detailed definition of green and reverse logistics activities has been made. Furthermore, the criteria set has been formed benefiting from the current literature and in the conclusion part, this criteria set has been summarized to guide the companies which aim to select suppliers paying attention to environment.

17.2   Conceptual Framework

Climate change, reduction of biodiversity, pollution of air, water, soil and resource scarcity are among the most important environmental problems of the twenty-first century. In order to overcome ecological problems, it is necessary to develop environmental awareness in all behaviors from the individual level to the business and government level. Although environmental awareness has increased at all levels of society in recent years, the perception in the business world has been against the environment in the relationship between the environment and profitability. However, with the increasing concerns about pollution in the 1960s, business managers realized that it was necessary to pay more attention to the natural environment as an externality of production. Paying attention to these environmental issues is seen as an opportunity in the growth and development of businesses as it enables to differentiate the business in the mind of the consumer or to innovate in completely new ways (Agyabeng-Mensah et al., 2020).

As globalization increasingly integrates countries and societies, the environment has been exposed to negative externalities that threaten the supply of natural resources. Increasing awareness of environmental issues that threaten economic sustainability has made the public more sensitive to purchasing behavior and consumption activities. Realizing that they have a negative impact on the environment, consumers have become worried about their daily habits. Consumers believe in the importance of green sensitivity for future generations to lead a better and healthier life and shape their purchasing behavior with this perspective (Li et al., 2021).

Increasing pressures with globalization have prompted businesses to improve their environmental performance. For this reason, businesses have become concerned for the environment for the last 20 years. The increase in environmental concern has become an increasingly part of the general corporate culture, and this has caused businesses to reconsider their strategies. Pressures for environmental protection are not only caused by legal obligations, but also consumers put pressure on businesses. In response to this pressure, the green logistics approach emerged in the 1990s, which went beyond the standard logistics understanding and brought a new perspective to logistics, delivering products and services to consumers in an efficient, effective, and fast manner with the perspective of environmental protection. Green logistics management plays an important role in addressing environmental concerns, as environmental impacts occur at all stages of a product's life cycle (Wang et al., 2018).

Green logistics aims to create sustainable business value by balancing economic and environmental efficiency. In other words, it means integrating environmental thinking throughout the entire life cycle of the product. Benefits of a business from green logistics is expressed as a reduction in carbon dioxide emissions, significant cost savings, increasing supply chain optimization, and increased operating performance. Green logistics management, which is a new trend in logistics management, also emphasizes long-term interests that reflect the green image of institutions and carry multi-faceted concerns for the environment. From this point of view, businesses have tried to develop their strategies in this direction by switching from a human-centered understanding to environment-centered understanding, with the thought that the negative effects of their activities on the environment will decrease (Yingfei et al., 2022).

In the performance measurements of enterprises, environmental effects have been started to be evaluated along with financial performance. The increasing importance of corporate social responsibility has led businesses to leave their negative environmental impacts to positive ones. In addition to these, the regulations implemented on a global scale also force businesses to act in line with their sustainability goals. With these developments, within the scope of reviewing the processes in the enterprises, the logistics activities have been designed in a way that will ensure the recycling of waste materials (Cricelli et al., 2021).

When the definitions in the literature are examined, it is seen that the common aspects are the regulation of the flow of used products to the original manufacturer. The emergence of reverse logistics has an important place in terms of sending

products and materials back to production through recycling. Turning many used products into a new product by processing is extremely important in terms of sustainability. Reverse logistics enables businesses to work more effectively by reprocessing waste. Businesses using reverse logistics applications in sectors where competition is high increase their profit margins thanks to the low-cost advantage. To protect the environment, great attention has been paid to re-evaluation, or in other words, recycling and waste management in recent years, and serious measures have been taken in this regard. In this way, the wastes were eliminated, and the way was opened for the processing and reuse of the wastes (Govindan & Gholizadeh, 2021).

As a result of ensuring efficiency in reverse logistics application, customer satisfaction is achieved by increasing the trust of customers in businesses. The purchasing costs of the business decrease and its profitability increases. Producers gain economic advantage as reverse logistics will reduce the costs of obtaining new products by reprocessing the surplus stock products that are idle and cannot be sold, making them usable and presenting them to the market. With the establishment of recycling enterprises, glass, plastic, paper, etc. collected from the consumer by reintroducing the products to the economy, a resource is created to produce raw materials and a strong production ring is created. Reverse logistics is not limited to these products, but is used in sectors where automotive, chemistry, medicine, steel, electronic goods are produced (Garai & Sarkar, 2022).

The way businesses work, the rapid technological changes experienced, and the new marketing and consumption understanding formed by the effect of globalizing markets have changed. As such, it has become difficult for businesses to survive, and it has become necessary for all actors in the flow from suppliers to end customers to act jointly. This requirement has led to the emergence of the supply chain structure. Therefore, businesses that can produce output with the least cost under competitive conditions and that can also provide this output in a quality and time that meet the expectations of the customers gain an important competitive advantage (Jauhar et al., 2021).

Recovery and reuse of products reduces negative impacts on the environment, mainly by reducing waste disposal, use of raw materials, emissions such as transportation and distribution. In addition, businesses can gain value from end-of-life products by reusing components, recycling materials, or recovering energy through disposal (Martínez et al., 2022; Sun et al., 2022a, b; Kafka et al., 2022; Mukhtarov et al., 2022). Finally, reverse logistics applications can reduce customer risk and increase customer value when purchasing a product. However, the success of reverse logistics implementation requires coordination of the forward and reverse flows of both material and information. The reverse flow of products entering the supply chain affects the dynamics of supply chain members' inventories. This affects the dynamics of ordering to suppliers and thus the performance of the entire supply chain in terms of increased order and inventory variance (Fu et al., 2021).

Economic Reasons: Businesses that want to increase their profitability can achieve this by reducing their use of new raw materials through reverse logistics activities. While adding value to the products with recycling, they can provide

customer satisfaction with a return or service guarantee. The protection of the market is ensured by regulating customer-supplier relations with applicable laws (Xu et al., 2021).

Marketing Reasons: Businesses that use the concept of green and reverse logistics together try to create a conscious society in terms of recycling of product packaging, product consumption and collection of product deposits with environmental and social responsibility campaigns. Today, businesses that evaluate the returned products, pay back the cost of the defective product to the customer, develop a good collateral policy and provide a good after-sales service have begun to dominate the markets more (Yang, 2022).

Legal Reasons: Laws protecting consumer rights oblige businesses to take back defective products and collect objectionable products. In addition, these costs are undertaken by the enterprises themselves. With the sanctions brought by green laws, businesses are compelled to reduce the environmental impact of packaging and waste. While businesses accept the return of their used products, they also perform reverse logistics activities to protect the information about the special components of the product and the intellectual property rights of the product (Roudbari et al., 2021).

Reverse and green purchasing benefits businesses in many ways. It is possible to classify these benefits under four main headings: financial benefits, managerial benefits, environmental benefits, and social benefits (Konys, 2019).

Green purchasing can benefit all organizations. It reduces costs and increases productivity by enabling more efficient management of inputs, outputs, and materials. By reducing total expenses, it increases profitability and improves equity. Organizations that want to exist in the future must carefully manage their financial performance and purchasing decisions. The financial benefits would be much greater if they could add a product lifecycle approach to their total cost ownership process (Qu et al., 2020).

Since the materials and processes to be used to produce green products require less resource use, it will be ensured that the use of materials and resources is reduced. Considering the product life cycle, the cost reduction will not only be limited to the use of materials and resources, but also the costs of waste disposal and environmental, occupational health and safety will be reduced. With the green purchasing preference, both the amount of material to be used during production and the use of energy and water to be used for production will decrease (Xu et al., 2022; Bhuiyan et al., 2022; Kou et al., 2022; Ermiş & Güven, 2022). With the purchase of environmentally friendly materials and production tools, material costs, energy consumption and waste costs will be reduced (Haeri & Rezaei, 2019).

By purchasing green materials, a business can greatly reduce its waste costs. In a process that will involve suppliers, the manufacturer can work to reduce packaging waste, thus reducing both costs and waste. Green products generally last longer, and because their lifespan is longer, waste disposal costs are also reduced in this perspective. In addition, green products reduce costs as they use resources more efficiently while performing their functions (Gao et al., 2020).

Since there will be no need for special teams and equipment for the use and storage of environmentally friendly products, a manufacturer who purchases

environmentally friendly materials will also reduce occupational health and safety costs. Green purchasing also reduces operating, maintenance, and replacement costs. With the efficient use of energy, it is possible to achieve significant cost improvements. The green materials and process purchases of businesses also enable some costs to improve in the long run (Eti et al., 2023; Li et al., 2022a, b; Haiyun et al., 2021; Yuan et al., 2021). Storage and disposal costs can be reduced by purchasing green materials. Since special precautions will not be required during the storage and use of environmentally friendly products, it will not bring additional occupational health and safety costs (Rouyendegh et al., 2020).

Green purchasing is an important indicator for an organization's stakeholders. It demonstrates the firm's commitment to the results of its activities and the importance it attaches to occupational health and safety issues. Sensitivity on these issues will have a positive impact on the public and will facilitate compliance with the legal regulations of the state. Thanks to public and government support, the company will be able to strengthen its image and gain financial benefits from this situation (Abdullah et al., 2019).

Reverse and green purchasing activities help a business improve its management systems and processes. It guides all processes, from how to integrate policies into business processes, to how to spread this awareness among their employees. Businesses define their goals and values and share them with the public. Green purchasing activities play an important role in realizing these goals and values that they have determined. Recently, many businesses revealed their social, ethical, and environmental values, corporate social responsibility principles they have determined and share this with all their stakeholders. As a result of harmonizing the defined values and goals with business processes, stakeholder support will increase, and the trust of customers and the public will be gained (Ecer, 2020).

Businesses always want to reduce their business risks. The green purchasing approach provides advantages to businesses in this sense. Evaluating environmental, social, and ethical dimensions in business processes will be beneficial in terms of reducing risks. Proactive approaches in management help reduce risks. Manufacturers also want to manage the risks that may arise from their suppliers. The environmental impacts of the materials and services to be purchased can be brought under control with the green purchasing policies and procedures that will be established to serve this purpose (Chen et al., 2019).

Green purchasing has many environmental benefits. With the effective use of resources, it is possible to protect natural resources that are approaching to depletion rapidly. Green products and services cause less pollution and as a result are beneficial in reducing emissions that cause global warming. It is possible to reduce the waste generated because of the production and use of the product, with improvements to be made in the production processes. Moreover, reducing waste in this way will not only be beneficial for the environment, but also less energy and materials will be used for the disposal of reduced waste (Wei et al., 2021).

When deciding on the materials to be used in the design phase of the products, the option of using recycled materials should also be taken into consideration. Likewise, in the design process, care should be taken to ensure that the product is recyclable or

reusable after completing its life. Considering all these suggestions, it will be possible to reduce waste by purchasing materials and technologies (Yazdani et al., 2019).

Equivalent purchasing has a direct impact on reducing resource use as it supports the purchase of recycled and reusable materials. Especially in the decision to purchase paper and plastic products, choosing recyclable and reusable materials will provide both environmental and economic benefits. The choice of manufacturers to purchase more environmentally friendly materials has a direct impact on the amount of greenhouse gas emissions that will be released during production. It is possible to reduce greenhouse gas emissions by purchasing more environmentally friendly materials (Tirkolaee et al., 2021).

Green products benefit all players in the supply chain, from the manufacturer to the supplier, from the customer to the public. It supports the protection of the environment and human health, ensures the occupational health and safety of the employees, and provides a competitive advantage for the manufacturer (Duan et al., 2019).

Supplier selection is to choose the most optimal one among more than one criterion for companies. In this way, it will provide many advantages for the company, especially in terms of finance. In addition, with the increasing importance of environmental issues in recent years, supplier selection with green and reverse applications is also gaining importance. Among the most important reasons for this are the benefits it provides to the environment and human health. Moreover, companies that want to have a competitive advantage in global economies have begun to care more about supplier selection (Zhang & Cui, 2019).

Today, not only consumers but also governments have begun to worry about environmental sustainability. The most important indicator of this is the symposiums and congresses implemented by the states on this issue. However, to prevent environmental pollution, protect natural resources and ensure environmental sustainability, supply chain processes need to be started from the very beginning. In this respect, choosing a green supplier means working with companies that have all these features (Ma et al., 2020).

The increase in consumers' awareness of environmental sustainability has led to the need for a more circular supply chain structure. In addition, the need for green supplier selection has increased because of fines paid by companies due to environmental issues. Furthermore, the environmental management approach, which includes many logistics activities such as green purchasing, production, and green marketing, brings the obligation to work with a green supplier from the beginning of the process (Deshmukh & Sunnapwar, 2019).

There are many companies in the world that can be shown as an example of green practices. One of the most important of these is undoubtedly Walmart. In 1989, Walmart took some green practice decisions to address the growing environmental concerns of consumers. In those years, the company succeeded in convincing its suppliers to provide environmentally soluble, that is, recyclable products. Along with all these, the company started to sell nearly 300 green products at green spots. In addition, the company began to display these products (Maamoun, 2020).

Supplier selection begins with the identification of needs. The need is usually determined by the manufacturers' R&D departments. After this stage, the task of the buyers is to identify potential sources of supply and to communicate with them. In the selection to be made among the supplier candidates who can meet the necessary conditions for the material sought, methods such as bargaining or tender can be used (Konys, 2019).

The flow in the process of determining the supplier is as follows (Konys, 2019).

– Determination of needs
– Determination of selection criteria
– Tender
– Evaluation
– Vote
– Performance evaluation

The process in green supplier selection works similarly, but the most important change is seen in the determination of selection criteria and performance evaluation steps. The supplier selection criteria in traditional purchasing can be listed as follows (Haeri & Rezaei, 2019).

– Unit price
– Ability to meet demands on time
– Meeting the quality expectation
– Honest communication
– Industrial knowledge and experience
– Flexibility, speed of response to sudden demands
– Financial situation
– Compliance with ethical standards
– References
– Size of the supplier
– Cultural harmony between the manufacturer and the supplier

The effect of increasing environmental awareness on the supplier selection and evaluation processes of manufacturers has been inevitable. Especially in the last 20 years, it is seen that there are many research and publications on environmental approaches. Many new environmental criteria have been added to the traditional supplier selection criteria and green purchasing/green supplier selection issues have been studied by many researchers and scientists. After the latest literature review, below criteria have been found to be among the most important ones of the reverse and green supplier selection criteria (Masoomi et al., 2022).

– Adding environmentally friendly supply chain activities to business policies,
– Preparing strategic management plans,
– Proving that they act with environmental concerns by preparing sustainability reports,
– Revise the organizational structures with a green perspective,

- Having ISO 9001 Quality Management System and ISO 14001 Environmental Management System,
- Minimizing the carbon footprint by developing environmentally friendly operations,
- Using environmentally friendly fuel vehicles (LPG, CNG, etc.),
- Using systems with low greenhouse gas emissions in transportation and distribution systems,
- Reducing carbon emissions by using intermodal transportation systems,
- Adding electric vehicles with zero carbon emission during transportation to the fleet,
- Reducing energy consumption in warehouses with automatic separation systems (Dong et al., 2022; Dinçer et al., 2022a–c; Zhang et al., 2022; Yüksel & Dinçer, 2022),
- Instantly measuring the electricity in the company with automatic meter reading systems and taking measures for saving,
- Keeping the packaging material used during product packaging as little as possible,
- Paying attention to the high recyclability rate in the selection of packaging materials,
- Recycling the product with environmentally friendly methods,
- Ensuring that waste motor oils are collected and disposed of without harming the environment,
- Reducing the noise pollution in the production and distribution stages,
- Raising awareness of the personnel and customers working within the company about environmental sensitivities.

Many businesses consider factors such as green product, pollution control and green packaging in supplier evaluation. A business that practices green purchasing can integrate environmental standards into purchasing policies, which are necessary for supplier selection, evaluation, and development of relations with suppliers. Environmental cooperation with suppliers, commitment of top management and consumer pressure positively affect the green purchasing of the enterprise. To develop high quality and environmentally friendly products, businesses work closely with their suppliers to recognize risks early and share risks with suppliers, thus achieving cost savings (Huang et al., 2022).

Cost, which is one of the most important criteria in the supplier selection process, is not the only factor to be considered. Green sourcing is environmental purchasing that consists of activities that include reuse, reduction, and recycling of materials in the purchasing processes. Green sourcing, which refers to purchasing products with recycled ingredients, is a start-up strategy with proven success. When faced with a competitive choice, materials that have less adverse effects on human health and the environment should be chosen. When comparing the choices, many factors such as means of distribution, whether the resources used are renewable or not, the cleanliness of the production processes, the energy used in production, the amount and type

of resources are taken into consideration (Carayannis et al., 2022; Li et al., 2022a, b; Yüksel et al., 2022; Mikhaylov et al., 2022; Verma et al., 2022).

17.3 Conclusion

Establishing sustainable relations with the right suppliers has become more important than ever in today's world where there is intense competition among manufacturers. In this direction, manufacturers had to consider many criteria in supplier selection. These criteria can vary depending on the working areas of the manufacturers, the characteristics of the product they produce, the production conditions, the legal regulations in the location where they produce, the legal regulations in the sales locations, brand images and many other parameters (Asgharnezhad & Darestani, 2022).

Green purchasing requires mastering the raw material of a product, where it comes from, who produced it, and how the final product will be disposed of. To reduce the environmental impact of a product, it is possible to make improvements such as reducing resources used in production, designing environmentally friendly production processes, replacing packaging materials and transportation methods with more environmentally friendly ones, and reuse (Wang et al., 2022).

One of the most important points in the supplier selection problem is to determine the appropriate supplier selection criteria for the problem. The first step in the traditional supplier selection process is to determine the need and the working criteria according to this need. Suppliers that meet these criteria are included in the tender under equal conditions and the appropriate supplier is selected because of the evaluation. The main criteria considered in selecting the appropriate supplier are unit price, meeting demands on time, meeting quality expectations, honest communication, industrial knowledge and experience, flexibility, speed of response to sudden demands, financial situation, compliance with ethical standards, references, size of the supplier and cultural harmony between the manufacturer and the supplier. Necessary conditions for green supplier selection include some environmental conditions as well as the criteria listed above.

In this study, green purchasing and green supplier selection issues are examined in detail and green supplier selection criteria are proposed by making use of many articles written on these issues. The most important of these criteria can be summarized as follows.

– Waste management
– Certification
– Reverse logistics
– Compliance with legal regulations
– Environmental management programs

The most important result of the study is that purchasing decisions are no longer only focused on unit price, and that the green perceptions and competencies of the

suppliers are also effective in the purchasing decision. This result shows parallelism with previous studies. Even when choosing a green supplier, costs are still important in the selection decision, but environmental factors also have a significant impact on the decision.

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