International Journal of Environment, Agriculture and Biotechnology
Vol-6, Issue-5; Sep-Oct, 2021

Journal Home Page Available: https://ijeab.com/
Journal DOI: 10.22161/ijeab

Green Logistics and Alternative Methods: A Review

Dr. Hulya Cagiran Kendirli[1], Omer Faruk Biyik[2], Sadi Arli[3]

[1]Dr (PhD.), Department of Business Administration, FEAS, Hitit University, Turkey
[2,3]Master Student, Social Science Institute, Hitit University, Turkey

Received: 11 Sep 2021; Received in revised form: 08 Oct 2021; Accepted: 16 Oct 2021; Available online: 24 Oct 2021

Abstract**—** *When logistics activities are evaluated, it creates awareness on consumers. The understanding of sustainability, which has developed and grown in recent years, has brought important developments in logistics applications. These developments have found a place in the understanding of the green logistics approach. With this understanding, it has found a place in the methods and practices of logistics. With this understanding, it has developed the organizational structures of logistics. In this understanding, the aim is not to harm the environment. On the other hand, rationalizing high energy costs is considered within this scope. Sustainability policies, which have become more important in the recent period, also show their effect in logistics applications. This also aims to give companies a competitive advantage. In this context, sustainability studies on social, ecological and economic issues have highlighted the "green logistics" approach. In addition to the developing retail sector, companies in this sector are trying to implement green logistics practices within the scope of trend logistics activities in order to stay in the market. In this study, the environmental impact of the measures taken by the companies in the field of green logistics practices and different sales strategies were examined. In this context, the effects of energy on the usage areas are evaluated and green logistics applications are discussed. In addition, a common framework was created by examining the success rates of green logistics applications. In this context, the scope of green logistics and its basic applications, followed by alternative green logistics applications are listed.*

Keywords**— Sustainability, Logistics, Green Logistics.**

I. INTRODUCTION

Towards the end of the 80s, the concept of "green", which opened a new era in the transportation sector, allowed to create new searches with the problems occurring in transportation. In the late 80s and early 90s, the concept of green became a new competitive slogan. The World Commission on Environment and Development Report provided support on green issues in the political and economic field (Banister et al. 1993). At the beginning of the 90s, studies were started on how the concept of green and the logistics sector are blended together.

Along with green logistics, it envisaged measuring the environmental effects of different distribution methods for goods produced and distributed in a sustainable way. At the same time, it aimed to reduce the use of energy in logistics operations. Again, the goal of green logistics is to protect biodiversity. However, sustainable activities and reducing carbon emissions are also included in the scope of environmentally friendly logistics systems. Another goal of green logistics, such as reducing environmental pollution, has been an application area that allows the method of operation of a logistics system to be viewed from a different perspective.

With the effect of increasing environmental awareness in the world, the importance and necessity of green logistics has increased with the legal infrastructure prepared by the green agreement in Europe. As a result of the activities of not only logistics, but also all sectors, there is a carbon emission released to the nature. The investments made within the scope of incentive investments of around 1 trillion Euros that the European Union will make for the studies in this field show the importance of the transformations in this field. Compliance and transformation in this field is much more important because when companies operating in this field are not compatible with this field, tax burdens such as carbon tax

at the border will increase, competition conditions will become more difficult, and commercial reputations will be damaged due to the increasing awareness in this field.

Turkey is developing many environmentally friendly practices within the scope of green logistics by many companies. While it is possible to reach earlier studies on the concept of green logistics in foreign countries, compared to Turkey, Turkey has only recently become acquainted with this concept.

Our aim in the study is to examine and research today's green logistics studies and to investigate to what extent companies include green logistics practices in their activities. At the same time, in this context, it offers suggestions about how the legal legislation should be. The method of the study consists of a literature review. After the general outlines of the subject were formed, the literature review was reduced to a summary by researching world examples.

Importance of Green Logistics and Effects on Businesses to Green Logistics

Sustainability, legal obligations, environmental concerns and the social responsibility understanding that emerged in the logistics sector, together with the recently increasing environmental sensitivity to the issue, pushes companies to participate in green logistics activities. The importance of green logistics, economic factors, has become an important label that guarantees customer satisfaction in the market. The importance of green logistics is increasing day by day due to factors such as green image and environment-oriented government programs (Acar and Köseoğlu, 2014: 352).

Logistics activities should be managed in an environmentally friendly manner. The use of more environmentally friendly raw materials in packaging and the search for alternative transportation methods are typical examples of this. Companies take various measures to reduce the harmful effects of traffic on the environment. Judging from these measures, they focus on noise pollution and traffic congestion, while considering reducing fuel costs to the most economical level. When buying a vehicle, a green company should prefer unleaded gasoline-powered vehicles and apply for long-distance rail transport. On the road, where road transport is essential, transport methods in accordance with the green understanding should be selected. The fuel used should be consumed in a way that does not pollute the environment. Environmentally friendly motor vehicles should be preferred (Aslan, 2007: 40).

II. GREEN LOGISTICS PRACTICES

There are many applications related to green logistics in the world and in our country, if we will consider them mainly (Gültaş and Yücel, 2015:75, www.tobb.org.tr);

- Use of alternative fuels
- Encouragement and dissemination of the use of environmentally friendly motor vehicles
- Promotion of public transportation and support of infrastructures
- Promotion of cycling
- Obligation to use noise and sound-preventing equipment in vehicles
- Use of environmentally friendly transportation and distribution systems
- Reducing overall packaging and materials used
- Use of materials with shorter recycling in packaging
- Use of sustainably produced pure products
- Increasing and planning environmentally friendly recycling activities
- Social awareness and educational practices
- Promotion of reverse logistics practices.

Advantages of green logistics

- By adding originality to the service production system and operating procedures, it provides learning how to deal with environmental impacts and current or future regulations and these changes.
- Increases the quality and efficiency of service and product delivery.
- Needs green economy enables innovative decisions to be made. These restrictions push companies further in their efforts to reduce operating costs.
- When you develop products that meet environmental requirements, a difference is made in the services and products offered.
- Being environmentalist strengthens the company's marketing and advertising policy. It gives strength especially in the sales area.
- It raises the awareness of sensitive consumers in the fields of sustainability and social responsibility.

GREEN APPROACH IN SUPPLY CHAIN MANAGEMENT

Green supply chain can be defined as a chain of processes in which environmentally friendly inputs are used in production and these inputs are naturally transformed into products that can be easily recycled and do not cause pollution after process changes (Temur, Ayvaz and Bolat,

2015: 1). Green supply chain refers to a system created by integrating environmental objectives into all branches of the supply chain. Procurement consists of a combination of green production (materials management), green distribution, green marketing and reverse logistics studies and the advantages of green technology.

Supply chain management of companies can be listed as follows (Temur, Ayvaz and Bolat, 2015: 2);

Cost reduction profit maximization

Ensuring an effective risk management

Preventing a possible increase in waste costs

Inexpensive fulfillment of environmental legal obligations now and in the future,

Increasing product and service quality

Meeting market expectations is the management of customer relations.

Green logistics in road transport

As road transport, trucks, trucks, etc., which only make intercity and international transport operations in mind. vehicles should not come. In addition, with increasing prosperity and wealth, road transport is used very seriously to provide personal transportation. When we look at today, 40% of the world's oil demand is demanded by road transport. This situation is increasing rapidly from year to year. Naturally, at the end of the process, the share of road transport in carbon emissions increases even more. According to TUIK 2020 data, while CO2 emissions in road freight and passenger transport in Turkey were 30 million tons in 1990, this figure increased threefold in 2018 and reached 90 million tons. Therefore, worldwide road freight and passenger transport has a serious impact on CO2 emissions. In the coming days, it will be extremely necessary for those who want to gain a competitive advantage in this field and who want to continue to exist in the sector, to minimize the effects of CO2 emissions and to update themselves with alternative methods for this. For this, firstly, instead of petroleum-derived fuels, they should use alternative fuels that emit less CO2 emissions to the nature. At the beginning of these is the most widely used "Electricity" energy. However, considering the increasing electricity demand in the world, this is not enough on its own. In addition to electricity, "Biodiesel energies obtained from vegetable oils" and "Bioethanol energies obtained from sugar-based plants", which are also obtained through plants, also constitute an alternative method. Likewise, newly developed and and hydrogen, "Hydrogen energy obtained as a result of combining oxygen and hydrogen" is an alternative method.In addition to these, alternative methods that are more used, "LPG, liquefied petroleum gas and CNG, liquefied natural gas" Among these methods, the method that releases the most CO2 to the nature is the use of energy obtained from LPG or CNG. However, it is expressed as more environmentally friendly when compared to petroleum.1 liter of gasoline, 2500 grams of CO2 While releasing its emissions to nature, this amount is 1600 grams in LPG (Synak, Ghana, Rievaj and Mokrickova: 2019).

Alternative Methods for Green Logistics

1) Electric Bus

It is one of the environmentally friendly transportation methods created for urban public transportation. Electric buses, which are more comfortable and easier to use for cities where the sun is abundant, work with zero CO2 emissions with the solar energy panels placed on them. It is thought that its use will become widespread in other cities, along with its use in cities such as Izmir and Malatya in Turkey. According to the data obtained from the 2-month usage results of the ESHOT Electric Bus Project, which is 40% domestic and used in İzmir, it provides an energy saving of up to 75% (www.emo.org.tr). Likewise, electric buses produced by Bozankaya, which are 100% domestic, are used in Malatya.

2) Trambus

It is one of the alternative methods developed for urban public transportation, which started to be implemented in Malatya in 2015 in Turkey. It is a transportation vehicle with a high passenger capacity due to the fact that it does not have a rail system body, which takes its power from the power line (cataner system) hanging along the road, provides ease of use by charging with the battery system in places where there is no power line (www.bozankaya.com.tr). Since it does not need a rail system infrastructure, the infrastructure cost is low. They are electric buses with freedom of route due to the use of the highway. Trambuses, which are economical because they do not require a rail system and work with zero emissions, are a transportation system that is expected to become widespread even though it is still new.

3) Electric Tram

Developed in 1881 by the German electrical engineer and industrialist Werner von Siemens (1816-1892), the electric tram was put into service on the Berlin-Lichterfelde trial line (https://core.ac.uk). Later, in 1914, it was first used on short lines in the Ottoman Empire, in the city of Istanbul. The system has started to be used on the Şişli-Karaköy line in Istanbul. Electric tram technology, which was very new at that time, could not become widespread in the Ottoman Empire. However, today in Turkey, with the rapid increase in the population of metropolitan cities, its use has

increased. Today, it has become a very preferred transportation system. Recently, electric trams have started to take on green colors and zero-emission electric trams have also started to be produced.

4) Silent night distribution

The European Union, which is the starting point of the Green Agreement, acts more effectively and effectively for green logistics than many other developed countries. For this, it uses special transport systems, transport hours, special transport places and environmentally friendly systems. One of the best examples of this is a pilot study in Barcelona using a special transport clock called the "silent night distribution system". Within the scope of the application, the trucks that will be required for transportation made the distribution at night. In this application, trucks with a capacity of 40 tons were used. These trucks were equipped with a noise-canceling system and were allowed to drive twice, from 11 am to 5 am. At 11 o'clock at night, long-lived goods were transferred, and at 5 o'clock in the morning, short-lived goods that need to be transported within the framework of the cold air chain were transferred (Güvercin, 2018:475). Thus, as the city traffic is not more concentrated during the daytime, a further reduction in the amount of emissions has been observed.

5) Bicycle transport

Logistics is not just a long-distance transportation system. At the same time, the concept of logistics is used within short distances. Many vehicles and engines are used in this. Although it is not very common today, there is actually "Bike Transport". It is more common in countries with green consensus and environmentally friendly laws. "Getir" brand, which is one of the most preferred brands for urban logistics in Turkey, offers its services with motorcycle couriers. However, in countries with environmentally friendly laws, such as Germany, this service is by bicycle and electric bicycle. In the transportation sector, if we go back to the history of an old transportation system, which is not really new, it will be necessary to go as far as India. Lunch has been delivered since 1890, with the oldest bicycle transport service in Mumbai, India. Today, in this area, more than 175,000 light goods are transported in Mumbai every day by 5,000 carriers (Maes and Vanelslander, 2012: 415).

Image:1 An official delivering food in Mumbai

Although it is more common in Europe, the use and transportation of bicycles is also encouraged in Turkey. For this, necessary bicycle paths, bicycle lanes and necessary infrastructures are prepared. Cycling is much more advantageous in urban transportation and transportation, as there is no parking problem and it has the advantage of being used in areas with heavy traffic. In the future, with the increase in e-commerce, small deliveries will increase even more, and with the increasing traffic density, it will be inevitable that the advantages of bicycle transportation will be reflected in logistics applications. It is thought that this situation will increase much faster once the logistics companies are noticed. Because cycling not only reduces carbon emissions, but also brings other advantages such as time savings and cost reduction. Again, in a review, it was investigated how much of a freight transport could be converted from road to bicycle transport in European cities. According to the findings obtained from the research, it was concluded that 7 km distances are acceptable distances for bicycle transportation. Within the scope of the research, 7 km distance is assumed as the transformation potential. This distance was accepted as the acceptable distance and calculations were made over this distance. According to the report in question, the crowd created by freight vehicles in traffic was also examined. According to the findings, freight transport vehicles constitute 8-15% of vehicle mobility for French traffic. This is 15% for Switzerland. According to the information obtained from the report, it has been observed that freight transport vehicles constitute 20% of Berlin traffic. (http://www.cyclelogistics.eu).

6) Logistic Villages

With the increase in the necessity and importance of green logistics, logistics has created logistics villages as a new concept and method. Although it is used in definitions such as freight village, logistics area, logistics center, logistics focus, logistics park, logistics base, logistics distribution park in Turkey (Tanyaş, 2010), these areas heavily overlap with the concept of logistics village. It is said that the idea of the logistics village first emerged in Japan. However, the first application area of the logistics village was in the USA, due to the increasing urban density and rapidly developing industry. Later, it started to be applied in other developed countries such as EU countries and Japan. Along with the widespread logistics villages, logistics activities have also become more efficient. In particular, logistics villages built in places where railway, road and seaway can be used together have become even more efficient. Therefore, the most critical move in the construction of logistics villages has been the choice of location. When choosing a location, the chosen location should be an advantageous location for both the transportation and distribution systems required for logistics. Besides, it should be a place that will not increase the density of city traffic with its distance to the city. Already, the purpose of its establishment is due to the fact that the vehicles in freight transportation increase the density of city traffic. In the USA, logistics villages have been established in order to prevent traffic congestion caused by heavy transport vehicles in the city. In Europe, the areas close to the main transportation networks were preferred for logistics villages by reducing the environmental pollution caused by the development of low-growth industrial areas and truck transportation. In this way, these old industrial areas, which allow intermodal transportation, have been used in a more consolidated way. When all these are considered in terms of Europe, the importance of logistics villages can be understood within the concept of sustainable development (Maes and Vanelslander, 2012: 415).

III. RESULT AND SUGGESTIONS

As a result, the tough competition environment brought by globalization, laws and regulations to protect the environment, customer power, activities in the field of corporate social responsibility bring the green perception to the fore and make it more important. In this context, the management of green logistics practices by logistics companies will bring along strategic decisions. In the context of these strategic decisions, they need to demonstrate environmental awareness in all areas of management and logistics practices. For this purpose, it is essential that they create a stronger entrepreneurial awareness than ever before. Businesses, industries and companies providing logistics services should focus on meaningful applications. At the same time, they should provide more value and benefits to their suppliers in terms of environmental awareness in their production and management processes. In this context, they should develop guidelines and strategies. In the process, they should always be open to development and change in accordance with the green consciousness. If it is desired to leave a world worth living for future generations, it is necessary to act with this awareness in the field of logistics, as in every field. In this context, all players in the logistics sector should define green logistics practices as a mission and target. In their business processes, they should implement green logistics practices as soon as possible.

This situation can be viewed from another angle. Developing countries are in fierce competition with developed countries in the field of technology. In order to compete with developed countries in the field of technology, many infrastructures need to be developed. However, in order to compete in green logistics applications, government incentives and increased awareness are required. Considering from this point of view, in terms of green logistics in Turkey, the necessary breakthrough and legal infrastructure should be made urgently. With the legal implementation of these practices, significant contributions will be made to Turkey economically, along with the contributions to the environment.

REFERENCES

[1] Acar A.Z. and Köseoğlu A.M. (2014), Lojistik Yaklaşımıyla Tedarik Zinciri Yönetimi, Nobel, Ankara

[2] Aslan F. (2007) Yeşil Pazarlama Faaliyetleri Çerçevesinde Kafkas Üniversitesi Öğrencilerinin Çevreye Duyarlı Ürünleri Kullanma Eğilimlerini Belirlemeye Yönelik Bir Araştırma, Yüksek Lisans Tezi, Kars

[3] Banister,D., K.(1993),Transport, the Environment and Sustainable Development, 1st Edition,Routledge, London Birleşmiş Milletler Dünya Cevre Kalkınma Komisyonu Raporu,1987

[4] Gültaş, P , Yücel, M . (2015). Yeşil Lojistik: Yeşil Ulaşım Hizmetleri Malatya Büyükşehir Belediyesi Örneği . Akademik Yaklaşımlar Dergisi , 6 (2) , 70-83 . Retrieved from https://dergipark.org.tr/en/pub/ayd/issue/27224/286706

[5] Güvercin, S. (2018). "Sürdürülebilir Kalkınma için Yeşil Lojistiğin Önemi Dünya ve Türkiye'deki Uygulama Örnekleri", SOBİDER Sosyal Bilimler Dergisi, Yıl:5 Sayı:19, s.465-481.

[6] http://www.cyclelogistics.eu

[7] https://core.ac.uk/download/pdf/38306416.pdf

[8] https://www.bozankaya.com.tr/trambus/

[9] https://www.emo.org.tr/ekler/0eeea44ff2c7982_ek.pdf?dergi=1104

[10] https://www.youtube.com/watch?v=4fMo7GVZiVI (Tobb Yeşil Lojistik ve Yeşil Tedarik Sistemi Seminer)
[11] Maes J., Vanelslander T., 2012, "The use of bicycle messengers in the logistics chain concepts further revised", The Seventh International Conference on City Logistics , Procedia - Social and Behavioral Sciences 39, s.409 – 423.
[12] Synák F., Gaňa J., Rievaj V., & Mokričková L. (2019). Ways of reducing carbondioxide from road transport. The Archives of Automotive Engineering – Archiwum Motoryzacji, 86(4), 41–54. DOI 10.14669/AM.VOL86.ART3
[13] Tanyaş, M. 2010, "Kentsel Lojistik", Bölüm 4, Lojistik Köyler.
[14] Temur G.T. , Ayvaz B. , Bolat B. (2015) Tersine Lojistik Yönetimi, Nobel, Ankara