ÇEVRESEL LOJİSTİK: "YEŞİL TEDARİK ZİNCİRİ YÖNETİMİ"

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Özet

Tedarik zincirinden kaynaklanan atık ve emisyonlar ciddi çevre sorunlarının ana kaynağı haline gelmiştir. Taşıma sistemlerinin verimliliği açısından lojistik uygulamalarının çevre dostu olması önerilmektedir. Çevresel zararlar; toksik atık, su kirliliği, biyolojik çeşitliliğin kaybı, ormansızlaşma, ekosistemlerin uzun vadeli zarar görmesi, tehlikeli hava emisyonlarının yanı sıra yüksek sera gazı emisyonlarını içerebilir. İşletmeler çevresel bilinci teşvik etmek amacıyla çevresel sorumluluğu ve temiz teknolojileri kullanan tedarikçilerle işbirliği yapmalıdırlar. Yeşil Tedarik Zinciri Yönetimi içerisinde çevresel kaygılar ön plana çıkartılarak ortaya çıkmıştır. Günümüzde Yeşil Tedarik Zinciri Yönetimi, akademik ve uygulayıcılar arasında önemli bir popülerlik kazanmıştır. Ayrı kuruluş birimleri, ürün geliştirme, süreç tasarımı, operasyon, lojistik, pazarlama, yasal uyum ve atık yönetimi çevresel mükemmellik sağlamak için sorumlulukları vardır. Bu yönetimi kavramı, tedarik zinciri yönetimine çevresel düşünmenin entegresi ile mümkündür.

Anahtar Kelimeler: Lojistik, Tedarik Zinciri Yönetimi, Yeşil Tedarik Zinciri.

ENVIRONMENTAL LOGISTICS: "GREEN SUPPLY CHAIN MANAGEMENT"

Abstract

The waste and emissions caused by the supply chain have become the main sources of serious environmental problems. Since the applications of logistics are generally positive for the efficiency of transport systems, it has been suggested that logistics are environmentally friendly. Environmental damages can include toxic waste, water pollution, loss of biodiversity, deforestation, long term damage to ecosystems, hazardous air emissions as well as high greenhouse gas emissions. Companies should engage with suppliers to improve environmental impacts, by applying the precautionary approach, promoting greater environmental responsibility and the usage of clean technologies. Green Supply Chain Management (GSCM) has appeared as an environmental innovation which integrates environmental concerns into supply chain management. GSCM has gained popularity with both academic and practitioners today. Separate organizational units had responsibility for ensuring environmental excellence in product development, process design, operations, logistics, marketing, regulatory compliance and waste management. The concept of GSCM is possible to integrate environmental thinking into supply chain management (SCM).

Keywords: Logistics, Supply Chain Management, Green Supply Chain Management.

1. INTRODUCTION

During the 1990s, many manufacturers and service providers sought to collaborate with their suppliers and upgrade their purchasing and supply management functions from a clerical role to an integral part of a new phenomenon known as supply chain management (Tan, 2001). Supply chain management (SCM) has become an important competitive approach for organizations in this environment (Zhu, Sarkis, & Lai, 2008). Green supply chain management (GSCM), which integrates environmental concerns into supply chains, has been widely implemented by companies to improve performance (Zhu, Feng, & Choi). Some studies showed that GSCM can bring both environmental and economic performance (Chiou, Chan, Lettice, & Chung, 2011). Supply chain management is a hierarchical and strategic approach to planning supply and demand, sourcing raw materials and components, making products and parts, tracking inventory and order fulfillment, and delivering to the customer and end user (Chow et al., 2008).

The GSCM practices concept is introduced for measurement of a firm's competence involving management on environmental performance (Chong et al., 2015). Environmental activities goes beyond the firm's borders and involves the whole supply chain from the raw material supply to product usage and even further to postuse processes including reverse logistics (Seliger, Mohd. Yusof, Masoumik, et al., 2015). Consequently, companies should invest in design and planning to optimize their logistic network, while accounting for the trade-off between cost and environmental effects in this evaluation (Seliger, Mohd. Yusof, Memari, Rahim, & Ahmad, 2015).

2. GREEN SUPPLY CHAIN MANAGEMENT

Recent years have seen a growing interest among both academics and practitioners in the field of supply chain management. Generally, a coordinated decentralized supply chain usually performs better than the uncoordinated one (Chen, Shen, & Feng, 2014). Today's Globalization increases the opportunities for buyers. As buyers increase their focus on environment improvement, which increases the supplier environmental performance. Proactive purchasing activities must also address environmental issues within the organization as well within the supply chain (Zsidisin & Siferd, 2001). During the last decade, there has been considerable interest in both environmental management issues and buyer–supplier relations (Hall, 2000). Indeed, there are three approaches to GSC: environment, strategy, and logistics (Diabat & Govindan, 2011). The green SCM concept firms in supply chains today often feel obliged to reduce their own carbon footprints as a result of competition and ethical pressures (Tang, Wang, Yan, & Hao, 2015).

GSCM covers activities such as 'green design', 'green sourcing/procurement', 'green operations' or 'green manufacturing', 'green distribution, logistics'/marketing' and 'reverse logistics' (Diabat & Govindan, 2011). GSCM practices encompass a set of green activities in procurement, manufacturing, distribution and reverse logistics (Ninlawan et al. 2010).

2.1. Green Procurement

Green Procurement means purchasing products and services that cause minimal adverse environmental impacts. Green procurement in companies is supported by a number of formal elements such as environmental policies and systematized environmental efforts (Alberg Mosgaard, 2015). Green, or environmental purchasing, is the involvement of the purchasing function in supply chain management activities such as life-cycle analysis (LCA) and environment design that facilitates recycling (Appolloni, Sun, Jia, & Li, 2014). By using their purchasing power to choose environmentally friendly goods, services and works, they can make an important contribution to sustainable consumption and production ("Green Procurement Guidelines," 2006).

2.2. Green Manufacturing

Green technology is the application of one or more of environmental science, green chemistry, environmental monitoring and electronic devices to monitor, model and conserve the natural environment and resources, and to curb the negative impacts of human involvement (Singh, Paul, Bhole, & Chaudhari, 2014). Supply chain activities important for environmental performance include marketing, customer relations, distribution, product design, order management, and manufacturing (Zsidisin & Siferd, 2001).

2.3. Green Distribution

Green distribution are consists of green packaging and green logistics. Companies that have adopted GSCM practices in distribution activities have successfully improved their business and environmental performance on many levels. Furthermore, the concept is often used in a context where different transport alternatives are compared. It is therefore much more fruitful to provide the concept of "green transportation services" (Björklund, 2011). The implications of marketing and distribution channels, and subsequently an SCM, appear in the early economics literatüre (Sarkis, Zhu, & Lai, 2011).

2.4. Reverse Logistics

Green logistics includes recycling and disposal logistics, reverse logistics, and other names for it are 'reverse distribution', 'reverse-flow logistics', and 'green logistics' (Ala-Harja & Helo, 2015). Remanufacture denotes a higher order option than recondition and is the process of restoring used products to at least original equipment manufacturer (OEM) performance specifications (Khor, Udin, Ramayah, & Hazen, 2016). Many electronic companies such as HP, Cannon and NEC Corporation are taking advantage of reverse supply chain (Gou, Liang, Huang, & Xu, 2008). Fig. 2.1. illustrates a generic supply chain for both forward and reverse logistics.

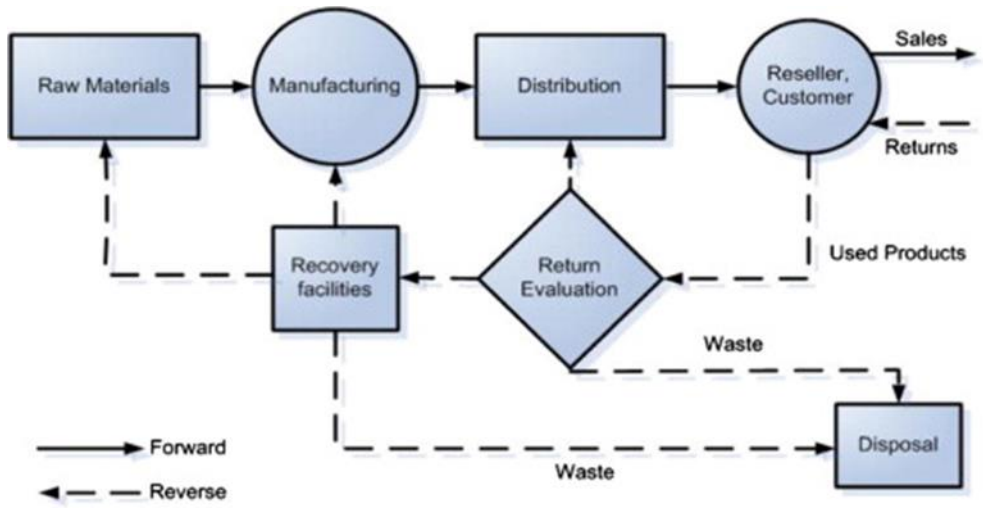

Figure 2.1. A generic form of forward/reverse logistics (Tonanont et al., 2008).

3. Impacts of Climate Change upon Supply Chain Operations

Natural forces ensure that the Earth has experienced a changing climate since the beginning of time (Chapman, 2007). CO_2 emissions from an average car showed that 76% were from fuel usage where as 9% was from manufacturing of the vehicle and a further 15% was from emissions and losses in the fuel supply system (Potter, 2003). The amount of energy and carbon emissions that is required to satisfy transport needs in developed countries is high, has increased rapidly in the past few decades (Mattioli, 2016). 24% (12 GtCO2eq, net emissions) in AFOLU, 21% (10 GtCO2eq) in industry, 14% (7.0 GtCO2eq) in transport and 6.4% (3.2 GtCO2eq) in buildings. When emissions from electricity and heat production are attributed to the sectors that use the final energy (i.e. indirect emissions), the shares of the industry and buildings sectors in global GHG emissions are increased to 31% and 19%7 , respectively (Figure 3.1.) (IPCC, 2014).

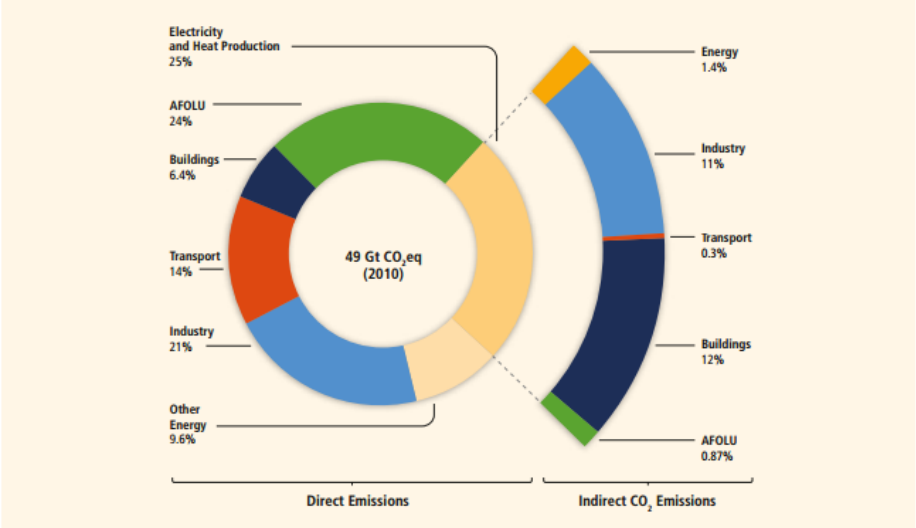

Figure 3. 1. Total anthropogenic GHG emissions (GtCO2eq/yr) by economic sectors (IPCC, 2014)

Transport is a key economic sector, supporting economic and social development, allowing efficient allocation of materials and resources and mobility for human. Total CO_2 emissions from fossil fuel increased approximately 38% from 20.9 gigatonnes (Gt) in 1990 to 28.8 Gt in 2007, of which the emissions from the transport sector rose from 4.58 Gt in 1990 to 6.63 Gt in 2007, an increase of 45% (Saboori, Sapri, & bin Baba, 2014).

4. CONCLUSIONS

The International Transport Forum (ITF) estimates that international trade-related freight transport currently accounts for around 30% of all transportrelated CO2 emissions from fuel combustion, and more than 7% of global emissions (OECD/ITF, 2015). Two sectors produced nearly two-thirds of global CO2 emissions in 2013: electricity and heat generation, by far the largest, which accounted for 42%, while transport accounted for 23% (Figure 4.1.) (IEA, 2015).

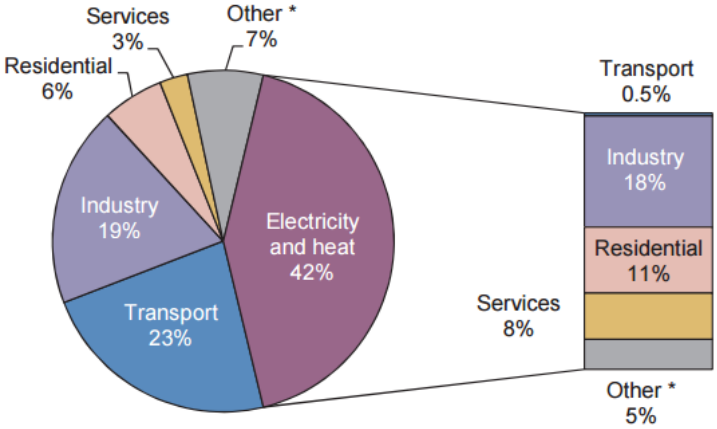

Figure 4.1. World CO2 emissions by sector in 2013 (IEA, 2015)

The main air pollutants related to the production and use of energy are CO, CO_2, CH_4, SO_2, NO_x and suspended particulates in Turkey (Table 4.1. and Fig. 4.2., Fig. 4.3., Fig. 4.4.).

Tablo 4.1. Direct and indirect greenhouse gas emissions in Turkey between 1980 and 2010 (Gg) (State Institute of Statistics (SIS), 2003)

GHGs	1980	1985	1990	1995	2000	2005	2010
Direct GHGs	110,216	133,056	200,720	241,717	333,320	427,739	567,000
CO_2	81,889	108,923	177,973	211,229	303,079	397,351	535,966
CH_4	27,574	23,265	21,618	24,302	25,585	25,531	25,640
N_2O	753	868	1128	6116	4656	4858	5394
NO_x	380	493	680	814	1154	1513	2073
CO	2936	3115	3715	3961	8390	9552	11,433
MNVOC	360	380	524	599	1415	1638	1991
SO_2	131	420	813	894	1038	1038	1038

GHGs: Greenhouse gases.

Regional differences in contributions to global emissions conceal even larger differences among individual countries. Two-thirds of global emissions for 2013 originated from just ten countries, with the shares of China (28%) and the United States (16%) far surpassing those of all others. Combined, these two countries alone produced 14.1 GtCO2. The top-10 emitting countries include five Annex I countries and five nonAnnex I countries. For transport, the fast emissions growth was driven by emissions from the road sector, which increased by 68% since 1990 and accounted for three quarters of transport emissions in 2013 (IEA, 2015).

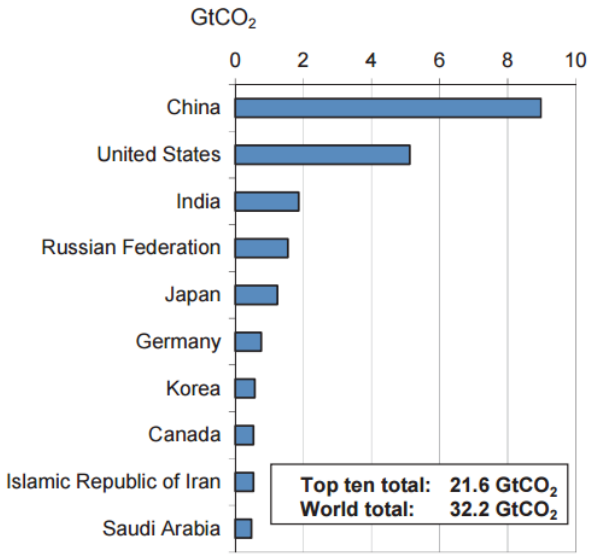

Figure 4.2. Top ten emitting countries in 2013 (IEA, 2015)

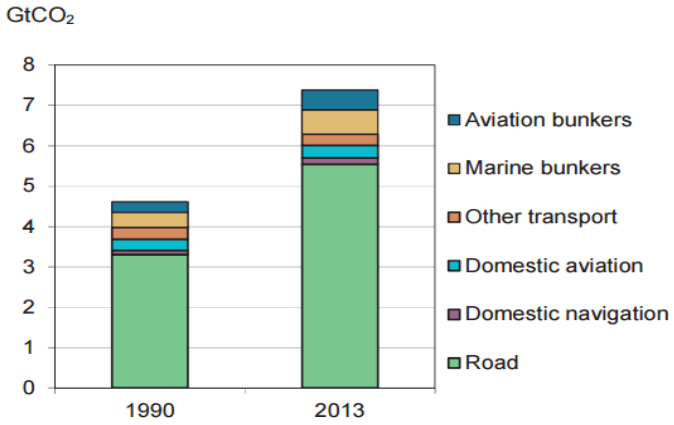

Figure 4.3. CO2 emissions from transport (IEA, 2015)

The model projects total CO_2 emissions to increase at an average rate of 5.8%/yr and reach 871 million t/yr by 2025 (G. Conzelman, V. Koritarov, (2002).

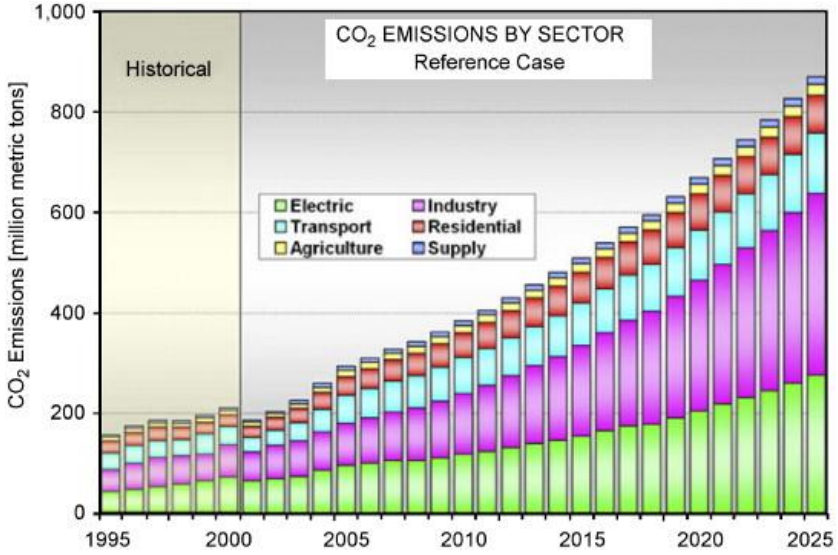

Figure 4.4. Reference Case CO2 Emissions (G. Conzelman, V. Koritarov, (2002)

Economic expansion, rising per capita income, positive demographic trends and the rapid pace of urbanization have been the main drivers of energy demand, which is estimated to increase by around 6 percent per annum until 2023. If the small and medium enterprises are interested in making their processes more ecological, at the beginning it is important to focus on implementation of initiatives of green logistics into such corporate strategies which will enable their implementation in the whole enterprise, and will have a positive impact on the offer of products and services (Bektas, Denisa, & Zdenka, 2015). Green logistics is therefore defined as efforts to examine ways of reducing these externalities and achieving a more sustainable balance between environmental, economic and social objectives, (Figure 4.5.) (Iwan, Thompson, & Seroka-Stolka, 2014). GSCM alone is not enough to improve financial performance but the manufacturers will need to extend their focus beyond organisational boundaries to their customers (Laari, Töyli, Solakivi, & Ojala, 2016).

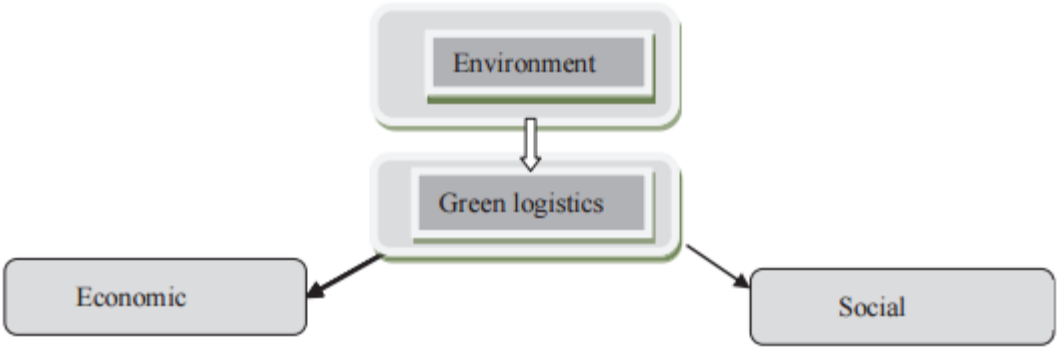

Figure 4.5. Green logistics as an element of sustainable development ((Iwan et al., 2014)

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