



Analyzing the Impacts of European Green Deal on Logistics through CIMO-Logic

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Abstract

The European Green Deal (EGD) is a set of legislation and policy guidelines aimed at making Europe the first continent to become carbon neutral by 2050. According to this agreement, changes and transformations are foreseen in various fields in order to achieve the sustainable development goal. The focus of the logistics industry has shifted to green logistics, also known as eco-logistics, in compliance with this deal. This concept describes the sustainable approaches implemented by the wider logistics industry on the continent to minimize the environmental impact of warehousing and transporting goods as well as other logistical activities. The effects of EGD on logistics should be examined and practices that can give better results should be developed. In this study, CIMO-Logic, which is one of the design science research approaches that enable the evaluation of processes and the presentation of scientific evidence, is promoted. The findings of the study are intended to help reveal the effects of this deal on logistics practices.

Keywords: European Green Deal (EGD), Logistics, Eco-logistics, CIMO-Logic.

Avrupa Yeşil Mutabakatının Lojistik üzerindeki Etkilerini CIMO-Logic ile Analizi

Öz

Avrupa Yeşil Mutabakatı (AYM), Avrupa'yı 2050 yılına kadar karbon-nötr haline gelen ilk kıta haline getirmeyi amaçlayan bir dizi mevzuat ve politika kılavuzudur. AYM'ye göre, sürdürülebilir kalkınma hedefine ulaşmak için çeşitli alanlarda değişiklik ve dönüşümler öngörülmektedir. Lojistik sektörünün de odak noktası, bu mutabakata uygun olarak eko-lojistik olarak da bilinen yeşil lojistiğe kaymıştır. Söz konusu kavram, depolama, nakliye ve diğer lojistik faaliyetlerin çevresel etkisini en aza indirmek için lojistik endüstrisi tarafından uygulanan sürdürülebilir yaklaşımları tanımlamaktadır. AYM'nin lojistik üzerindeki etkileri incelenmeli ve daha iyi sonuçlar verebilecek uygulamalar geliştirilmelidir. Bu çalışmada, süreçlerin incelenmesini ve bilimsel kanıt sunulmasını sağlayan tasarım bilimi araştırma yaklaşımlarından biri olan CIMO-Logic'ten yararlanılmıştır. Çalışma bulgularının, mutabakatın lojistik uygulamaları üzerindeki etkilerini ortaya koymaya yardımcı olması amaçlanmaktadır.

Anahtar Kelimeler: Avrupa Yeşil Mutabakatı (AYM), Lojistik, Eko-lojistik, CIMO-Logic.

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1. Introduction

The production speed and volume enabled by the industrial revolutions have rapidly changed the way people live (Schwab, 2017). Increasing population and prosperity have caused consumption to increase tremendously and jeopardized the continuity of resources for future generations (Basiago, 1998). In view of the fact that resources are running out over time, and the extent of environmental damage, governments are prompted to take measures to preserve the environment (Sneddon et al., 2006). Thus, the concept of sustainable development has been emerged and defined as "the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (Borowy, 2013). Sustainable development examines the relationship between sustainability in the environment, community, and life support and the development of people's life, societies, and economies (Robert et al., 2005). Through sustainable development, it is aimed to reconcile the goals of economic activity and environmental protection (Waas et al., 2011).

Over time, various government agencies, interstate organizations, and non-governmental organizations have come together and put forward legal environmental regulations and action plans. European Green Deal (EGD), announced by the European Commission in the last month of 2019, is one of the most inclusive and up-to-date green deal (Hainsch et al., 2020). The strongest goal of the deal is to be the first climate-neutral continent by 2050 (European Commission, 2019). A shorter-term goal is to reduce greenhouse gas (GHG) emissions by at least 55% by 2030 compared to 1990 (Wolf et al., 2021). For this purpose, road maps and action plans are prepared in many fields such as agriculture, health, finance, industry, and energy (Eckert & Kovalevska, 2021). The elements of the EGD are shown in Figure 1.

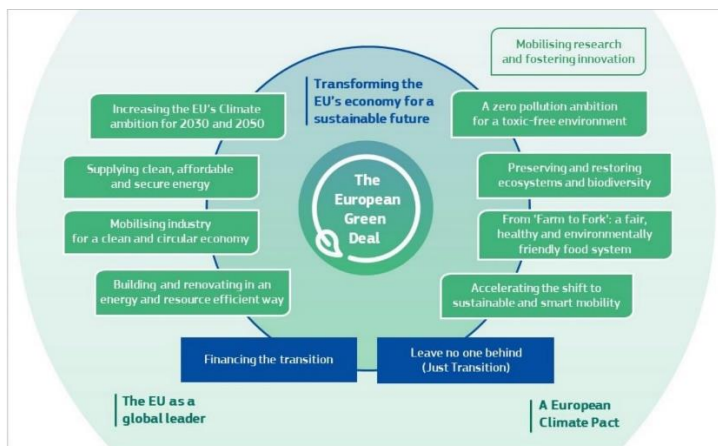


Figure 1. The elements of the EGD (European Commission, 2019)

The actors in the sectors should adopt the strategies determined by the countries within the framework of compliance with the EGD and contribute to the management of the climate crisis (Jäger-Waldau et al., 2020). One of the sectors where revolutionary changes is expected to be experienced are transportation, more specifically logistics activities.

The concept of logistics includes the entire process in which goods and other resources are obtained, stored, and ultimately

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transported to their intended destination in order to develop a flow plan (Christopher, 2016). Supply chain management that contributes to cost advantage and customer satisfaction can be created with logistics applications (Yu et al., 2013). Until recently, cost minimization and the desire to increase market share were the major motivations of logistic implementation strategies (Mentzer et al., 2004). Increasing environmental concerns over time have changed the focus of supply chain management of enterprises and the success criteria of logistic activities. Thus, green supply chain management and green logistic (eco-logistics) have become conspicuous concepts (Walton et al., 1998). Green logistic inherently denotes prioritizing the environment in logistics activities (Thiell et al., 2011). Green logistic is part of the broader shift towards Green Supply Chain Management (GSCM). GSCM includes various aspects of the organization's production processes, including green product design, the process of sourcing raw materials, manufacturing, purchasing, and delivery of products and services to consumers (Sarkis, 2003). As green supply chain management becomes widely popular with time, some organizations have already recognized and appreciated the importance of global supply chain management in boosting their profitability while also creating a positive impact on the environment simultaneously.

Making transportation and mobilization ecological is one of the targets of the EGD. Demonstrating the effects of EGD can increase green success in logistic applications. Various tools can be proposed to investigate the interaction between EGD and logistics. In this study, there is a methodological examination of the effects of EGD on the logistic sector and its applications. CIMO-Logic, design science research, is used for analysis. There are numerous studies in the literature using the CIMO-Logic approach. CIMO-Logic was applied to examine internal communication in SMEs (Eskelinen et al., 2017). Nurmala et al. (2017) implemented the approach to collect the literature on partnerships between humanitarian organizations and business enterprises in humanitarian logistics. Similarly, Bălan (2018), Kochan and Nowicki (2018) and de Sousa Junior et al. (2019) used CIMO-Logic for systematic literature review in their studies. In another study, Costa et al. (2018) used CIMO-Logic to a study case including transforming an association in a digital network.

CIMO-Logic is preferred since it is easy to implement, offers decision makers simplicity in evaluation and has a holistic view. It is aimed that the results of the study contribute to the determination and implementation of logistics activities in accordance with the content and objectives of the agreement.

The remainder of the study is structured as follows: The CIMO-Logic approach is introduced in Section 2. The application is included in Section 3. The study ends with discussion and conclusion in Section 4.

2. Methodology

Design science research approaches can be used to analyze the current situation, reveal problems, observe solutions and results (Costa et al., 2020). CIMO-Logic was presented in 2008 as design science research (Denyer et al., 2008). CIMO-Logic aims to "template for the creation of solutions for a particular class of field problems" (Denyer et al., 2008). Hence, it allows bringing together different results, appraising causality, and designing propositions (Kajanus et al., 2019). This approach is formed by

combining the initials of the words “Context, Intervention, Mechanism, and Outcome” with the word “logic”. These four components form the basis of the CIMO-Logic approach. Context (C) refers to the first component in which the problem or change occurs. Intervention (I) includes suggested actions. Mechanism (M) reveals the relationship between Intervention and Outcome. Outcomes (O) are those obtained as a result of this analysis (Halminen et al., 2021). These components of CIMO-Logic are presented in Figure 2.

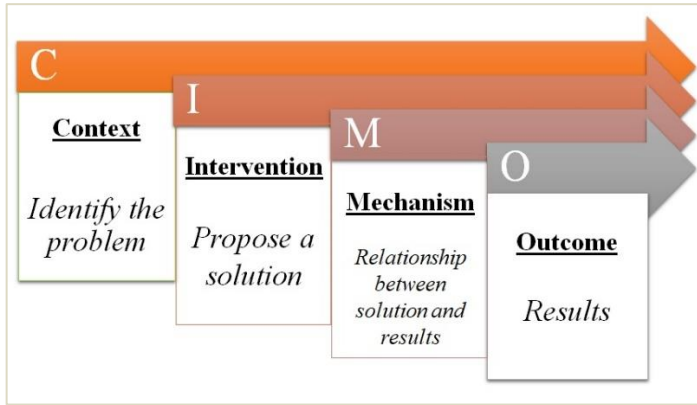


Figure 2. The components of CIMO-Logic

3. Application

In this case, the initial context is the problem of climate change, which deeply affects the life and future of all living things in the world. The European continent has witnessed significant consequences of climate change in recent years. The transport sector is one of the biggest contributors to environmental degradation through carbon emissions. The logistic sector relies heavily on road transport to move goods from one place to the other. The transportation sector is one of the most damaging to the environment (Pucher et al., 2005). 29% of total greenhouse gas emissions in the USA come from transportation activities (EPA, 2019). Road vehicles are one of the main causes of greenhouse gas emissions in the transport sector due to fossil fuel consumption and the gases they produce (La Notte et al., 2018). Prior to the enactment of the European Green Deal (EGD), road transportation formed the largest part of managing logistic and general supply chain management in Europe (Hafner & Raimondi, 2020). The context is including the implementation of European Green Deal (EGD), which is comprehensive legislation aimed at reducing the environmental impact of various sectors, including the transport and logistic sector.

The intervention that can be used under the EGD is focusing on railway transport through the TEN-T network that seeks to connect more than 424 cities in Europe (European Commission, 2013). TEN-T is a smart and sustainable network that brings together rail, inland waterways, roads, and short sea shipping routes (Panagakos, 2016). The links connecting the key nodes in this network and the comprehensive network covering all European regions are expected to be completed by 2030 and 2050, respectively (Stoilova et al., 2020). It is anticipated that the TEN-T system drastically reduces travel time for both passengers and freight between the interconnected cities. The TEN-T proposal comes with a draft of action plans and strategies that focus on encouraging more people to rely on trains for cross-border transport and other long-distance journeys (Öberg et al., 2018).

The triggered mechanism in the analysis is to reduce greenhouse gas emissions from transportation by road, air, and sea. It is necessary to reduce and reset the traditional energy consumption consumed. Carbon pollution in human and freight transportation can be prevented with technological vehicles that use renewable fuels and consume low fuel (EPA, 2021). The TEN-T project can contribute to overcoming challenges such as ensuring energy efficiency, reducing environmental impact, and ensuring high-security transportation. Improving the use of existing infrastructure in the project and adapting new technology developments are also within the scope of the project (European Commission, 2013).

Ideally, the intended outcome of the intervention is to have transportation vehicles and networks that reduce carbon emissions to zero and use sustainable energy sources. Thus, it can contribute to making the continent carbon neutral by 2050 and minimizing the adverse consequences of climate change. This increases the importance of the output since the damage to the ecological balance is higher than all other sectors. In a similar vein, the EGD also encourages the production of lithium-ion batteries, which are key components of electric vehicles. This is also seen as one way of making road transportation more eco-friendly.

The CIMO-Logic approach analysis is summarized in Table 1.

Table 1. The CIMO-Logic approach analysis

Abbreviation	Component	Application
C	Context	The transport and logistic sector accounts for 29% of carbon emissions. The EGD legislation offers valuable options for making the sector eco-friendly.
I	Intervention	TEN-T system reduces travel time for both passengers and freight between the major cities.
M	Mechanism	Reducing greenhouse gas emissions and energy consumption.
O	Outcome	Making the continent carbon-neutral by 2050.

4. Discussion and Conclusion

With the recently enacted European Green Deal (EGD), it is expected to go a long way in renewing the industry by focusing on green solutions to make the logistic industry environmentally friendly. The concepts, such as green supply chain management and green logistics are likely to be influential in the design and overall management of freight movement across European borders. There are several proposed measures and policies to sensitize European cities to the environmental needs of the day. For instance, focusing on rail transport can help to reduce energy consumption and also increase the safety of people and goods transported over longer distances.

Moreover, another area that needs to be planned is the transportation sector. The targets that can be set by the EU in relation to the transportation sector, which can be considered an integral part of foreign trade, will reflect on both the production and transportation sectors. For this reason, it may be necessary to shift the freight mostly transported by road to environmentally friendly transportation types such as rail and intermodal transportation. As a result, this can ensure that correct design is implemented in logistic centers where freight transfers between types of transportation are facilitated, and on the basis of the sustainability principle, legislation and implementation changes can be made. Investing in environmentally friendly technologies, encouraging these investments, developing and facilitating the physical and legislative infrastructure of transit transportation can be considered as other measures to be taken.

This study uses CIMO-Logic that analyzes context, intervention, mechanism, and outcomes to develop a set of design propositions within each of the themes identified in the research. The findings of the study serve to observe the effects of EGD on transportation and to offer solutions. It was revealed that TEN-T, which is a project compatible with the entry into force of EGD applications, is expected to contribute to creating a zero-carbon continent by preventing carbon pollution caused by transportation. In future studies, using CIMO-Logic, the effects of EGD in different sectors can be evaluated, results can be compared, and more comprehensive results can be obtained.

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