

Ecological E-Commerce in the Context of Sustainability

Ahmet OĞUZ¹

Abstract

Today, the relationship between e-commerce and ecology is increasingly attracting the attention of researchers. This relationship encompasses not only the opportunities offered by e-commerce but also changes in consumer behaviour. In particular, the growing demand for sustainable products among the younger generation is forcing companies to restructure their marketing strategies. The widespread adoption of e-commerce, combined with environmental concerns, has driven businesses towards environmentally friendly practices. In particular, green marketing strategies have become an important part of this transformation.

In the context of e-commerce and environmental sustainability, e-commerce offers certain advantages over traditional trading methods, but it also presents various challenges in terms of environmental sustainability. Therefore, information technology plays a crucial role in enhancing the sustainability of e-commerce. For example, modern technologies such as data analytics and artificial intelligence optimise supply chain management, reduce resource consumption, and enable the development of sustainable strategies.

Additionally, government policies supporting the sustainability of e-commerce play an important role. The adoption of sustainable business practices is made possible through effective policies, thereby supporting e-commerce in achieving its sustainability goals. Integrating such sustainability strategies into their operations enables businesses to gain a competitive advantage and increase profitability by reducing costs.

The sustainability of e-commerce is not only a discussion about environmental impacts, but also has critical importance in terms of increasing economic benefits and protecting public health. Effectively evaluating the opportunities offered by e-commerce contributes to sustainable development and ensures a better future. Therefore, sustainability strategies must be addressed not only in terms of environmental aspects, but also in terms of social and economic dimensions.

Keywords: Ecology, Sustainability, Electronic Commerce

Jel Codes: S56, S57, L81

Sürdürülebilirlik Bağlamında Ekolojik E-Ticaret

Özet

Günümüzde elektronik ticaret (e-ticaret) ve ekoloji arasındaki ilişki, giderek artan bir şekilde araştırmacıların dikkatini çekmektedir. Bu ilişki, e-ticaretin sunduğu fırsatların yanı sıra tüketici davranışlarındaki değişimleri de içermektedir. Özellikle genç neslin, sürdürülebilir ürünlere olan talebinin artması, firmaların pazarlama stratejilerini yeniden yapılandırmalarını zorunlu kılmaktadır. E-ticaretin yaygınlaşması, çevresel kaygılarla birleşerek işletmeleri çevre dostu uygulamalara yönlendirmiştir. Özellikle yeşil pazarlama stratejileri, bu dönüşümün önemli bir parçası haline gelmiştir.

E-ticaret ve çevresel sürdürülebilirlik bağlamında ise e-ticaret, geleneksel ticaret yöntemlerine göre bazı avantajlar sunarken, çevresel sürdürülebilirlik açısından çeşitli zorluklar da getirmektedir. Bu nedenle, e-ticaretin sürdürülebilirliğini artırmak için bilgi teknolojilerinin rolü büyük önem taşımaktadır. Örneğin, veri analitiği ve yapay zeka gibi modern

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¹Associate Professor Dr., Kütahya Dumlupınar University, KUBFA, Department of Electronic Commerce and Management, Kütahya/Türkiye.

EMAIL: ahmet.oguz@dpu.edu.tr **ORCID:** 0000-0001-5291-2819

teknolojiler, tedarik zinciri yönetimini optimize ederek kaynak kullanımını azaltmakta ve sürdürülebilir stratejilerin geliştirilmesini mümkün kılmaktadır.

Ayrıca, e-ticaretin sürdürülebilirliğini destekleyen hükümet politikalarının önemli bir rolü bulunmaktadır. Sürdürülebilir iş uygulamalarının benimsenmesi, etkili politikalarla mümkün hale gelmekte; bu sayede e-ticaretin sürdürülebilirlik hedeflerine ulaşması desteklenmektedir. İşletmelerin bu tür sürdürülebilirlik stratejilerini entegre etmeleri, rekabet avantajı elde etmelerini sağlamakta ve maliyetleri azaltarak karlılıklarını artırmalarına yardımcı olmaktadır.

E-ticaretin sürdürülebilirliği, yalnızca çevresel etkilere yönelik bir tartışma değil, aynı zamanda ekonomik faydaların artırılması ve toplum sağlığının korunması açısından da kritik bir önem taşımaktadır. E-ticaretin sunduğu fırsatların etkili bir şekilde değerlendirilmesi, sürdürülebilir gelişime katkıda bulunarak daha iyi bir gelecek sağlamaktadır. Bu nedenle, sürdürülebilirlik stratejilerinin yalnızca çevresel değil, aynı zamanda sosyal ve ekonomik boyutlarıyla da ele alınması gerekmektedir.

Anahtar kelimeler: Ekoloji, Sürdürülebilirlik, Elektronik Ticaret
Jel Kodu: S56, S57, L81

1. INTRODUCTION

Environmental sustainability and electronic commerce (e-commerce) are two important concepts that are currently being discussed in almost every sector. While e-commerce offers many advantages over traditional trading methods, it also brings with it certain challenges in terms of environmental sustainability. In this context, the integration of information technologies into strategies aimed at enhancing the sustainability of e-commerce plays a significant role in promoting sustainability. In particular, the adoption of effective e-commerce management helps to increase sustainable integration and reduce challenges. The widespread adoption of e-commerce has changed consumers' shopping preferences, and this change has necessitated the development of new technologies that are compatible with sustainability goals. In this context, technologies such as data analytics and artificial intelligence optimise supply chain management, increasing resource intensity and minimising the effects of focus. Additionally, these technologies enable better analysis of production and the development of strategies for sustainable marketing.

To increase the sustainability of e-commerce, the growing consumer demand for sustainable products requires e-commerce to restructure its marketing strategies in this direction. Consumers' income concerns and social responsibilities enable e-commerce to be more effective in promoting sustainable products and increasing their sales. In this context, e-commerce businesses should develop strategies to increase consumer interest in sustainable products when promoting them. Younger generations, in particular, are turning to brands that are active and socially responsible. This situation is causing e-commerce businesses to re-evaluate their product development and marketing strategies.

Government policies and regulations play an important role in sustainable e-commerce. The adoption of sustainable business practices in the e-commerce sector is made possible by the improvement of government policies. Such policies encourage e-commerce structures to support sustainable practices and increase overall sustainability in the sector. Additionally, the adoption of sustainable e-commerce practices by businesses contributes to their competitive advantage.

Furthermore, the realisation of sustainability continues to help reduce costs and increase profitability. Therefore, e-commerce businesses can reap economic benefits by adopting sustainability strategies.

2. SUSTAINABILITY AND E-COMMERCE

E-commerce not only changes the way retailers and consumers shop, but also raises important questions in terms of environmental and social sustainability. In this context, it is necessary to focus on the opportunities and challenges presented by e-commerce.

Firstly, there are various studies on the potential of e-commerce to enhance sustainability. When considering the environmental impacts of e-commerce, logistics and transportation play a significant role. High return rates and packaging waste commonly encountered in e-commerce pose a major challenge for environmental sustainability. At this point, the importance of sustainable packaging is emphasised, and innovative solutions in this area are proposed. Studies indicate that the use of reusable and recyclable packaging materials can reduce the environmental impacts of e-commerce (Oláh et al., 2023; Escursell et al., 2021).

Another aspect that can influence the sustainability of e-commerce is consumer behaviour. Consumers' increasing demand for sustainable products is encouraging companies to offer environmentally friendly products. Research shows that, in addition to the positive impact of sustainable products on consumers, increased sales of these products also strengthen companies' competitive advantage. In this context, showcasing sustainable products on e-commerce platforms

and strengthening marketing strategies for these products is of great importance (Singh & Aithal, 2024).

The sustainability of e-commerce also includes the structural and technological infrastructure of organisations. It is important for retailers to have the necessary infrastructure to implement sustainable practices. For example, online retailers need to adopt environmentally friendly practices and effectively communicate these practices to consumers. Such practices not only increase consumer confidence but also strengthen brand loyalty (Ghali, 2023).

Another critical factor for the sustainability of e-commerce is corporate social responsibility. Various studies show that e-commerce companies' investment in social responsibility projects strengthens consumers' relationships with the brand (Śmigielska & Oczkowska, 2017). Such projects help companies combine their goal of providing social benefits with their sustainability goals.

The international dimension of e-commerce is also an important issue in terms of sustainability. Cross-border trade can have an impact not only on environmental effects but also on social and economic sustainability goals. Especially emerging markets are enabling the international expansion of e-commerce and require the development of strategies to ensure sustainability in this process.

The relationship between sustainability and e-commerce is multi-dimensional and dynamic. Adopting sustainable practices not only reduces environmental impact but also increases consumer confidence and supports business success. In addition to consumer behaviour, innovative approaches such as social responsibility projects and gamification also contribute to increasing sustainability in e-commerce. In this context, the importance of adopting a holistic approach to best leverage the potential of e-commerce to increase sustainability becomes apparent.

3. CIRCULAR ECONOMY AND E-COMMERCE

The combination of the concepts of circular economy and e-commerce facilitates businesses' achievement of sustainability goals while also profoundly affecting consumer habits. The circular economy offers an alternative to traditional linear production and consumption patterns by focusing on the efficient use of resources and the reduction of waste. E-commerce, on the other hand, refers to the buying and selling of products and services through digital platforms and has a significant interaction with the circular economy in this context. The integration of these two concepts has become even more important, especially after the COVID-19 pandemic.

The COVID-19 pandemic triggered a sudden growth and transformation process in e-commerce. Consumers have become more willing to turn to online shopping due to the restrictions imposed by staying away from face-to-face shopping. During this period, e-commerce platforms have gained a wide range of customers by offering consumers more products and services (Erdoğan, 2020). Additionally, SMEs' adaptation to e-commerce processes has become a necessity for internalising competitive dynamics. These developments open up small businesses to the global market and offer opportunities for sustainable economic growth (Mirza & Çıngı, 2024; Kenger & Çetin, 2024).

Another important aspect of the circular economy is the efficient use of resources and minimisation of waste. E-commerce can contribute directly to this. For example, e-commerce accelerates recycling processes and facilitates integration into these processes. Businesses respond to consumer demands and reduce waste by offering refurbished products through online platforms (Arıtkan & Gavcar, 2020; Karabulut, 2019). On the other hand, digitalisation enables businesses to manage their supply chain processes more effectively, preventing resource waste and supporting sustainable practices (Klein, 2020).

The integration of e-commerce with the circular economy is also creating a noticeable change in consumer interactions. When consumers make purchases through online platforms, they place

greater importance on both the product life cycle and environmental impacts and make conscious choices (Paker & Kızılrnak, 2023). Additionally, online customer reviews and feedback on online platforms provide consumers with information about the environmental impacts of products. This has increased buyers' demand for environmentally friendly products (Akın & Öztürk, 2023).

The opportunities offered by e-commerce enable the development of sustainable business models within the framework of the circular economy. Today, many businesses are restructuring their product design and marketing in line with the principles of the circular economy, thereby reducing their environmental impact and increasing customer loyalty (Canoz & Gündüz, 2022; Kart, 2024). E-commerce enables businesses to reach wider audiences with their products, while also increasing customer satisfaction through these strategic changes (Karakuş & Özekenci, 2024). With the growth of e-commerce, campaigns for environmental sustainability and green marketing strategies are also gaining importance.

However, there are also some challenges related to the integration of the circular economy and e-commerce. In particular, managing the recycling processes of products on online platforms and continuously monitoring consumer behaviour create a complex structure. The difficulties some small businesses face in accessing technology and the lack of digital skills can create barriers to this integration (Bağdat & Şenol, 2024). To overcome these issues, it is necessary to explore ways to provide education and resources through government and private sector collaborations.

In this context, the circular economy and e-commerce, as two complementary concepts, play a significant role in achieving sustainability goals in today's business world. E-commerce enables businesses to create more value using fewer resources in line with the principles of the circular economy. In addition, consumer awareness and increased sensitivity to environmental issues support the positive development of this process. However, it is important to make breakthroughs in areas such as technology and education in order to overcome the challenges encountered. The future will be shaped by the integration of these two concepts, which are of critical importance for sustainable economic development.

4. ECOLOGY AND E-COMMERCE

Today, the relationship between e-commerce and ecology is increasingly attracting the attention of researchers. This relationship encompasses not only the opportunities offered by e-commerce but also changes in consumer behaviour. The spread of e-commerce, combined with environmental concerns, has led businesses to adopt environmentally friendly practices. Green marketing strategies, in particular, have become an important part of this transformation. E-commerce platforms are developing various strategies to reduce their environmental impact and raise consumer awareness of environmental issues (Harmandaroğlu, 2024).

Research on the environmental impacts of e-commerce shows that consumer demand for green products is increasing. Consumers have become more willing to accept higher costs when choosing environmentally friendly products. The impact of green marketing has become evident both in providing businesses with a competitive advantage and in shaping consumers' purchasing decisions (Berber & Öztürk, 2023). For example, businesses that adopt green marketing strategies have the potential to increase their market share by appealing to customer segments that are concerned about environmental issues (Akdemir & Akbulut, 2019; .

The campaigns and conveniences offered by e-commerce platforms have changed consumers' shopping habits, leading to an increase in e-commerce volume (Kugu, 2015). In addition, well-managed logistics services, when combined with environmental sustainability, become a critical factor in increasing customer loyalty (Özdemir et al., 2010).

Environmental concerns have a significant impact on consumer behaviour. Research highlights that perceived quality, perceived risk, and trust play important roles in the intention to purchase environmentally friendly products (Bozbay et al., 2019). Therefore, businesses must design their green marketing strategies with consumer perceptions in mind. Such practices will help businesses strengthen their position in the market by responding sensitively to consumers' environmental values (Uygurtürk & Şenoğlu, 2021).

However, digital transformation and the rapid development of technology play an important role in shaping the future of e-commerce (Klein, 2020). With the opportunities offered by the internet, businesses can reach a wider audience with their environmentally friendly products. E-commerce also supports the spread of sustainable trade practices by eliminating space and time constraints (Kaya, 2021). From this perspective, it can be said that e-commerce plays an important role in maintaining ecological balance.

The rise of e-commerce has also brought sustainability demands to the forefront in terms of supply chain management. The relationship between supply chain resilience and green marketing orientation provides important findings in terms of competitive advantage. In this context, the adoption of green practices by businesses has become critical both in terms of environmental sustainability and business profitability (Garip et al., 2020). The reason for the increase in consumer demand in this direction is the growing environmental concerns alongside the desire to create a greener world (Bayram & Üçüncü, 2022).

The relationship between e-commerce and ecology is quite complex and multifaceted in terms of both consumer behaviour and business strategic decisions. When developing forward-looking strategies, it is essential to consider environmental sustainability and consumer expectations. It appears possible for businesses to achieve more successful market performance by combining green marketing strategies with the e-commerce model. Achieving this is of vital importance both for commercial success and for a sustainable future that respects ecological balance (Çetinkaya & Özceylan, 2017).

5. MARKETING STRATEGIES: ECOLOGICAL VALUE PROPOSITION

Today, green marketing is becoming increasingly important with the rise of environmental sustainability and ecological value propositions. The growing environmental awareness of consumers has led to the need for businesses to develop environmentally friendly products and integrate them into their marketing strategies. Businesses aim to gain a competitive advantage through strategies developed with environmental concerns in mind. In this context, green marketing strategies are leading to significant transformations in both product development processes and shopping behaviour (Atılğan, 2019).

One of the fundamental elements of green marketing is the environmentally friendly qualities of products and the effective presentation of these qualities to consumers. In this context, green pricing strategies also play an important role. Pricing can directly influence both consumer perception and purchasing behaviour; therefore, the pricing of green products can shape consumers' perspectives on these products (Uygurtürk & Şenoğlu, 2021). Marketing environmentally friendly products at higher prices can affect consumer demand for these products; therefore, businesses should carefully determine their green pricing policies.

Another strategy adopted for green marketing is content marketing. Content marketing aims to increase environmental awareness while enabling consumers to form stronger bonds with brands (Çoban & Dünder, 2020). Businesses can attract consumers' attention by explaining the benefits and uses of their environmentally friendly products through social media, blogs, and other digital platforms. This way, both information is provided and the brand's green image is strengthened.

Consumers' interest in environmentally friendly products has a significant impact on their purchasing behaviour. Studies show that environmental awareness and sustainable product consumption are on the rise (Mosavichechaklou & Bozbay, 2018). For example, it has been observed that young consumers are more sensitive to environmental issues and therefore have a higher tendency to prefer green products. This situation has led to a focus on green marketing strategies, particularly in the field of education; that is, businesses aim to increase environmental awareness through campaigns targeting young consumers (Oğuz & Yılmaz, 2019).

Consumers' preferences for green products are also shaped by social interaction and group dynamics. Social influence is an important factor in shaping individuals' environmental behaviour (Gültekin & Gürbüz, 2022). Especially on platforms such as social media, when the use of green products and environmentally friendly behaviours become social norms, this can influence other consumers and increase the use of environmentally friendly products (İlsay & Doğdubay, 2018). Businesses can increase consumers' purchase intentions by using social proof and influential emotion management strategies.

Another important factor is the continuous evaluation of the effectiveness of green marketing strategies. Businesses should measure the success of their green marketing practices through market research and consumer feedback, enabling them to continuously update their strategies. This provides a responsive and environmentally conscious approach to consumer needs and environmental conditions (Koçak & Baş, 2022).

Looking ahead, it is expected that green marketing strategies will continue to be adopted by an increasing number of businesses. This will not only reduce environmental impacts but also bring opportunities to enhance business competitiveness and create a sustainable business model (Çevik & Güler, 2021). Therefore, green marketing strategies play a critical role not only in promoting environmentally friendly products but also in enhancing brand reputation and ensuring long-term customer loyalty (Korkmaz et al., 2017).

The integration of ecological value propositions into marketing strategies increases consumers' environmental awareness and provides businesses with significant competitive advantages. Green marketing practices are implemented in various ways to highlight the environmentally friendly qualities of products, develop effective pricing strategies, and raise environmental awareness through content marketing. Encouraging environmentally friendly behaviour among consumers, supported by social interactions, lays the groundwork for creating sustainable consumption habits (Tavşan & Bektaş, 2021).

Green Marketing Strategies

Green marketing refers to a set of strategies developed to ensure sustainable economic growth and promote environmentally friendly products and services. Green marketing plays an important role in helping businesses gain a competitive advantage in this era of increased environmental awareness and consumer consciousness (Yapraklı & Noksan, 2023; Urkut & Cengiz, 2021). Today, many businesses are adopting green marketing strategies to respond to the expectations of environmentally conscious consumers in the face of issues such as the depletion of natural resources and environmental pollution.

The foundation of green marketing lies in the development of environmentally friendly products and their presentation to consumers through appropriate communication channels. These strategies, based on sustainability principles, place environmental awareness at the centre of both product design and market communication. The effects of green marketing are not limited to providing environmental benefits; they also enhance corporate reputation and increase brand loyalty (Karaman, 2021). Research shows that consumers' intention to purchase green products may

increase and that perceived quality, trust, and perceived risk factors play a role in consumers' shift towards environmentally friendly products (Küçükyörük & Kurtuldu, 2022; .

Another objective of green marketing strategies is to create a social impact in society, in addition to businesses' efforts to reduce their environmental impact (Şaylan et al., 2023). When consumers turn to environmentally friendly products, they consider not only the environmental benefits of these products, but also the brand's understanding of social responsibility and ethical values (Karaboğa & Özdemir, 2019). In this context, green marketing practices provide a platform for businesses to fulfil their social responsibilities. Businesses can gain a positive image in society by contributing to the conservation of natural resources through green marketing strategies (Hamşioğlu & Nalcı, 2023).

Green marketing strategies are not only applicable to large companies but also to small and medium-sized enterprises (SMEs). SMEs can gain a sustainable competitive advantage by adopting green marketing strategies. These businesses strengthen their position among their target audiences with their environmentally friendly approaches while also contributing to sustainable development. For example, according to research, consumers' environmentally conscious purchasing behaviour is directly related to the effective marketing of these products (Elgün & Karabıyık, 2022).

Green marketing within the marketing mix requires rethinking product, price, distribution, and promotion strategies from an environmental sustainability perspective. In the product development process, innovative approaches to green product design are gaining importance. Developing products that meet consumer expectations and promoting these products through effective communication channels is critical to the successful implementation of green marketing (Akgün & Çini, 2021). Furthermore, positively influencing consumer perceptions of green products is directly related to raising environmental awareness (Şener & Yılmaz, 2023).

One of the fundamental elements of green marketing in building a sustainable future is establishing social interaction with consumers. Businesses should develop participatory marketing strategies to encourage green consumption (Kaya, 2023). Developing such strategies provides an opportunity for businesses to demonstrate their commitment to environmental awareness. In addition, it is also important to increase consumers' knowledge of green marketing through education and awareness-raising activities (Demir & Kazançoğlu, 2020). Businesses must adopt these strategies in order to both provide environmental benefits and meet consumer expectations. As environmental awareness increases, businesses will need to re-evaluate their strategies from a green marketing perspective. In this context, it is understood that green marketing is not only a marketing tool but also a necessary approach for a sustainable future. These strategies will both promote the widespread adoption of environmentally friendly products and services and give businesses a competitive advantage (Alyakut, 2020). Offering environmentally friendly options that align with consumer demands is a key element in enhancing the success of green marketing. Green marketing is more than just a marketing strategy; it is a tool for transforming both businesses and social values. It is important to further promote green marketing and develop various awareness projects in this area to achieve sustainable development goals (Dural et al., 2023). Businesses must be aware of their responsibility to ensure a socially and environmentally conscious future by directing them towards environmentally friendly practices.

6. ECOLOGICAL CONSUMPTION: THE TRANSFORMATION OF CONSUMER BEHAVIOUR

Ecological consumption has become an important concept that reshapes consumer behaviour in the context of increasing environmental problems and sustainability requirements today. While consumer behaviour undergoes a transformation parallel to ecological awareness, individuals' sensitivity to the environment and sustainable lifestyle choices also play an important role in this process. Sustainable consumption encompasses the efficient use of natural resources, reduction of waste production, and efforts to protect the environment (Altın, 2023).

Among the key factors driving the transformation of consumption habits is individuals' awareness of their ecological footprints. The ecological footprint is defined as a measure that highlights the impact of individuals' consumption activities on nature. In this context, understanding their environmental impact is critical for individuals to adopt sustainable consumption behaviours. Developing ecological intelligence, especially among young consumers, helps foster attitudes that support sustainable lifestyles (Çakıroğlu, 2023).

Social values also play a decisive role in the transformation of consumer behaviour. These values increase individuals' tendency to prefer sustainable products and services, which can positively change the environmental impact of consumption habits. This value-oriented approach to consumer environmental behaviour emerges as an important mechanism in promoting sustainable consumption.

In developed societies, sustainable consumption has become not only an individual responsibility but also part of the social structure. In particular, residential identity and social belonging directly influence individuals' environmental attitudes and behaviours. Local identity increases individuals' sensitivity to their environment, which in turn encourages sustainable consumption habits. Additionally, social norms and social pressure are among the factors that guide individuals towards conscious consumption behaviours (Altın, 2023).

The relationship between ecological consumption and environmental awareness requires not only individuals but also companies and governments to take responsibility. Increasing sustainability practices on a sector-by-sector basis not only responds to consumer demands but also contributes significantly to reducing environmental damage (Yemez & Akca, 2024). This relationship between consumers' environmental awareness and their demand for sustainable products has become a factor shaping market dynamics.

It has been observed that individuals' lifestyles have a decisive impact on sustainable consumption. Consumers' lifestyle choices directly affect their purchasing intentions and ultimately the level of environmental damage. In addition to lifestyles, demographic factors such as gender and education level also play an important role in shaping conscious consumption behaviour (Kır & Polat, 2020).

In this context, developing sustainable consumption habits requires various strategies at the personal and societal levels. In addition to education, awareness-raising and campaigns, identifying the values that shape consumer behaviour is a critical element (Altay, 2024). Here, individuals' understanding of their environmental impact and, as a result, their conscious purchasing of products and reduction of waste plays an important role in building a sustainable future. The transformation of ecological consumption and sustainable consumer behaviour is shaped not only by individuals' personal awareness but also by the influence of social structures and norms. While being aware of one's ecological footprint is a critical factor in changing individual behaviour, the emergence of environmental values as social norms also stands out as a factor that encourages sustainable consumption habits. This transformation will form the social framework needed to support sustainable development in the future.

7. LOGISTICS AND DISTRIBUTION: REDUCING CARBON FOOTPRINT

Green supply chain management, which plays an important role in combating global warming and climate change, is the process of integrating environmentally friendly practices into every stage of supply chain activities. These studies show that GSCM practices not only increase efficiency but also improve companies' environmental and financial performance. In particular, companies that implement green supply chain practices gain a competitive advantage in achieving sustainability goals (Green et al., 2012).

Green logistics refers to the process of reducing environmental impacts in production, storage, and distribution stages to ensure sustainability in supply chain processes. In this context, one of the steps that must be taken to ensure environmental sustainability is the adoption of practices such as recycling and the use of environmentally friendly packaging. Recycling practices, in particular, play an important role in both reducing costs and strengthening the company's image (Dey et al., 2011).

The implementation of green supply chain management methods not only reduces environmental impacts but also positively affects the financial performance of businesses. The studies mentioned above show that green supply chain practices are necessary for environmentally friendly economic growth and that these practices can also increase inter-company solidarity. These findings, which emphasise the importance of collaboration, will accelerate companies' progress towards achieving their sustainability goals (Rashidi & Cullinane, 2019).

Similarly, managerial skills are also critical to the effectiveness of green supply chain management practices. Senior management support is necessary for companies to successfully manage these processes. Furthermore, cooperation and coordination among supply chain partners is a critical factor in the successful adoption of green supply chain practices (Sarin & Srivastava, 2024). In this context, it is understood that companies sharing their sustainability goals with their partners and the solidarity established in this regard have a positive impact on overall performance (Arjuna et al., 2022).

Furthermore, models and methodologies developed to assess the sustainability of logistics processes provide important tools for improving environmental performance. In terms of efficiency, such friendly approaches help to ensure both economic and environmental sustainability (Borisova & Pechenko, 2021). For example, a company's adoption of environmental responsibility and the establishment of strong relationships with its supply chain partners enable both a reduction in its carbon footprint and a decrease in costs.

In addition, the interaction between green logistics and digitalisation is driving significant innovations in this field. The use of advanced digital technologies helps businesses manage their operational activities and environmental impacts more effectively. In particular, the integration of technologies such as data analytics and artificial intelligence enables businesses to achieve their sustainability goals while also reducing costs (Wichaisri & Sopadang, 2017).

Reducing the carbon footprint in logistics and distribution requires a comprehensive approach. Green supply chain management practices have the potential to increase businesses' competitiveness and financial performance while ensuring environmental sustainability (Sharabati, 2021). Factors such as top management support, strong partnerships, and the effective use of digital technologies are critical for companies to succeed in this process. This enables the creation of efficient logistics processes that minimise environmental impacts. Ultimately, every step taken towards a sustainable future and reducing the carbon footprint helps to demonstrate a responsible approach towards customers, society and nature.

8. ENVIRONMENTAL IMPACTS AND POLICY DEVELOPMENTS

Environmental problems threaten social welfare and create significant pressures on economies. In this context, thoroughly examining environmental impacts and developing political strategies aimed at reducing these impacts is one of the greatest challenges facing modern societies.

In managing environmental impacts, the diversity and scope of policy integration is of great importance. Ensuring policy integration is a key consideration for all stakeholders in the creation of policies that are consistent with environmental sustainability goals. Research has shown that bringing together knowledge and experience from various fields is a critical factor in ensuring policy

integration (Mickwitz & Kivimaa, 2007). This is effective not only in solving environmental problems but also in addressing social and economic issues.

In this context, alternative solutions offered to reduce environmental impacts are of great importance. For example, car-sharing applications can reduce environmental impacts by reducing traffic congestion and carbon emissions. The use of mobile technologies and data analytics enhances the effectiveness of such applications (Khan, 2024). The success of these projects is supported by reward mechanisms that encourage user participation and smart route planning algorithms.

At the same time, global collaborations also play a critical role in managing environmental impacts. Global issues such as climate change require international cooperation, while many countries need to coordinate their own environmental policies. Ways to increase the effectiveness of environmental policies should be expanded with different types of applications. Mandatory and mixed policy tools can yield significant results in terms of regional environmental efficiency, while the adoption of more flexible policies also becomes important over time (Liang et al., 2018). Such complex structures can yield more effective results when customised according to different environmental and social conditions.

As a result, environmental impacts and policy developments addressing these impacts emerge as a multidimensional issue. Not only natural events and human activities, but also the interaction of political, social, and economic structures in this area play an important role in the process. Policy integration, innovative approaches, and collaborations are of critical importance for reducing environmental impacts and achieving sustainability goals. In this context, detailed assessment and continuous monitoring processes are vital for success.

9. LEGAL REGULATIONS AND COMPLIANCE STRATEGIES IN ECOLOGICAL E-COMMERCE

E-commerce has become a reflection of today's dynamic economic environment and an important part of global trade. However, the sustainability and ecological impacts of e-commerce are important from a legal regulatory perspective. In this context, the effects of legal regulations on ecological e-commerce and strategies for compliance with these regulations are issues that must be considered not only from an economic perspective but also from an environmental sustainability perspective. This study aims to provide the basic information necessary to determine the legal frameworks for the strategies to be developed.

The growth of e-commerce has led to an increase in the number of businesses operating effectively on digital platforms. This situation facilitates the acceleration of trade between countries and the emergence of new forms of trade. In Turkey, the rapid growth of e-commerce is an important development in terms of Turkey gaining a greater foothold in the digital economy (Akpınar, 2017). However, this growth also brings with it certain legal challenges and ecological problems. For example, the environmental impacts of e-commerce are directly related to the increase in transportation and packaging. This situation poses a threat to environmental sustainability and makes it necessary to consider the effects of e-commerce in this context (Hayrullahoğlu & Varol, 2023).

Legal regulations are an important tool for reducing the environmental impacts of e-commerce. While the European Union's digital market policies seek to balance the impacts of large technology companies, similar regulations need to be developed in Turkey (Kart, 2024). In addition, some legal regulations in Turkey only cover specific sectors, and these assessments are incomplete because a comprehensive framework for the entire industry has not been established. At this point, strengthening the legal framework and making it compatible with ecological goals will contribute to the sustainability of e-commerce.

Compliance with legal regulations is a critical issue for businesses and an important tool for fulfilling their environmental obligations. The question of how businesses in Turkey comply with legal regulations in their e-commerce processes is the main determinant of this situation. Since the effectiveness of legal regulations concerns not only a specific sector but all sectors, policies targeting businesses must be developed to ensure compliance with these regulations (Eryüzlü & Kurtoğlu, 2020). In particular, with the spread of e-commerce, more companies are required to develop various strategies to reduce their environmental impact (Aksu & Gürbüz, 2018).

Legal regulations in the e-commerce ecosystem affect not only companies but also consumers. Consumer awareness and not being limited to the rights granted by the law are important in terms of environmental sustainability. In this context, organising information and education programmes for consumers will raise awareness about the environmental impacts of e-commerce. Legal regulations can serve as guidelines for the content of such education (Koçdemir, 2020).

Assessing the effects of e-commerce in terms of environmental sustainability means not only implementing legal regulations but also determining long-term strategies. The effectiveness of the legal regulations implemented can be increased by establishing a systematic control mechanism. Therefore, in order to create effective roadmaps on the ecological effects of e-commerce, cooperation between relevant stakeholders (government, private sector and non-governmental organisations) is necessary (Tosun & Kesmen, 2022).

In this context, legal regulations and compliance strategies in ecological e-commerce are considered complementary elements. Businesses should consider not only legal obligations but also environmental concerns when developing these compliance strategies. Effective legal frameworks, strategic cooperation and increased consumer awareness are of great importance in achieving ecological sustainability goals. Therefore, it is essential to develop innovative approaches to the e-commerce ecosystem, along with a comprehensive and interactive legal framework.

10. CONCLUSION

Environmental sustainability has become an urgent necessity in order to prevent the environmental degradation experienced today. This concept aims to minimise the negative effects of human activities on the ecosystem, while at the same time ensuring the protection of existing natural resources. The fulfilment of people's responsibilities towards the environment is not only an individual responsibility but also a social obligation. In today's business world, companies' approaches to environmental sustainability also affect the development of sustainability policies and corporate social responsibility practices. While e-commerce offers lower operating costs than physical retail, it can also offer opportunities for environmental sustainability. For example, selling products without opening a physical store can reduce energy consumption and carbon footprint. E-commerce processes can reduce environmental impacts by avoiding centralised storage and unnecessary transport. However, the effects of online shopping on consumer behaviour should also be considered. The ease of online shopping can lead to increased consumption and therefore greater use of environmental resources.

Many businesses are making efforts to increase this awareness in their products and services by adopting environmental sustainability principles. Environmentally friendly packaging, the presentation of recyclable products and the use of energy-saving technologies are among these efforts. Promoting sustainable products selected by users through e-commerce platforms can help reduce environmental impacts. However, it is of great importance to raise awareness of users in order to improve the environmental situation. Raising awareness on environmental sustainability can be achieved through the effective use of social media and other digital communication channels by businesses.

Since e-commerce is a system that requires fast delivery times, these processes may lead to an increase in the environmental impact of transport and logistics processes. In particular, the transport costs of products transported by air also increase environmental costs. In the current situation, there may be more energy consumption and waste generation to meet the needs. Therefore, it is critical to focus on sustainability disclosures and performance indicators of e-commerce platforms.

In addition to the advantages of combining e-commerce with environmental sustainability, there are also challenges. Ever-increasing consumption and demand lead to over-utilisation of natural resources and trigger environmental degradation. At the same time, the innovation and financial investments required to realise environmental sustainability goals can be challenging for many businesses.

The relationship between environmental sustainability and e-commerce is intense and complex. While e-commerce offers opportunities for sustainable resource use and environmental impact reduction in production processes, it is also necessary to be aware of the negative effects of overconsumption. It is critical for businesses to adopt an understanding of environmental responsibility, develop sustainable practices and increase consumer awareness in this process. Although technological developments can help find ways to support environmental sustainability and e-commerce, it should never be forgotten that the main goal is the protection of nature and human health.

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The study is single-authored.

CONFLICT OF INTEREST

"The authors declare that there is no conflict of interest.

DATA AVAILABILITY

The data can be provided upon request by the author.

ETHICAL STATEMENT

The study does not require ethics committee approval.

ARTIFICIAL INTELLIGENCE (AI) USAGE STATEMENT

No AI-based tools were used in this study.

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