ARTIFICIAL INTELLIGENCE IN DIGITAL TRANSFORMATION AND SUSTAINABLE GREEN MARKETING STRATEGIES IN THE EUROPEAN GREEN DEAL PROCESS

Sevgi AYDIN[*]

Kemal Gökhan NALBANT[**]

Ceren ALTUNTAŞ[***]

ABSTRACT

Due to the devastation of natural resources and ecological balance on the world that began with the industrial revolution and continues to the current day, it has been proved that the economic development models of the past are incapable of ensuring environmental sustainability. The conventional perspective of economic development, which maintains that growth should be based on an unlimited rise in consumption, cannot be sustained for the long term due to increasing understanding of the consequences of climate change and rising levels of concern over this issue. Sustainability awareness's international and national dimension has also affected multidisciplinary academic studies. In this perspective, marketing and engineering investigate ideas such as sustainable solutions, green goods, green marketing, and green processes. This study examines the European Green Deal and the digital transformation process, the sustainable green marketing objectives of the EU within the framework of the green agreement, green products and green marketing, the use of artificial intelligence systems in marketing relations, and green marketing's digital systems. This study's primary objective is to provide a comprehensive model for conducting SWOT analysis that takes into consideration a variety of factors to generate significant insights into a variety of business contexts. In addition, the SWOT analysis model is on the use of artificial intelligence technologies in digital transformation and sustainable green marketing strategies in the transition to the European Green Deal.

Keywords: European Green Deal, Sustainability, Twin Transformation, Artificial Intelligence, Green Marketing.

DİJİTAL DÖNÜŞÜMDE YAPAY ZEKA VE AVRUPA YEŞİL MUTABAKATI SÜRECİNDE SÜRDÜRÜLEBİLİR YEŞİL PAZARLAMA STRATEJİLERİ

ÖZ

Sanayi devrimi ile başlayan ve günümüze kadar devam eden dünya üzerindeki doğal kaynakların ve ekolojik dengenin tahribatı nedeniyle, geçmişin ekonomik kalkınma modellerinin çevresel sürdürülebilirliği sağlayamadığı kanıtlanmıştır. Büyümenin sınırsız bir tüketim artışına dayanması gerektiğini savunan geleneksel ekonomik kalkınma perspektifi, iklim değişikliğinin sonuçlarının giderek daha iyi anlaşılması ve bu konudaki artan endişe nedeniyle uzun vadede sürdürülememektedir. Sürdürülebilirlik farkındalığının uluslararası ve ulusal boyut kazanması multidisipliner arası akademik çalışmalara da etki etmiştir. Bu perspektifte, pazarlama ve mühendislik, sürdürülebilir çözümler, yeşil ürünler, yeşil pazarlama ve yeşil süreçler gibi fikirleri araştırır. Bu çalışmada, Avrupa Yeşil Mutabakatı ve dijital dönüşüm süreci, AB'nin yeşil anlaşma çerçevesinde sürdürülebilir yeşil pazarlama hedefleri, yeşil ürünler, yeşil pazarlama, yapay zeka sistemlerinin pazarlama ilişkilerinde kullanımı ve yeşil pazarlamada kullanılan dijital sistemler incelenmektedir. Bu çalışmanın temel amacı, çeşitli iş bağlamlarına ilişkin önemli içgörüler oluşturmak amacıyla çeşitli faktörleri dikkate alan SWOT analizini yürütmek için kapsamlı bir model sağlamaktır. Ayrıca SWOT analizi modeli Avrupa Yeşil Mutabakatına geçiş sürecinde yapay zeka teknolojilerinin dijital dönüşümde kullanımı ve sürdürülebilir yeşil pazarlama stratejileri üzerinedir.

Anahtar Kelimeler: Avrupa Yeşil Mutabakatı, Sürdürülebilirlik, İkiz Dönüşüm, Yapay Zeka, Yeşil Pazarlama.

[*] Asst. Prof. Dr., Istanbul Beykent University, Faculty of Economics and Administrative Sciences, Department of Business, E-mail: bolersevgi@gmail.com, ORCID Number: 0000-0002-9507-5448

[**] Asst. Prof. Dr., Istanbul Beykent University, Faculty of Engineering and Architecture, Department of Software Engineering, E-mail: kemalnalbant@beykent.edu.tr, ORCID Number: 0000-0002-5065-2504

[***] Res. Assist., Istanbul Beykent University, Faculty of Economics and Administrative Sciences, Department of International Trade and Finance (English), E-mail: cerenaltuntas@beykent.edu.tr, ORCID Number: 0000-0002-9071-2807

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INTRODUCTION

The terms "sustainable", "environmentally friendly," and "green" are often used interchangeably to describe companies, products, and production processes that use less energy, recycle materials, and reduce waste (Simula et al. 2009). Sustainability is the more efficient consumption of products based on economic, social, and environmental factors (Seretny & Seretny 2012).

Sustainable marketing has three different dimensions: social, critical, and green marketing. Green marketing, which stands out from these dimensions, aims to develop sustainable products and services with behaviors such as reduced packaging and efficient energy consumption by placing sustainability at the center of marketing and business processes in organizations (Gordon et al. 2011).

Today, developments on a global scale and technological changes have led to a change in consumer behavior and, accordingly, the development and change of marketing practices with various strategic concepts (Durukal 2019; Wongmonta 2021). The United Nations (UN) brings together the work it carries out by highlighting artificial intelligence applications for sustainable development goals around the concepts of human-centered and responsible artificial intelligence (National Artificial Intelligence Strategy 2021).

In the literature, artificial intelligence studies in the field of marketing have been examined. It has been determined that studies in this context are few in the literature. Studies in the literature are given below. In their study, Bayuk and Demir (2019) aim to show the technological developments until the fourth industrial revolution, the emergence and development of artificial intelligence, and the applications of artificial intelligence in the field of marketing, and to examine its effects on the field of marketing and the benefits it provides to businesses and customers. Davenport et al. (2020) outline a framework for understanding how AI will impact the future of marketing, specifically outlining how AI can influence marketing strategies and customer behavior. Verma et al. (2021) in their studies aim to provide a

comprehensive review of artificial intelligence in marketing using bibliometric, conceptual, and intellectual network analyses of existing literature published between 1982 and 2020.

Ćalasan et al. (2021), in their studies, examined green technologies within the scope of green marketing. Green marketing should be promoted by placing all materials released into the environment, emissions, and pollution-related products, processes, or activities within the framework of life cycle thinking. In the studies of Cayiragasi and Sakici (2021), by examining business behaviors in understanding sustainability, they touched on the advantages and main challenges in the field of sustainable and digital marketing. In this direction, it has included sustainable digital marketing strategies and the latest trends. Zengin and Zengin (2022) examined the concepts of Social 5.0, the 5th Industrial Revolution, and Marketing 5.0. Accordingly, they included determinations about the direction of developments in personalization, green products and green marketing, artificial intelligence systems in marketing relations, and marketing communication.

Upon general examination, it becomes evident that there exists a scarcity of research pertaining to the intersection between artificial intelligence and green marketing, as well as artificial intelligence and the European Green Deal. A systematic literature review was made and focused on articles in Web of Science database. The systematic literature review aimed to identify, integrate, and evaluate research on the selected topic based on clearly defined criteria. Research query included TS (Title Search) = “artificial intelligence” AND “green marketing” in the case of Web of Science. No results were found. Research query included AFS (All Fields Search) = “artificial intelligence” AND “green marketing” in the case of Web of Science. In total, 6 publication records were qualified. Research query included TS (Topic Search) = “artificial intelligence” AND “green marketing” in the case of Web of Science. In total, 5 publication records were qualified. The systematic literature review aimed to identify, integrate, and evaluate research on the selected topic based on clearly defined criteria. Research query included TS (Title Search) = “artificial intelligence” AND “european green deal” in the case of Web of Science. No results were found. Research query included AFS (All Fields Search) = “artificial intelligence” AND “european green deal” in the case of Web of Science. In total, 12 publication records were qualified. Research query included TS (Topic Search) = “artificial intelligence” AND “european green deal” in the case of Web of Science. In total, 7 publication records were qualified.

Studies using green marketing and European green deals with artificial intelligence in the literature are examined and shown in Table 1. Rathore (2018) conducted an examination of the swiftly developing field of green marketing, placing particular emphasis on the interplay between sustainability, artificial intelligence, and the nascent notion of the metaverse. Gailhofer et al. (2021) described environmental potential, clarified environmental risk characteristics, and causes, and outlined environmental policy initiatives and best practices. They illustrated the need for regulatory action to align the design and deployment of AI with the objectives of the European Green Deal and concluded with specific recommendations. Nahr et al. (2021) provided a framework for the implementation of an AIoT-based green supply chain. Zhang (2021) aimed to resolve the issues between the development of corporate GDP and environmental preservation, as well as analyze the impact of China's green business development policies on corporate GDP. Baqi et al. (2022) proposed practical implications that enhance the reputation of corporations through the implementation of sustainability strategies, particularly in response to scandals such as greenwashing. These implications aimed to address the challenges posed by the marketing environment, which often presents competing perspectives on the incorporation of green marketing and the promotion of eco-friendly consumption. Zhou et al. (2022) proposed a method employing artificial intelligence and machine learning technology to improve the green development potential of the industry's capacity to manage economic resources and increase innovative agricultural product development patterns.

Table 1. Studies in the Literature Using Green Marketing, European Green Deal with Artificial Intelligence

Subject area	**Authors**
Emergent Perspectives on Green Marketing: The Intertwining of Sustainability, Artificial Intelligence, and The Metaverse	Rathore (2018)
The role of Artificial Intelligence in the European Green Deal	Gailhofer et al. (2021)
Green Supply Chain Based on Artificial Intelligence of Things (Aiot)	Nahr et al. (2021)
Development Of Internet Supply Chain Finance Based on Artificial Intelligence Under The Enterprise Green Business Model	Zhang (2021)
Embedding Artificial Intelligence and Green Ideology in Formulating Corporate and Marketing Strategies	Baqi et al. (2022)
Artificial Intelligence and Machine Learning for The Green Development of Agriculture	Zhou et al. (2022)
Role of artificial intelligence on green economic development	Chang et al. (2023)
Role Of Artificial Intelligence on Consumer Attitude and Awareness Towards Green Cosmetic Products	Singh (2023)
Artificial Intelligence (AI) Opportunities and Challenges of Green Marketing Tourism	Suryani & Luthfiyyah (2023)
Sustainable Marketing and Artificial Intelligence	Yadav & Sondhi (2023)

Artificial Intelligence (AI) In Green Choices: How AI Recommender Systems Decrease Green Consumption	Wang et al. (2023)

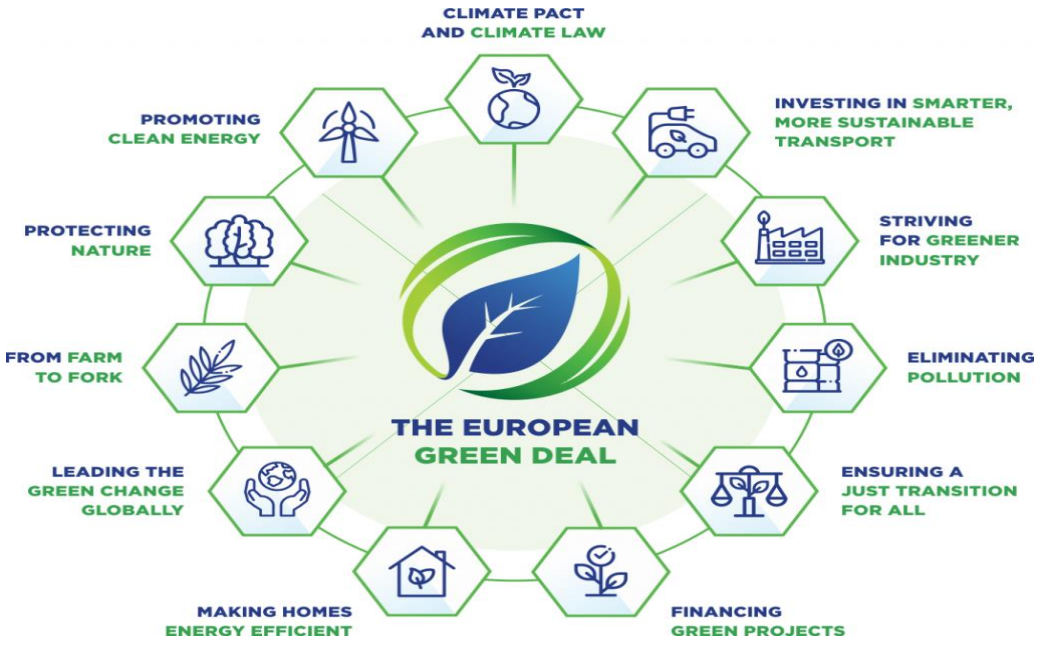
Chang et al. (2023) proposed the reciprocal effect of artificial intelligence (AI) and the market for natural resources on green total factor productivity (GTFP). Using China as a case study and a relevant mathematical model, they performed a thorough analysis of the effects of AI on green economic development. Singh (2023) concluded that there is a disparity between consumer behavior and the purchase of green cosmetic products and that the government and large corporations must collaborate to close this gap. In addition, he demonstrated how the pandemic has facilitated the tremendous advantage of artificial intelligence in enticing customers. Wang et al. (2023) contributed to the literature on green consumption and AI use and provided marketers with practical implications for managing consumers' reduced intentions to engage in green consumption because of AI recommenders. Yadav & Sondhi (2023) compiled a literature review paper, synthesized, and analyzed 10 years of data to reveal trends, and proposed a robust agenda for future research on the topic. Their research revealed that AI is an emerging field that is beneficial to the sustainable growth of marketing.

This study utilizes a SWOT analysis as a methodological framework to draw comprehensive conclusions regarding the possible implications of artificial intelligence. The study utilized a qualitative approach, especially adopting a descriptive methodology and conducting a comprehensive evaluation of existing literature. The aim of this study is to examine the digital transformation in the transition process of the European Green Deal and to analyze the use of artificial intelligence in sustainable green marketing strategies in this direction. In the second part of the study, the European Green Deal and the digital transformation process were examined. In the third part, sustainable green marketing objectives of the EU within the framework of the Green Agreement are discussed. In the fourth chapter, green products and green marketing are researched. In the fifth section, the use of artificial intelligence systems in marketing relations is examined. In the sixth section, the digital systems used in green marketing were investigated, and a SWOT analysis was made on the use of artificial intelligence technologies in digital transformation and sustainable green marketing strategies in the transition process of the European Green Deal. The seventh section is the conclusion.

The European Green Deal and The Digital Transformation Process

The European Green Deal, presented to the world public in 2019 by the European Commission, is a roadmap for transitioning to a green order by making Europe climate neutral, supporting a cleaner environment, more affordable clean energy, smarter transportation, and a sustainable life. In this direction, it is a fair, inclusive growth strategy that aims to be the first continent to achieve the goal of zeroing greenhouse gas emissions by 2050 and in which the circular economy is at the center of the realization of these goals (European Commission 2019). The European Green Deal has become a critical tool for the European Union to achieve the United Nations Sustainable Development Goals (Širá et al. 2021).

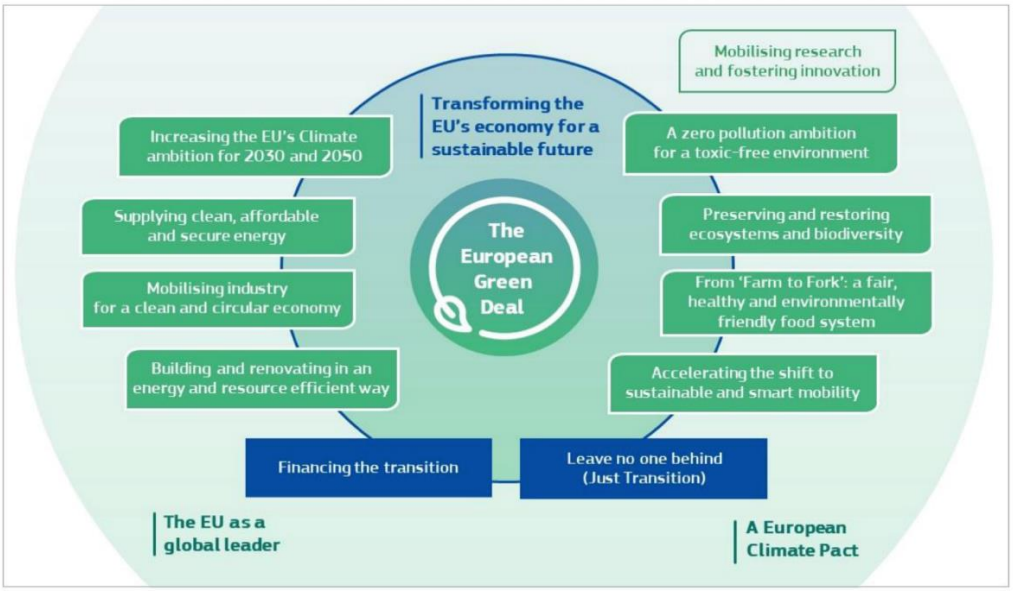
Figure 1. General Framework of the EU Green Deal



Source: (EU Green Deal 2022).

Figure 1 shows the general framework of the EU Green Deal. There are elements related to climate, transport, finance, regional development, research and innovation, energy, industry, and agriculture.

Figure 2. Key Elements of the European Green Deal



Source: (European Commission 2021).

Figure 2 shows the basic elements of the European Green Deal. To transform the EU economy for a sustainable future, mobilizing and promoting research, ensuring a just transition, financing the transition, and making the EU a global leader are the most fundamental elements. Green transformation is the roadmap created by the European Union for climate action and sustainability with the Paris Agreement and the United Nations Sustainable Development Goals international commitments (European Commission 2022b; Joint Research Centre 2021). Green transformation, which expresses the fundamental change in production and consumption patterns, is also an opportunity to transform today's unsustainable situation and for a fair future (European Commission 2021).

Table 2. Twin Transformation Goals

1. Strengthening resilience and strategic autonomy in sectors critical to twin transformation	6. Transition to green and digital diplomacy by using the power of standardization to disseminate EU values and strengthen cooperation
2. Diversifying the supply of strategically critical materials and preventing new dependencies	7. Strengthening economic and social cohesion by strengthening social protection and the welfare state, with regional development strategies and investment also playing an important role.

3. Supporting the transition to green professions if necessary changes are made in the education and training system	8. Increasing strategic investments, especially in research and development activities, to accelerate the twin transformation
4. Developing structures through which social welfare can be monitored beyond GDP and assessing the enabling effects of digitalization and the overall carbon, energy, and environmental footprint	9. Establishing regulatory mechanisms by increasing the use of AI for policymaking and citizen participation
5. Setting standards and achieving competitive advantage in this regard with green digitalization	10. Securing the twin transformations that will strengthen cybersecurity and data policies

Source: (Muench, S. et al. 2022; European Commission 2022a).

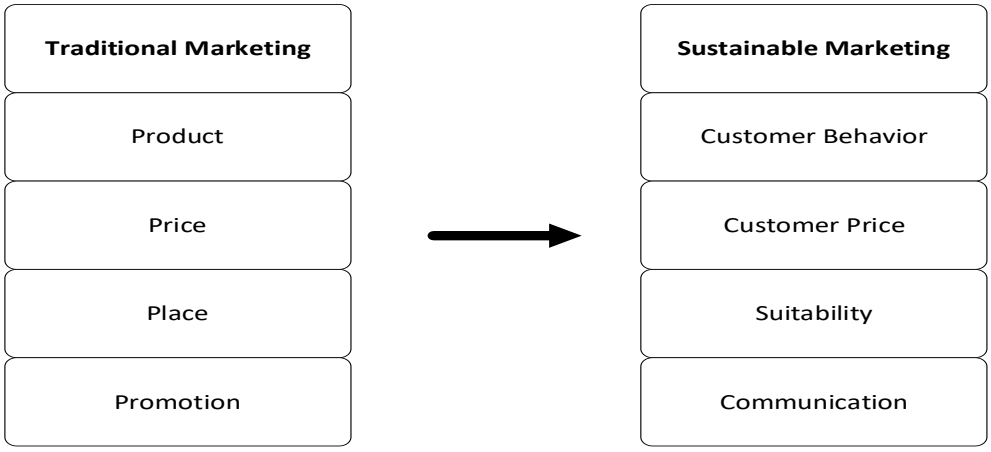
Within the framework of the Green Deal targets, the European Commission adopted the European Union Industrial Strategy in March 2020 for the transition to "green and digital transformation". It is aimed at benefiting from digital transformation and its potential and is adopted as a mandatory strategy (European Commission 2019). Digital transformation plays a critical role in Europe's new growth strategy, the European Green Deal. Since green transformation and digital transformation are transformations that feed and support each other, they are called "Twin transformations" together. In the report published by the EU Joint Research Center on June 29, 2022, the 10 targets set for twin transformation are shown in Table 2.

Green and digital transformation appear as two concepts that support each other and are not considered separately, not only by the Constitutional Court but also by many international organizations. In June 2022, the United Nations launched the "Digital Environmental Sustainability Coalition (CODES), an action plan to drive digitalization to accelerate environmentally and socially sustainable development. To meet the 2030 Agenda for Sustainable Development, it aims to ensure that digital technologies are reoriented and prioritized in solving threats to the planet such as climate change, biodiversity loss, pollution, and waste (UNDP 2022). A national and international call to action against risks and threats to the world, particularly climate change, is the European Green Deal. This call necessitates social, cultural, and environmental change rather than transformation (Aci 2021).

Sustainable Green Marketing Goals in The Eu's Green Deal Framework

In recent years, consumers' awareness, interest, and expectations for environmentally friendly and ecological alternatives have led businesses to adopt sustainable strategies.

Figure 3. Comparison of Traditional and Sustainable Marketing

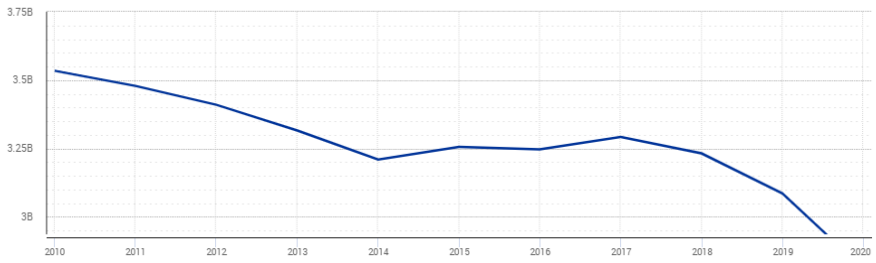


Source: (Belz, F. & Peattie, K. 2009).

Figure 3 shows the comparison of traditional and sustainable marketing. Traditional marketing has been perceived as a process that identifies and meets needs. Sustainable marketing includes cooperation, communication, and innovation that can be shaped according to customer behaviors (Trivedi et al. 2018).

The concept of marketing, which has evolved from the industrial revolution to the present, is today's marketing 5.0. Marketing 5.0 is the period when consumers interact with artificial intelligence (Zozul'ov & Tsarova 2020). Today's and future marketing understanding aims to provide the highest level of opportunities to consumers and to create personal interaction environments with them. In line with this goal, smart and flexible artificial intelligence plays an important role in the realization of the determined goals.

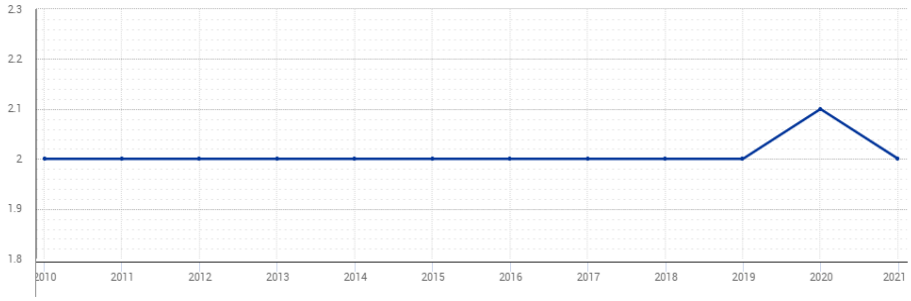
Figure 4. Greenhouse Gas Emissions Employment Intensity



Source: (Eurostat 2021).

Figure 4 shows the Greenhouse Gas emission Employment Intensity. This indicator, which shows the social potential impact of the green transition calculated by the European Statistical Office, EUROSTAT, measures the greenhouse gases (GHG) emitted by the entire country's economy per employed person. With the European Green Deal, which was presented as a roadmap in 2019, there is a decrease in the greenhouse gas emitted by the entire country's economy per person employed.

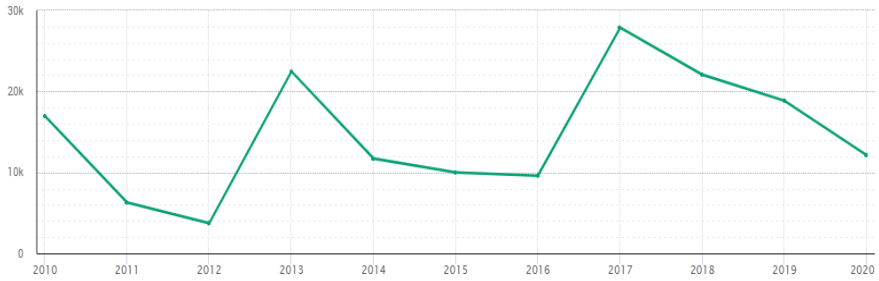
Figure 5. Environmental Protection Expenditures by the Institutional Sector



Source: (Eurostat 2021).

Figure 5 depicts the expenditures allocated towards environmental preservation across several Institutional Sectors. This statistic quantifies the allocation of economic resources towards the prevention, mitigation, and eradication of pollution and other forms of environmental degradation. It represents the overall proportion of environmental protection expenditures in relation to the Gross Domestic Product (GDP). Upon examination of Figure 5, it becomes apparent that the business sectors have consistently neglected to dedicate a portion of their resources towards expenditures related to environmental preservation over an extended period of time.

Figure 6. Climate-Related Economic Losses by Event Type



Source: (European Environment Agency 2022).

Figure 6 illustrates the economic losses associated with several types of events that are influenced by climatic factors. The indicator presented in this statement quantifies the aggregate financial damages incurred as a result of weather and climate-related occurrences, as reported

by RiskLayer's CATDAT dataset (EEA 2022). Based on the data shown in Figure 6, there is a discernible decline in economic losses associated with climate-related factors subsequent to the year 2019.

An analysis of a firm's strengths, weaknesses, opportunities, and threats (also known as a SWOT analysis) is a common tool used in the management of businesses. Its purpose is to determine where a company stands in its industry and to help with the development of strategic plans. The research focused on the utilization of AI technology in the context of green marketing, with a SWOT analysis as the primary methodology. SWOT analysis is a strategic framework utilized to identify and evaluate the internal strengths and weaknesses, as well as the external opportunities and threats inside a business. The primary objective of doing a SWOT analysis is to enhance one's understanding of the elements that are vital to the formulation of a business decision or the development of a strategic plan for an organization. The next section will provide a full examination of the difficulties surrounding green products and green marketing.

Green Products and Green Marketing

In accordance with the United Nations Environment Programme (UNEP) report published in 2007, the function of sales and marketing is significant within the life cycle initiative since it facilitates the effective exchange of information between the consumer and the organization. To effectively develop goods that resonate with consumers' values and are in line with their preferences and priorities, it is imperative for a company to possess a comprehensive understanding of the market. To address customers' needs for environmentally friendly goods, it is imperative for the company to possess a comprehensive understanding of the environmental implications associated with a product throughout its entire lifecycle.

The foundations of Green Marketing are based on the work of Lazer (1969). He addressed the greening of various parts of traditional marketing and its social and environmental dimensions. It has been emphasized as one of the new types of marketing that can play an important role in providing opportunities for social welfare (Kumar & Ghodeswar 2015).

According to Grant (2008), the objectives of green marketing encompass the following:

-The objective should not be the creation of additional consuming regions but rather the optimal utilization of finite natural resources.

-The mobilization of consumers, public and commercial organizations, and non-governmental organizations (NGOs) is crucial for the effective implementation of green marketing strategies, since it necessitates the distribution of responsibilities among these stakeholders.

-Promote the use of eco-friendly products and foster consciousness regarding recycling practices.

-The focus should be on reducing energy usage rather than relying on throwaway items.

According to Polonsky and Rosenberger (2001), green marketing may be described as a comprehensive and integrated strategy that involves ongoing assessment of how businesses can attain their corporate objectives and fulfill customer demands, all while avoiding potential ecological damage in the long run. The primary purpose of this approach is to effectively attain the strategic and financial goals of the organization while simultaneously mitigating any adverse impacts on the natural environment or enhancing favorable ones (Leonidou et al. 2013).

According to the 6th Assessment Report of the Intergovernmental Panel on Climate Change (IPPC), greenhouse gas emissions can be reduced by 40–70% with a change in consumer behavior (IPCC 2022). In this direction, the impact on consumer behavior will become important with green marketing strategies.

Figure 7. Green Brand Characteristics That Matter to Consumers Worldwide, 2020

Source: (Statista 2022).

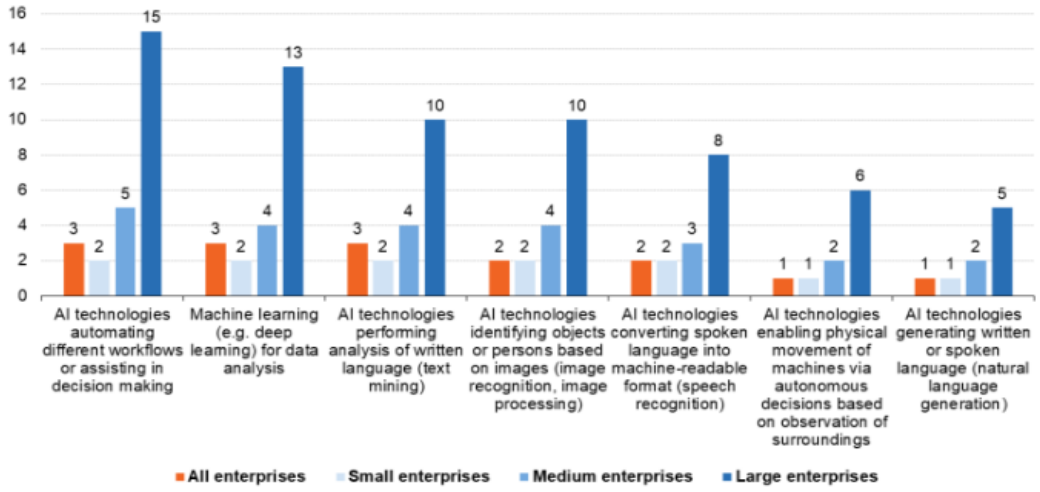
Figure 7 shows environmentally friendly brand features that are important to consumers around the world. As a result, by 2020, 45 percent of customers surveyed will be interested in

discovering sustainable or environmentally sound products. Similarly, 44% of customers said they are interested in brands that encourage recycling.

Use of Artificial Intelligence Systems in Marketing Relations

Research on marketing is rich with studies evaluating the effects and applications of various technologies on marketing performance. However, only in recent years has more attention been paid to research positioned at the intersection of Artificial Intelligence (AI) and marketing, and recent research calls have encouraged further exploration of AI-related issues and their role in marketing (Davenport et al. 2020; Kumar et al. 2019). It is important for sustainable marketing strategies that artificial intelligence (AI) influences customer behaviors as well as business models, sales processes, and customer service options and is the most preferred technology in the relevant field. A growing amount of research on Intelligent systems and artificial intelligence (AI) in marketing has shown that AI could imitate humans and perform activities in an "intelligent" way (Vlačić et al. 2021).

Figure 8. Businesses Using Artificial Intelligence Technologies, by Type and Size Class, EU, 2021



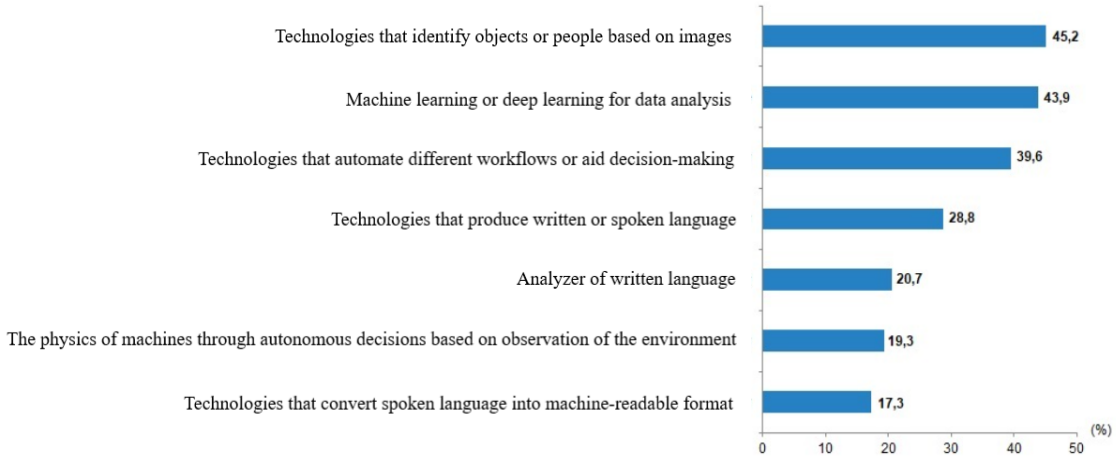
Source: (Eurostat 2022).

In Figure 8, businesses using artificial intelligence technologies are divided by type and size class. Accordingly, less than 1 in 10 EU businesses will use artificial intelligence technologies in 2021. In 2021, 8% of businesses with more than 10 employees and self-employment in the EU reported using one or more of the following AI technologies: The share of large businesses using these AI technologies was 28%, and 6% of the value recorded for

small businesses was significantly high. The difference can be explained by the complexity of implementing artificial intelligence technologies in-house.

Although at a low level, EU companies used most AI technologies to perform analysis of written language, AI technologies for machine learning, and all 3% of AI technologies that automate different workflows. Again, the share of large businesses reporting using such AI technologies appears to be 3 to 5 times higher, reaching 15% for AI technologies to conduct written language analysis.

Figure 9. Artificial Intelligence Technology Usage Rate by Startups



Source: (TÜİK 2021).

Figure 9 shows the rate at which startups are using artificial intelligence technologies. In 2021, 2.7% of startups reported using any artificial intelligence technology. Up to 45.2% of businesses use image-based item or person recognition technology. This was followed by 43.9% use of machine learning or deep learning for data analysis and 39% of technologies that automate different procedures or aid decision-making.

The Digital Economy and Society Index (DESI) provides a comprehensive overview of Europe's digital performance by aggregating several metrics and monitoring the advancements made by member countries of the European Union (EU). The DESI 2022 reports mostly rely on data from the year 2021. Based on the index data, it is projected that around 8% of enterprises within the European Union will adopt artificial intelligence technology in the year 2021. Artificial intelligence (AI) has the potential to yield several advantages for organizations, including enhanced decision-making capabilities, increased production, and efficiency, and streamlined energy and resource management for greater sustainability. Artificial intelligence (AI) systems encompass both software-based applications, such as image identification

software, virtual assistants, and speech and facial recognition systems, as well as hardware-based implementations, where AI is incorporated in devices like autonomous robots, self-driving cars, and drones. Denmark (24%), Portugal (17%), and Finland (16%) had the highest percentages of businesses using AI, while Romania (1%) and Bulgaria, Estonia, Cyprus, and Hungary had the lowest percentages (DESI 2021). It is already reshaping the technical landscape of enterprises using artificial intelligence, comprehensive data, machine learning, and ideal solutions. How companies run their businesses evolves to be more responsive, productive, and competitive. Each new technological development has led to the emergence of new job opportunities. Artificial intelligence will change how people interact with information, technology, brands, and services, just as the introduction of television ushered in a new era of mass advertising and reach. The Internet and mobile phones have brought a new level of targeting and context (Dimitrieska et al. 2018).

Digital Systems Used in Green Marketing

Twin transformation is a concept developed to express the production of new digital solutions to help society as a whole transition to sustainable processes by carrying out a green transformation. Twin transformation encompasses green and digital transformation. The solutions that digital technologies can offer in green transformation in the "Toward a Green and Digital Future" report prepared by the European Commission are shown in Table 3.

Table 3. Functions of Digital Technologies in Green Transformation

Monitoring and Tracking	**Simulation and Prediction**
a) Digital tracking of materials with digital product passports for reuse and recycling b) Making healthier decisions for the elimination of environmental problems with advanced data analysis and artificial intelligence	a) Making predictions about the power needs of the electricity grid with algorithms based on artificial intelligence b) Obtaining information about all life cycles of my products with the help of digital simulation
Virtualization	**System Management**

a) The spread of production and consumption activities on the online platform thanks to augmented reality and the metaverse	a) Making production processes more efficient with artificial intelligence b) Efficient energy and infrastructure installation in cities with artificial intelligence

Source: (European Commission 2022b).

The AI Watch study provides an analysis of the adoption of artificial intelligence (AI) in the context of smart mobility. An acknowledgement is made that the utilization of artificial intelligence in smart mobility applications has promise in enhancing traffic flow management, enhancing road safety, and increasing mobility accessibility for individuals without personal transportation. It has the potential to induce alterations in user conduct, such as the shift from perceiving mobility as a possession to perceiving it as a service. This transition can enhance the effectiveness of utilizing mobility resources, diminish energy consumption and pollution, and encourage the adoption of more environmentally friendly modes of transportation. The successful use of artificial intelligence (AI) in smart mobility is contingent upon addressing many technological and structural obstacles pertaining to governance and stakeholder collaboration. Further research is needed to address key concerns related to data, such as data sharing, protection, and standardization, as well as concerns regarding algorithms, including their fairness and transparency (Joint Research Centre 2021).

Using blockchain in logistics can increase transparency, build trust, and improve collaboration. The blockchain-based platform can provide relevant stakeholders with reliable, consistent, and unalterable data. Unlike traditional data exchange methods, stakeholders can access data from the bitcoin network. As a result, data about the logistics system can be easily accessed by end users (Sidana et al. 2022). In their study, Tashkulova and Kletskova (2019) proposed a digital production and consumption organization model that incorporates environmentally friendly practices. This model is built upon the integration of the Internet of Things (IoT) and artificial intelligence technologies. The approach specifically transfers the financial burden and obligation of waste segregation to digital production and consumption, thereby facilitating more automation and diminishing the expenses associated with recycling. The use of automated control in waste disposal within the established paradigm facilitates a heightened level of ecological responsibility in both production and consumption.

Artificial intelligence stands as the predominant catalyst propelling the Internet of Things. The exponential expansion of the Internet of Things (IoT) across many domains has created a demand for the integration of artificial intelligence (AI) functionalities to effectively leverage the available data. Nahr et al. (2021) integrated these technologies. The technological innovation is commonly referred to as artificial intelligence. The integration of this technology with artificial intelligence enables organizations to effectively incorporate management, forecasting, and monitoring practices, therefore enhancing operational efficiency, and promoting decision-making transparency. In Table 4, a SWOT analysis has been made regarding the use of artificial intelligence technologies in digital transformation and sustainable green marketing strategies during the transition process to the European Green Deal.

Table 4. SWOT analysis of the use of AI technologies in Green marketing

Strengths	**Weaknesses**
a) The aim is to raise the standard of living through the implementation of various policies, including but not limited to environmental cleanup, affordable renewable energy, smart transportation, circular economic models, and new employment opportunities. b) Increasing strategic spending, particularly in research and development-related activities, to accelerate the twin transformation. c) Developing regulatory mechanisms by expanding the application of artificial intelligence for policy making and citizen participation.	a) The difficulty of testing technologies. b) Time wastage. c) Lack of technical knowledge and experience. d) Structural problems.
Opportunities	**Threats**
a) In the context of sustainable development, the implementation of green transformation strategies includes the design of energy resources, production processes, and products to reduce their environmental impact. b) Introducing new digital technologies.	a) Insufficient infrastructure for digital and artificial intelligence technologies to be used in some regions. b) Difficulties in keeping up with new developments. c) Not being able to adapt to digital and artificial intelligence technologies. d) Adaptation problems in institutions.

	e) The high cost of technology.

Table 4 gives a thorough SWOT analysis model of the use of artificial intelligence technologies in the context of digital transformation. The development of strategic plans for domestic and international enterprises, as well as a variety of governmental organizations, has seen a significant increase in the use of this model, which has contributed to the model's significant rise in popularity. One of the most significant techniques that companies may use to investigate the numerous facets of their operations is to do a SWOT analysis, which stands for strengths, weaknesses, opportunities, and threats assessment. You will be able to decide whether the tool will aid you in completing accurate research on the organization after becoming familiar with the SWOT analysis model. One of the benefits of carrying out a SWOT analysis model is that it is a methodology that can be applied by most businesses, teams, and professionals.

The utilization of AI technology offers a promising avenue for green marketers to enhance their understanding and responsiveness towards the behaviors and actions of environmentally conscious consumers, all within a sustainable framework. The utilization of AI and extensive data holds promise for enhancing marketers' capacities to influence client preferences and lifestyle decisions in a manner that is characterized by heightened intelligence and environmental sustainability. Moreover, it possesses the capacity to function as a burgeoning prospect for enticing a particular demographic of clientele and facilitating the dissemination of tailor-made encounters for those who have a keen interest in actively participating in eco-conscious endeavors. This is due to its capacity to function as an opportunity to engage customers who possess a keen interest in actively participating in environmentally conscious endeavors (Baqi et al. 2022).

Artificial intelligence has the potential to play a pivotal role in augmenting green marketing endeavors. Machine learning algorithms have the capability to offer valuable information about client preferences pertaining to sustainable products, while AI has the potential to automate green production processes. The metatheory encompasses an analysis of the ethical ramifications associated with the utilization of AI, as well as its effects on society and the environment. Additionally, it explores the ethical considerations involved in the development of AI systems that promote sustainability. Artificial intelligence algorithms have the capability to forecast customer behavior, thereby facilitating the development of customized

environmentally conscious products or services by corporations. AI has the potential to evaluate and analyze the environmental consequences associated with certain business choices, therefore aiding in the development of the most ecologically friendly strategies (Rathore 2018).

CONCLUSION

In their policies of harmonization with the roadmap created by the European Union for the green transformation, the member states and their commercial collaborators should analyze the sectors operating in the carbon-intensive economic field. Green and digital transformation, commonly known as twin Transformation, is a long-term transformation process, not a destination. A better understanding of the possibilities and knowing what needs to be done in the green and digital transitions is essential to success.

The overall aim of the European Green Deal is to prepare and transform the EU economy for a more sustainable future. To the extent that Turkey adapts to green and digital transformation, it will increase its international competitiveness. Green marketing has evolved into a product that protects the environment for present and future generations and a tool that contributes to the greater goal of sustainable development.

The integration of artificial intelligence plays a significant role in facilitating the transition towards the European Green Deal. The European Green Deal is an audacious initiative with the objective of accomplishing significant environmental objectives. To achieve the goals that Europe has set, every aspect of European life will need to undergo a comprehensive transformation toward sustainability. The meteoric rise in popularity of artificial intelligence (AI) has revealed that it has the potential to considerably contribute to the accomplishment of objectives associated with the movement toward a more sustainable future. Simultaneously, the use of digital technologies such as AI, for instance, substantially increases the consumption of energy and resources, raising the prospect of problems associated with catastrophic environmental consequences. The goals outlined in the European Green Deal are brought into sharper focus using a visual representation that emphasizes the importance of actively participating in political and legislative actions to successfully steer the capabilities of AI toward alignment with those goals. To develop and implement effective strategies for AI, a comprehensive understanding of the socio-technical dynamics that have the potential to produce both positive and negative outcomes is essential. This is required to meet the challenge of creating artificial intelligence. There is a possibility that artificial intelligence may have a

variety of consequences, including both positive and negative outcomes. This is due to the possibility that AI could have wide-ranging consequences.

Based on the comprehensive examination of the many strengths, weaknesses, barriers, and challenges, the advantages and disadvantages of the approach might be examined. The SWOT analysis is susceptible to subjective interpretations, oversimplification of intricate issues, a lack of prioritizing, and a dearth of efficacious solutions. Nevertheless, it offers a thorough portrayal of the organization and facilitates the prioritization of some aims and objectives over others. To evaluate the suitability of implementing a strategic management technique, such as SWOT analysis, in a particular company's setting, it is crucial for the business to conduct a comprehensive assessment of the advantages and disadvantages connected with the application of this methodology. When SWOT analysis is applied effectively and with careful consideration, it could support organizations in making well-informed decisions and attaining their goals. This assumption is made if it is utilized in an appropriate manner.

Today, with the development of digital technologies, the importance given to green marketing is increasing. The development of many companies in the industry increases the damage to the environment. Green marketing has evolved into a product that protects the environment for present and future generations and a tool that contributes to the greater goal of sustainable development. The development of an environmentally friendly product, the use of environmentally friendly packaging, environmentally sound business practices, and the dissemination of messages emphasizing the environmental benefits of a product are essential components of “green marketing”.

For the AI marketing space, it can bring many benefits to companies, including enhanced decision-making, higher productivity, and efficiency, and optimized, more sustainable energy or resource management. As a result, countries should invest significantly in areas with a role in artificial intelligence and digital transformation within the framework of their national policies. The importance of sustainable green marketing strategies in the transition process of the European Green Deal will increase the use of artificial intelligence technologies.

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