ALTINBAŞ ÜNİVERSİTESİ YAYINLARI

Editors
Tina Shabsough - Tanyeri Uslu - Zeynep Özsoy

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FOREWORD

Our Republic, the best gift of the great leader Gazi Mustafa Kemal Atatürk to the Turkish Nation, celebrates its 100th anniversary.

This milestone marks the achievement of many successful endeavors in the history of the Republic of Türkiye. It represents the perseverance of a nation under the guidance of a great leader who provided the foundations of a new state despite the different kinds of internal and external obstacles faced during this period.

Similar to every field, our Republic has made significant strides in education. On its foundation, Türkiye had only one university. Today, our Republic has over 200 state and foundation universities dispersed over 81 cities. This progress in the number of universities and quality of education enabled Türkiye to become a destination for many international students from Europe, the Middle East, Africa, and other global locations. Furthermore, the scientific research orientation of our universities played a significant role in offering academic and research opportunities in all fields of science.

At Altınbaş University, we wanted to celebrate our Republic's 100th anniversary by publishing 100 books in different disciplines. These series of books are prepared by experts in their fields and represent the valuable perspectives of researchers in contemporary topics that will contribute to various areas of life.

In that respect, this book discusses one of the major topics impacting different aspects of life: sustainability. The book is the product of academicians and researchers on the significance of sustainability, resilience, and its implications on Türkiye and the international arena.

Celebrating 100 years of the republic, we at Altınbaş University will continue to work for the prosperity of our nation and its sustainability in the future.

Happy 100th anniversary to our nation and the Republic of Türkiye.

Prof. Dr. Çağrı ERHAN
President of Altınbaş University

PREFACE

Sustainability relates to meeting the needs of the present without undermining the ability of future generations to meet their needs. The last few decades witnessed an increased interest in sustainability, application, and implications. Despite starting as a concept concerning environmental aspects, today many other fields are beginning to pay attention to sustainability. Businesses and organizations proved to be one of the major areas that emphasized the significance of sustainable practices and developments. Thus, many organizations started to practice sustainability through the triple bottom line, which consists of financial, social, and environmental dimensions. In this context, sustainability was depicted as the establishment of a balance between the organization's financial performance, its social inclusiveness, and its environmental resilience, which will result in positive outcomes for the present and future generations.

A further aspect of sustainability is concerned with its resilience and ability to adapt to changes in external and internal environments. The dynamic changes in the technological, political, legal, social, environmental, and economic factors businesses encounter in today's market force them to become more organic and adaptable. Organizations are expected to develop flexibility to deal with these challenges, adapt to environmental changes, and maintain themselves for future generations.

This book, "Sustainability Resilience in a Turbulent World" aims to gain a better insight regarding sustainability and sustainability resilience and the implications it might have on organizations. It brings together the perspectives and research interests of several authors to share their ideas regarding sustainability and resiliency in different fields and sectors.

Supply chain management is one of the areas where sustainability resilience should be emphasized. In this direction, Ibrahim Sarper Karakadılar discusses the necessity of organizations to

implement agile supply chain approaches supported by artificial intelligence, which might lead to higher economic effectiveness and environmental sustainability. Moreover, the author demonstrates the impacts of green logistics on operational efficiency. Finally, the author develops theoretical frameworks explaining the possibility for companies in emerging markets to adapt to the changes in the environment, which can result in operational excellence and green logistics improvements.

The changes in today's markets encouraged many entrepreneurs to establish successful businesses globally. The establishment of new businesses increased the need for developing and implementing unique business models. Despite the enhancement in this area, Özlem Kunday explores the sufficiency of integrating sustainability in these business models as they differ from traditional models by focusing on environmental and social concerns, while considering the principles of circular economy. The author builds on the existing literature to develop a circular business model for startup companies in emerging countries, including Türkiye.

Technology advancements, especially in the area of artificial intelligence (AI), play a major role in enhancing sustainability and resilience. Esin Yücel and Murad Canbulut explore the positive and negative impacts of AI applications on the realization of the United Nation's Sustainable Development Goals (SDGs). Despite the major benefits that can be achieved by implementing AI, the authors also draw the attention of readers to the risks related to it.

In line with the aims of this book, Mustafa Şenyücel and Zorlu Şenyücel investigate the issue of plastic waste management in Türkiye. The authors demonstrate the implications of waste management, the processes in which waste management is implemented, and finally the current situation of waste management in Türkiye and the way to legitimize its operations in the country.

Another impact of technological advancement is evident in the increase in e-commerce. The changes in shopping habits among customers play a significant role in enhancing e-commerce,

reshaping supply chains, and encouraging employment in different sectors. Gül Esin Delipınar, Bengi Yanık İlhan, Soulef Bensoula, and Mohamed Fathy Saber Hussein investigate e-commerce sales and employment trends in selected thirteen European countries. Through exploring the changes in e-commerce trends during the last few years, the authors emphasize the importance of adopting a circular economy and sustainability practices.

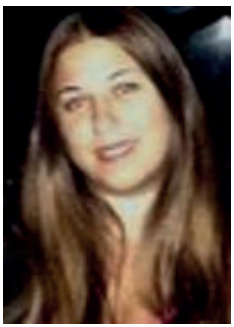
Social sustainability relates to creating sustainable practices that ensure the well-being of people, whether in societies or organizations. In this context, Mustafa Ege Koç draws the attention of readers toward the differences found among generations, especially in relation to the characteristics of each generation and the impact this will have on professional expectations. The author exhibits the importance of understanding the differences in generations in ensuring the well-being of people, thus, realizing the concept of social sustainability.

The book concludes with an exploration of the concept of sustainability and its connection to behavioral-based theories. Kağan Beşoğul investigates the prospect, nudging, and green nudging theories together with the sustainable consumption model, which is considered a necessity for environmental development. The author emphasizes the importance of societal consumption values changes to expand sustainable consumption globally.

Dr. Tina SHABSOUGH,
Dr. Tanyeri USLU,
Prof. Dr. Zeynep ÖZSOY

ABOUT THE EDITORS

Dr. Tina Shabsough is an Assistant Professor at Altınbaş University. She obtained her doctorate in business administration, specializing in management and organization, from Hacettepe University. In addition to her experience in the academic field, she worked in various positions in international and national organizations in Jordan. Her research interest includes organizational behavior, entrepreneurship, management, and diversity.



Dr. Tanyeri Uslu holds a PhD in Business Administration from Gebze Technical University. Over the past decade, she has taught both undergraduate and graduate courses at prestigious universities. She began her career as a diplomatic assistant for high-profile figures and subsequently gained extensive experience in the business sector, serving as a general manager in New York, an operation executive in New Jersey, and working at the Turkish Consulate in New York. During her time abroad, she also completed her MSc degree at the State University of New York. Upon completing her PhD, she served as an assistant professor at various academic institutions, specializing in teaching courses on marketing, business management, and scientific research methods. She has made significant contributions to marketing and management journals and has co-authored books on supply chain management and the dynamics of the airline industry. Her research interests encompass marketing, marketing research, consumer behavior, business management, and sustainability.

Prof. Dr. Zeynep Özsoy built her academic career in Organization Studies for more than 25 years. She studied business administration at Ankara University and sociology at Middle East Technical University. She is currently the Dean of Business School at Altınbaş University. The areas she is particularly interested in and has written about include corporate governance practices of Turkish listed companies, boards of directors, gender diversity, and alternative organizations.

In memory of the 100th anniversary of our Republic

Editors

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A SUSTAINABLE FUTURE IN SUPPLY CHAIN AND LOGISTICS SUPPORTED BY ARTIFICIAL INTELLIGENCE: ACHIEVING OPERATIONAL EXCELLENCE

İbrahim Sarper KARAKADILAR[1]

ABSTRACT

In the contemporary business landscape, it is imperative for organizations to manage their supply chains under global competition regulations and to participate in competitive chains, particularly in emerging economies such as Türkiye. Concurrently, logistical operations must be conducted with both efficiency and environmental consciousness. The research objective is to develop two theoretical frameworks for scientific research that examine how businesses in Türkiye should adapt to these evolving global competitive conditions with the support of artificial intelligence (AI) technology. The scope of the study is specifically focused on manufacturing companies within supply chain networks and third-party logistics (3PL) service providers. The research topic is evaluated under two main themes: operational excellence and green logistics principles. The methodology involves defining concepts, compiling solution proposals, and developing a theoretical framework focused on sustainability goals. The first perspective of this study suggests that operational excellence can be achieved through the successful implementation of an agile supply chain approach supported by artificial intelligence and that

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these factors together will enhance the effectiveness of economic and environmental sustainability. The second perspective suggests that 3PL companies should focus on green logistics internally and integration with their clients for operational efficiency. As the concluding remark of this paper emphasizes, while AI applications are essential, investing solely in AI tools is insufficient. A robust supply chain network structure is necessary to achieve success. This study intends to contribute by clarifying how companies from emerging markets can adapt to changing global competitive conditions by leveraging artificial intelligence technology to achieve world-class efficiency in supply chain and green logistics. Consequently, the suggested model framework of this study facilitates more effective decision-making in supply chain and logistics processes within the contemporary business environment characterized by volatility, uncertainty, complexity, and ambiguity, thereby leading to increased efficiency in operational processes.

Keywords: Conceptual framework development, Economic sustainability, Environmental sustainability, 3rd Party Logistics service providers.

1. INTRODUCTION

From the end of World War II until the 2000s, the global economic and trade order emerged based on cooperation between Western countries, creating a balanced and predictable structure. During this period, organizations gained competitive advantages through planning for supply and production.

However, that stable order shifted to a dynamic environment dominated by uncertainty and ambiguity; the first milestone was the 2008 global financial crisis. In 2011, environmentally sensitive regulations led to a shift from the linear to the circular economy approach as well (Maitre-Ekern, 2017; Stankevičienė et al., 2020). This era also marked the conceptualization of Artificial Intelligence (AI), with sustainability becoming a key performance standard after that time (Jabbour et al., 2018; Stock & Seliger, 2016). At the end of 2019, the COVID-19 pandemic disrupted business life and revealed the importance of agile supply chains in the new global economic system (Ivanov, 2022).

Since AI became integral in 2023, industrial or logistics systems once controlled by humans may soon become fully autonomous. The key differentiator ability in the global economic structure will be institutions' and societies' ability to innovate. Simply providing low-cost production resources won't ensure efficiency in a competitive environment. Instead, focusing on using AI-supported autonomous devices in supply chains would enhance effectiveness. This transformation of traditional business structure also reduces waste and improves supply chain and production operations (Shamout et al., 2022).

In this recent global structure, all stakeholders must work together and take responsibility for each other's environmental sensitivity to be environmentally conscious in their tasks. Supply chain design is crucial for sustainable performance in today's global economy (Abbasi & Erdebilli, 2023). By uniting all relevant players through digital transformation, achieving operational excellence, ensuring efficiency, and improving

sustainability can be possible. This high-level coordination among chain participants enhances economic and environmental sustainability (Park & Li, 2021). This leads to broader benefits such as creating social value and conserving natural resources.

In this context, although the changing global business landscape and the impact of AI technologies on existing business models have been extensively discussed in international literature, it has been observed that the studies conducted are primarily in the form of panel research evaluating sector expert opinions, followed by academic studies that compile and interpret the findings of these research papers. Nevertheless, the literature does not contain any in-depth survey research with sizable samples that were carried out on a specific target population. It is also noteworthy that field studies on how practitioners should approach this transformation process, especially in developing countries, have not been conducted either. The study aims to address gaps identified in the existing literature and provide a theoretical framework for creating a road map for building a world-class competitive supply chain network by integrating artificial intelligence (AI) technologies.

This paper addresses how supply chain management should be structured at the level of global competition, particularly in emerging markets such as Türkiye. Businesses in Türkiye face a variety of challenges while implementing strategies related to sustainability and logistics efficiency. These challenges require a comprehensive and difficult approach, such as overcoming financing difficulties, improving the employment of a skilled workforce, promoting collaboration with stakeholders, and aligning short-term operations with long-term sustainability goals.

In this regard, the research question addressed by this study is: How can businesses in Türkiye adapt to the changing global competitive conditions with the support of artificial intelligence (AI) technology?

This research highlights the value of green logistics practices in the 3PL sector and improvements suggestions for operational excellence in production firms' supply chain networks. The paper claims that AI-supported agile supply chain solutions improve sustainability on both an economic and environmental level. It also aims to present an action plan that should be followed in this context and to encourage 3PL businesses to adopt green logistics principles.

2. LITERATURE REVIEW

2.1. Creating an Effective Supply Chain Network

Today's business environment is characterized by increased competition, globalization, technological advances, and events like pandemics, natural disasters, and wars (Shahed et al., 2021). Political and legal concerns about sustainability have heightened the importance of an effective supply chain. Manufacturing companies can't achieve this goal alone. Modern supply chain management aims to deliver value to customers by providing quality goods and environmentally friendly operations. Developing long-term partnerships with suppliers focused on shared goals is essential for achieving customer-oriented objectives (Christopher, 1998).

Modern supply chain management emerged in the 1980s in the Western world due to renewal (re-engineering and re-organizing) and to provide competitive advantages. During this period, contemporary supply chain management and two Japanese managerial innovations (lean management and total quality management) were concurrently adopted by Western organizations. The underlying principle of modern supply chain management posits that companies should optimize internal processes and respond to customer needs, necessitating a market-oriented approach. Consequently, partner companies have initiated the integration of their operational activities through the establishment of channel integration (Farooq & Yen 2024).

From the 1990s to the mid-2000s, digital information and communication technologies were incorporated into supply chain activities, a phase known as the technology acceptance period. During this era, these technologies emerged as competitive tools; however, their substantial costs and implementation challenges restricted their adoption primarily to large corporations (Akkartal, 2018). The fundamental characteristic of this approach was its reliance on trust, long-term relationships, and close collaboration among supply chain partners. The win-win policy was the guiding principle adopted and implemented. Advanced technologies enhanced efficiency and facilitated globalization, enabling expansion beyond national borders and yielding substantial success and significant revenues.

After 2006, information and communication technologies flourished to popular levels. Small and medium-sized enterprises (SMEs) in developing countries and e-commerce applications became integral components of the online electronic supply chain. The utilization of information-communication technologies in the supply chain system improved efficiency, enabling enterprises to integrate seamlessly and share information simultaneously and transparently (Farooq & Yen 2024). Since then, at the beginning of 2012, according to de Mattos Nascimento et al. (2024), autonomous information sharing has begun occurring without human intervention, thanks to cyber-physical systems, IoT, big data, cloud-fog computing, machine learning, AI-robotics, and blockchain.

This article focuses on integrating artificial intelligence (AI) technologies into supply chains and logistics operations to achieve sustainability goals. One of the main themes of this study is to present a roadmap for creating a world-class competitive supply chain network. Various advanced technologies of the AI paradigm will be carefully integrated into supply chain design so that operational excellence is ensured in the planning, execution, and management of activities. By achieving operational excellence, a supply chain structure will be able to achieve sustainability and respond agilely to changing business conditions.

2.1.1. Creating an Effective Supply Chain Network with AI Technologies

AI technologies enhance supply chain efficiency and sustainability. Srhir et al. (2023) highlight key technologies like IoT, blockchain, and additive manufacturing, which create smarter, more efficient supply chains, reducing waste and boosting sustainability. Sensors and IoT technological tools enable real-time process monitoring, improving resource management, and cutting carbon emissions in production (Aliahmadi et al., 2022). Machine-to-machine connectivity and autonomous robots aid in establishing operational productivity by quickly identifying defects, further reducing waste, and optimizing resources (Ayoubi & Tabaa, 2023).

Integration of technologies among supply chain participants enables real-time market data collection and synchronized operations, reducing costs and improving efficiency and quality (Muthuswamy & Ali, 2023). Information communication technologies enhance data visibility, reducing errors, idle time, and logistics expenses, which cut waste and boost operational excellence. Effective resource management through technology helps firms minimize their ecological footprint. Adopting advanced technology allows businesses to pursue sustainable production and innovative waste reduction strategies. Therefore, artificial intelligence supports responsible consumption of natural resources, climate action, and economic development (Abaku et al., 2024).

Contemporary technologies streamline processes and reduce errors, allowing companies to operate more efficiently leading to lower operational costs and environmental impact. By integrating technology, companies can develop and modify their business models to incorporate more sustainable practices. In summary, attaining sustainability objectives depends on supply chain management's use of cutting-edge technologies to optimize resources, reduce waste, and increase operational efficiency (Srhir et al., 2023).

2.1.2. Encouraging Agile Supply Chain and Sustainability with AI

Supply chain agility is essential for companies to maintain a competitive edge by quickly adapting to marketplace changes and challenges. An agile supply chain is built on flexibility, speed, adaptability, technology integration, and partner collaboration (Wong et al., 2024). Supply chain agility is the ability to quickly respond to changes in demand and the ability to supply it as soon as possible (Pasupuleti et al., 2024). Key aspects include accurately predicting market demand using real-time data (Chukwu et al., 2024) and fostering collaboration among stakeholders like suppliers, manufacturers, and logistics providers to create a responsive ecosystem (Wong et al., 2024).

Implementing an agile supply chain aims to identify and reduce risks by improving operations and ensuring continuity in changing circumstances. To aid the key aspects of agile supply chain issues, using autonomous AI tools would enhance key performance indicators and overall efficiency. In this context, flexibility is a company's ability to adjust to unforeseen changes in customer demands or disruptions, while adaptability is modifying strategies to align with market trends and customer preferences. Responding ability is the speed at which a supply chain reacts to market changes, minimizing delays. To achieve these agile supply chain characteristics integrating the most recent technologies like management information-communication systems, machine learning, and blockchain among companies improves data sharing and efficiency (Srhir et al., 2023). These agility traits are crucial for thriving in a complex, dynamic global market.

From the standpoint of an agile supply chain, artificial intelligence is also an important element of sustainability. Following is a list of AI-related areas when viewed in connection with the concept of a sustainable supply chain (Dubey et al., 2022; Kazancoglu et al., 2023):

- Real-time inventory monitoring, enabled by AI, reduces waste through accurate demand forecasts, minimizing overstocking and understocking.
- Optimizing transportation routes and schedules, reducing emissions, and improving logistics efficiency.
- Enhancing reverse logistics with AI improves returns management, waste reduction, and recycling, aligning with sustainability goals.

2.1.3. Becoming Globally Competitive through Operational Excellence

A supply chain's basic competency lies in predicting and adapting to market demand. Achieving operational excellence in the chain structure is crucial as it can transform firms' ability to compete globally. This can be done by creating artificial intelligence (AI) supported autonomous decision-making mechanisms in everyday activities (Jackson et al., 2024). So, as can be claimed in today's complex business environment, AI is critical in supply chain management to drive operational excellence and global competitiveness (Al-Surmi et al., 2022).

Today, as companies compete globally, leveraging AI technologies in supply chain management processes has become one of the essential requirements to remain competitive. The effective adoption and utilization of artificial intelligence (AI) are crucial for fostering growth and enhancing operational excellence. In contemporary practice, AI-driven supply chains are being implemented through comprehensive data analysis and the facilitation of real-time decision-making based on accurate, reliable data (Jackson et al., 2024). However, in the application of AI to supply chain management, organizations should adopt a strategic, holistic approach that ensures operational excellence while considering potential risks (Belhadi et al., 2022).

AI systems provide supply chain managers with insights and information that are challenging to obtain through conventional

methodologies. Using AI in supply chain management can lead to significant cost savings and improved efficiency (Niranjan & Vinay-Karthik, 2021). Beyond cost savings and efficiency, AI helps align a firm's strategic goals with its supply chain operations, enabling better decisions and goal achievement. As the global economy becomes more interconnected, leveraging AI technology is essential for operational excellence in supply chain management (Belhadi et al., 2024).

2.2. Importance of Green Logistics-Oriented 3rd-Party Logistics Service Providers

Today, one of the main objectives of logistics operations is to be environmentally conscious, reduce air pollution, limit the wasteful use of natural resources, and help to decrease global warming (Zhu & Gao, 2019). A green logistics system should minimize global costs while simultaneously producing value for people to meet their needs. As such, it is about striving to ease the detrimental effects of logistical activities, including but not limited to "climate change, air pollution, noise pollution, and accidents" (Karim & Meo, 2022).

Measurement of carbon footprint is becoming an essential performance criterion in all industrial and logistics service sectors due to the Green Deal Policy (Dogangun et al., 2023). In light of this development, shippers are now considering environmental sustainability in addition to more conventional logistics performance factors such as cost and punctuality when selecting logistics service providers. This shift necessitates that supply chain and logistics activities adhere to sustainability principles and be precisely executed to preserve the environment and prioritize social responsibility over commercial considerations. A critical component of green logistics operations is to facilitate, streamline, and efficiently manage all logistical processes involving all stakeholders from the point of goods reception to delivery (Jinru et al., 2022).

This chapter will examine environmental sustainability and how it can benefit third-party logistics (3PL) service providers in

this domain. Additionally, it will analyze the factors influencing green practices in the transportation and logistics industries, evaluate specific green initiatives implemented by companies, assess their impact on performance, examine the influence of AI tools on green initiatives, and consider energy efficiency implications.

2.2.1. Green Practices for Third-party Logistics Service Providers

To ensure that third-party logistics (3PL) service providers effectively implement green logistics principles, it is essential for the shipper in the position of supply chain leader to clearly articulate its goals and expectations regarding green logistics activities. To accomplish this goal, a uniform evaluation system is needed; however, the current systems generally do not tend to be holistic, and there is no common standard with a fragmented structure (Evangelista et al., 2018). In the application of 3PL, green policy practices are either partially a response to the concerns of sender-receiver companies or are derived from the environmental regulations that 3PL organizations are required to adhere to within the framework of the legislation established by government agencies.

For the green logistics approach to be fully adopted and effectively implemented by 3PL companies, it is essential to take advantage of innovative AI tools in today's modern technological era. Digitization of processes and artificial intelligence tools like machine learning are suitable for effectively managing logistics activities (Schlüter et al., 2021). Reverse logistics activities, for instance, can be organized and performed using autonomous artificial intelligence tools to facilitate the process (Wilson et al., 2022). In green logistics activities, big data analytics have a critical impact on waste management. Such environmentally focused approaches effectively implement green logistics and reduce waste in the supply chain, thereby improving companies' economic performance (Al Doghan and Sundram, 2023).

Green facilities (vehicles and equipment) and warehousing activities are another dimension of green logistics. Green warehousing is gaining attention due to its significant corrective effect on greenhouse gas emissions in supply chains. With increasing interest in sustainability, energy saving is the main objective of green facilities (Bartolini et al., 2019). Incorporating environmentally friendly industrial practices improves energy efficiency and reduces the impact of climate change caused by logistics facilities and warehouses. It covers the benefits of implementing green facilities projects, difficulties, and stakeholder collaboration. Implementing practical recommendations for decarbonizing warehouses requires highlighting the need for cutting-edge innovations, regulations, and environmentally friendly architectural techniques (Korra & Valaboju, 2024).

The adoption of Environmental Management Systems and green certifications is low among 3PLs (Evangelista et al., 2018). The environmental management system ISO 14001 should be considered a fundamental pre-criterion by shippers when selecting a 3PL service provider as a preference factor. In the current situation, it appears that there is not much enthusiasm for this certification due to the obligations it imposes on 3PL companies. For this reason, shippers need to require that the 3PL company has an environmental management system certification before contracting with service providers (Moretto et al., 2018).

The 3PL company's technological capabilities must align with the employees' sincere commitment to engage in environmentally conscious green logistics activities. Moreover, for the implementation of green initiatives in 3PLs, available technology should be considered a crucial component, and its absence should be regarded as a significant impediment. Nevertheless, it is essential to acknowledge that the development of green competencies necessitates both technological advancements and human involvement working in conjunction with these developments. Green logistics services can operate more efficiently if 3PL service methods are designed to facilitate the development of these competencies (Mak et al., 2022).

2.2.2. The Factors that Impact the Adoption of Sustainable Practices in 3PL

The implementation of sustainable practices in third-party logistics (3PL) is influenced by various factors categorized into drivers and barriers. This section discusses the key elements that affect the adoption of sustainable practices in the 3PL service-providing sector.

As previous chapters mentioned in this paper, customer requirements are of paramount importance. Increased consumer awareness resulting from recent regulations coming into force and from ultimate market demand for environmentally friendly logistics options compels 3PL providers to adopt sustainable practices to meet client expectations (Jamkhaneh et al., 2022). 3PL companies aim to enhance their corporate image by adopting green practices that can provide a competitive advantage in the market endeavoring to be the preferred organization that clients consider when selecting a service provider in a highly competitive environment (Bathmanathan & Hironaka, 2016).

Innovations in technology that promote energy efficiency and waste reduction are one of the key elements supporting the implementation of sustainable practices in the 3PL sector. The critical aspect, however, is that these new sustainable practices need to be seamlessly integrated with existing logistics operations, and the transformation process must be conducted in a way that avoids disrupting current operational processes. Meanwhile, elements such as 3PL service providers establishing strong partnerships based on long-term collaboration with customers focused on sustainability and facilitating the acquisition of financial support for necessary investments will support the effective application of green logistics practices (Creazza et al., 2024).

At this stage, another critical factor is the attainability of necessary technological investments, the feasibility of establishing them, and the ability to employ a skilled workforce

that can implement them effectively (Junge, 2019). Redesigning all of this into a structure that operates efficiently and the entire process undoubtedly requires the support and commitment of top-level management (Ali et al., 2014). Creating a continuous sustainability culture in a 3PL company primarily depends on management's adherence to this policy.

The significant investment costs for technological equipment and the construction of green facilities needed to support sustainable practices may prevent 3PL service providers, which are generally small and medium-sized enterprises with limited financial resources, from adopting a sustainability approach or striving to implement it ideally as it should (Creazza et al., 2024). Another critical obstacle may be that the management of 3PL companies has limited superficial knowledge about the concept of sustainability, which leads to inadequacies in implementing the necessary action plans (Perotti et al., 2015).

The adoption of such complex transformation planning requires embarking on a journey with a belief in long-term goals. However, the management approach focused on daily financial performance reports leads to an emphasis on short-term operational goals, which in turn results in the neglect of environmentally friendly practices. Moreover, it is essential to prevent resistance to the adoption of a sustainable logistics understanding not only from top management but also from mid-level management, who are responsible for daily operations within the company, and their employees (Klein et al., 2024).

The complex structure of the current supply chain may pose challenges for 3PL companies in aligning green practices with the business models of multiple stakeholders, and it could even lead to a chaotic situation during the transformation process of the existing operational framework. In the case of a strategic partnership, a collaborative structure must be established that will allow the client of the 3PL company to become a solution partner (Bahr & Sweeney, 2019; Creazza et al., 2024). As third-party logistics providers navigate the complexities of implementing

sustainable practices in their operations, all of these factors play an important role in shaping their strategies and operational decisions (Evangelista et al., 2018).

2.2.3. Practice and Performance Impact of Green Actions on 3PL Companies

The term green logistics refers to all environmentally sustainable practices used by companies engaged in transportation, particularly third-party logistics providers (3PLs). These applications aim to improve operational efficiency and financial performance while reducing environmental impact. Green actions, such as energy-efficient technologies and sustainable logistics practices, are evident in improving environmental performance by reducing greenhouse gas (GHG) emissions and energy consumption (Jazairy, 2020). The development of proactive environmental action plans and the design of AI-enabled operational activities could further enhance this impact (Abaku et al., 2024).

Green logistics operations typically have a positive impact on financial metrics, according to previous studies in literature. By using green practices, businesses can reduce energy and resource consumption costs and increase their financial performance. However, financial benefits might sometimes be limited, and this case should not be overlooked, as they can vary depending on the size of the company and the scope of the green initiatives implemented; thus, one should not have overly high expectations (Sureeyatanapas et al., 2018).

Although previous studies in the literature show that green logistics activities have a positive and significant relationship with environmental and financial performance, the same cannot be observed for operational performance. Most likely, this situation can be attributed to operational processes maintaining excellence in internal activities and integrating effectively with external partners, allowing processes to run smoothly, affecting the green logistics strives indirectly (Vienažindienė, 2021). This operational performance success has consequently led to the

emergence of effectively implemented green logistics processes. In other words, this situation can be interpreted as the necessity of ensuring the efficiency of logistics operations carried out by the 3PL company to facilitate the effectiveness of green practices (Creazza et al., 2024).

Establishing successful collaborations between 3PL service providers and their clients typically necessitates a shared commitment to effective communication, which is often predicated on continuous, long-term cooperation (Ali et al., 2014). A comprehensive understanding of this partnership—wherein both parties adopt a proactive stance toward sustainability—is considered essential to the efficacy of green logistics initiatives. To specify sustainability targets in the service contracts, the shipper and 3PL must demonstrate their mutual commitment to supporting these processes (Moretto et al., 2018).

3PL companies must have the capacity and necessary qualifications to fulfill their contractual obligations in line with their customers' service expectations. In particular, standard logistics services need to be adapted to the customer's sustainability expectations, which is an important requirement. In such renewed conditions, changes to contract terms can be easily modified quickly and securely by taking advantage of blockchain technology in a digital environment (Berneis et al., 2021).

For 3PL service providers to effectively integrate associated processes, their technological capabilities should, at minimum, be commensurate with those of their clientele. This alignment ensures the seamless and efficacious functioning of procedures related to green logistics and facilitates the efficient transfer of information. Another important point is the collaborative synchronization of environmental and operational performance evaluation systems and their regular monitoring. As soon as a problem arises, action needs to be taken to find solutions under the required conditions to identify areas for improvement and to resolve the problem in a short period to perfect the operating procedure (Jackson et al., 2024).

In this context, it is essential to recognize that various third-party logistics (3PL) companies of different sizes possess diverse corporate capabilities and target heterogeneous market segments. Within the 3PL industry, assessing green logistics activities through a uniform performance measurement system is unfeasible, despite the necessity for standardized approaches when evaluating environmental practices by clients. This is due to the variability in the adequacy of corporate resources among 3PL companies and their differing capacities to adapt and implement existing technologies within their business models. From this perspective, it is more probable that large-scale companies will adopt a proactive approach to meeting customers' expectations regarding green logistics performance (Creazza et al., 2024). However, the implementation of these principles by only a limited number of companies does not indicate that the industry is genuinely green-focused. Furthermore, the social benefits intended through green logistics practices cannot be achieved with the participation of just a few companies, ultimately rendering it impossible to attain the goal of a more sustainable world.

Therefore, the fundamental issue that needs to be addressed is how to develop beneficial suggestions to fully involve 3PL firms, which have limited resources and focus only superficially on green logistics practices, in a radical transformation. In light of scientific research methods, it is crucial to guide how 3PL service providers and transportation operators can fully embrace green logistics initiatives and how this change can be efficiently implemented through a systems approach (Ustun & Akkartal, 2024).

In conclusion, it should not be forgotten that successful collaborations are not merely about the legal obligations of contracts. Particularly in sustainability-focused logistics practices, establishing mutual understanding regarding corporate culture and shared goals and sincerely implementing them is the key to success.

3. RESEARCH METHOD

This paper's study design is based on recently published literature reviews. The primary goal of this study is to define the role of artificial intelligence (AI)-supported technologies in supply chain and logistics management. A study of this kind will guide companies in adapting to the economic and trade changes of recent years and developing a competitive position in today's business environment. Within this main theme, the research topic has been evaluated in two sub-dimensions. The first sub-dimension explains the role of AI in achieving operational excellence by creating an effective supply chain network that generates shared value among all chain participants. The second sub-dimension is to identify how 3PL companies can benefit from AI in their business models to achieve effectiveness with their green logistics programs.

In the context of the research, a detailed literature review has been done to develop a theoretical framework to achieve the objectives above-mentioned. As seen from the literature review, there is a noticeable lack of field surveys that encompass general applications. Therefore, establishing a broad-ranging theoretical framework will prove beneficial before undertaking a field survey. In light of this framework, future surveys that will be conducted could provide valuable insight into designing research that examines the degree of maturity of the use of artificial intelligence in supply chain and logistics management practices.

The methodology used in this study involved identifying sectoral area problems and examining studies that compiled the observations and opinions of experienced sector representatives from expert academics. The research methodology consists of the following stages: (1) define concepts and identify problems to ensure operational excellence related to supply chain and logistics management; (2) compile solution proposals supported by AI technology from the related subject expert academics; (3)

develop a theoretical framework focused on sustainability goals and design a research proposal.

For this purpose, a systematic approach was employed to identify the literature sources used in the study. As a beginning step, this study investigates operational excellence and green logistics as a fundamental concept. In well-known databases, studies published after 2020 were screened for addressing these topics. Among the selected articles, articles related to sustainability or artificial intelligence technologies were identified. This step was completed after identifying suitable papers and assessing their relevance to the research objective.

4. RESULTS

When evaluating the results of previous studies in the literature, a strong positive correlation between operational excellence and sustainability approaches is observed in the context of supply chain and logistics management (Wojtkowiak & Cyplik, 2020). Organizations that pursue sustainability in the dynamic modern business world not only lessen environmental damage but also exhibit increased market resilience. As this paper emphasizes, operational excellence is a prerequisite for achieving sustainability goals. Although a direct relationship between operational performance and sustainability performance is sometimes not observed, operational excellence is claimed to be a prerequisite for sustainability. The integration of operational excellence as an organizational culture and the implementation of agile processes are critical in this context (Naik et al., 2024).

A primary issue identified in this study pertains to the optimization of supply chain structures to enhance customer-centricity and environmental sustainability within the evolving global economic, trade, and global warming-related regulatory landscape. In this regard, the predominant solution proposed in current literature is the implementation of autonomous artificial intelligence (AI) technologies in supply chain network design as

an antecedent factor for operational efficiency. The Internet of Things (IoT) and smart sensors that manage processes without human intervention, machine-to-machine communication, and autonomous robotic operations are among the key technologies essential to the design of supply chain networks with ERP (Srhir et al., 2023).

The volatile nature of the contemporary business environment necessitates agile supply chain network structures. In this context, accurate forecasting of potential market demand emerges as the most critical indicator. Achieving economic and environmental sustainability goals simultaneously is possible by accurately analyzing demand forecasting and then ensuring that the supply chain can respond to this level of demand. The effective use of AI technologies is important in this context from two perspectives. Firstly, AI assists in data collection and evaluation methodologies to conduct comprehensive scientific analyses that take into account all factors in demand forecasting. Secondly, AI technologies can be used to coordinate efforts to respond to the demand levels of chain members in the best possible way.

AI-supported supply chain network architecture maximizes the efficiency of autonomous decision-making systems. Big data analysis makes it easier to make decisions based on current facts more quickly and effectively. This reformation of decision-making processes can significantly reduce costs associated with companies' operational activities and enable the management of more environmentally focused processes by minimizing waste and increasing energy efficiency.

This study proposes a theoretical framework based on the concepts mentioned above. As shown in Figure 1, by implementing an agile supply chain approach supported by artificial intelligence technology tools, operational excellence can be achieved in supply chain networks (SCN), thereby ensuring economic and environmental sustainability.

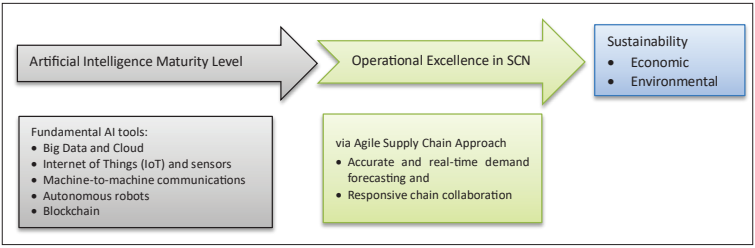

Figure 1. The first proposed theoretical framework is related to operational excellence improvement

Source: by Author

The second perspective of this study examines how logistics operations, which provide the movement of goods via third-party logistics companies, can more effectively implement green logistics principles through the utilization of AI technology as opposed to conventional methods. Environmentally conscious clients and current regulatory pressures from global warming require companies to not only engage with 3PL firms that are environmentally friendly but also focus on sustainable practices in their operations. 3PL companies need to manage their operations to meet consumer demands and efficiently utilize natural resources without environmental detriment.

Eventually, carbon footprint performance and global warming targets will become the primary selection criteria. It is an important criterion for 3PL companies to be able to certify their processes by initially meeting the requirements of the ISO 14001 environmental management system. With the gathering of the certificate, the business model that operates in a conventional structure could be made environmentally focused. The next step is to establish green logistics facilities through investments in warehouses and vehicle equipment, thus developing an innovative business system focusing on energy efficiency by consuming renewable sources. Investments in AI technologies such as big data and machine-to-machine should be made, and integration should be ensured, especially to enhance coordination with all stakeholders and thus increase efficiency. Surely, the success

of such a digital transformation process is not possible solely through investment in technological tools. A qualified workforce with sectoral expertise and the ability to implement technology-based solutions is critical. If all four processes mentioned above are completed, green logistics can be achieved.

Efforts to enhance green logistics practices cannot be limited to a 3PL company. 3PL service provider companies need to operate in long-term strategic partnerships with their clients, who are in the position of shipper and receiver. In this regard, when a service contract is made, green logistics activities related to sustainability criteria should be clearly defined, and the responsibilities the parties must undertake to achieve these goals should be documented in writing. To guarantee that the system functions effectively and autonomously, the pertinent parties should incorporate components such as AI-supported tools, equipment, and facilities they own. In the case of a problem with the system, all relevant stakeholders should dedicate themselves to resolving the issue and ensuring smooth operation.

This study proposes a second theoretical framework based on these concepts, as shown in Figure 2: A 3PL company must fulfill conditions in two primary dimensions to assert that it implements green logistics activities. The first dimension encompasses four factors related to the internal structure of a 3PL company: (1) Possessing and effectively implementing ISO 14001 environmental management system certification; (2) assembling green warehouses, vehicles, and equipment; (3) designing an efficient operational system that functions autonomously with AI support; and (4) employing sector experts who can utilize AI technologies. The second dimension pertains to factors related to the strategic cooperation structure a 3PL company would establish with its clients, comprising three elements: (1) arranging long-term contract logistics; (2) providing real-time and transparent integration of operational processes with stakeholders; and (3) adopting a problem-solving approach aligned with the philosophy of Kaizen.

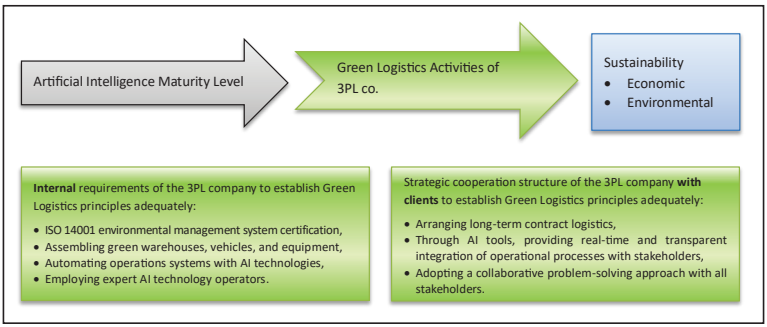

Figure 2. The second proposed theoretical framework is related to green logistics improvement

Source: by Author

However, the audience should be aware that such a dramatic transformation is not easy for any organization, and there are several motivational factors related to this process, as well as some serious barriers that need to be overcome. The number one trigger of this transformation process is the demand of customers in the market for green logistics activities due to their environmental sensitivities and the efforts of 3PL service providers to create a positive image of that expectation in the market. The key factor for the success of such a radical transformation process is the determination of upper management and having a strategic vision for the transformation process. If not, such a transformation process will end in disaster. An important aspect of managing a change process is an analysis of how the existing system functions. When it is properly analyzed, necessary improvement suggestions are identified, and the transformation process is completed with minimal discomfort.

Nevertheless, the most frequent obstacle to this transformation process for 3PL companies seems to be a lack of funding and human resources, particularly for small and medium-sized enterprises (SMEs). Inadequate understanding of ideas like artificial intelligence and green logistics can also have a disruptive impact on the extent of the transformation process and, ultimately, its effectiveness. The resistance of employees

accustomed to the status quo to change and the concerns regarding the potential chaos that may arise if the transformation strategy fails to achieve the desired goals in the short term constitute a significant point of reluctance.

In conclusion, alongside other influencing factors, having technological capabilities supported by artificial intelligence serves as an indicator of the industry's competence and maturity level in implementing green logistics principles for 3PL companies. In this context, the most critical element on a sectoral basis is that the success of the industry formed by a country's 3PL service providers is determined by the performance of the least capable representative among those firms. Developing projects in a sector-government-academia partnership can create significant benefits in implementing the necessary action plans to enhance sectoral activity and success. These projects typically involve civil society organizations, public authorities, and relevant academic institutions in the sector. In the absence of such initiatives, it is evident that many industry representatives with limited resources will struggle to fully adapt their operations to green logistics practices.

5. CONCLUSION AND DISCUSSION

This study examines the potential of contemporary artificial intelligence (AI) technologies to enhance operational excellence and address environmental concerns in the business world, with a particular focus on supply chain and logistics management applications. Organizations can optimize their operational efficiency and resilience by leveraging AI technology capabilities, thereby maintaining competitiveness in an increasingly complex marketplace. While the integration of AI technology tools in supply chains presents significant opportunities for improving sustainability, it necessitates ongoing investment in research and development to surmount existing challenges and foster operational coordination and effectiveness through innovation in sustainable practices.

At this stage, it is crucial to accurately position the role and importance of AI in everyday life. It should not be forgotten that having AI technology alone does not hold any meaning. The fact remains, however, that AI technologies have become an irreversible part of our society and the business world. It is therefore impossible to avoid its effects and refrain from using it. To integrate AI technologies with the current business system, a thorough system analysis should be carried out, and a network structure that fully integrates with all stakeholders should be built.

At this point, it is necessary to draw attention to the awareness done by Dörfler (2022) regarding the role that AI technological tools should play in business life, as mentioned below. AI technologies primarily affect humanitarian processes when utilized for routine operational tasks, such as algorithm-supported decisions. AI also facilitates the prompt collection, evaluation, and analysis of sources based on explicit information found in database clusters; however, it cannot make decisions autonomously in strategic decision-making processes where qualities such as common sense and experience are paramount. Due to the limited areas of expertise in AI technologies, they can perform operations with significantly greater speed and efficiency than humans in their focused domains. This observation indicates that AI can generate highly accurate results on a limited and well-defined dataset. AI technologies demonstrate exceptional proficiency in tasks that require precision, attention, and time compared to human capabilities. However, the fundamental characteristics of the human brain, such as emotional intelligence, common sense, and the ability to retain experiential knowledge, are absent from AI technologies. AI cannot retain a memory of a task after it has been completed.

In essence, AI technologies assist decision-makers in coping with today's uncertainties. A well-designed network of AI tools is tasked with providing the necessary support and contributing to easier and more accurate assessments. For this

reason, in an ideal collaboration, qualified expert personnel supported by AI can identify which information is useful through technology and develop creative ideas. This also enables the development of effective competitive strategies that cannot be imitated under uncertain market conditions. Furthermore, the second fundamental aspect of this research examines how AI technological tools may facilitate synchronization in supply chain network structures, enabling organizations to respond more expeditiously to market demands and evaluate the chain's value performance in real time. This is relevant as the network structure of supply chains has become increasingly complex in the contemporary global market. In the current global market, enterprises no longer compete in isolation; rather, the point of competition has shifted to the supply chains within which firms operate. Consequently, brands offering products and services to the market can no longer establish a competitive advantage independently; instead, they can attain a sustainable competitive advantage to the extent that they can develop and implement an effective supply chain management strategy in collaboration with their suppliers. From this perspective, organizations view their supply chains as a competitive asset to enhance their core competencies. Effective management of the supply chain necessitates that the company responds competitively to market fluctuations and customer demands while maintaining or pleasing to the eye its market share and profitability.

Managing the supply chain involves executing management activities under conditions of uncertainty, which is why it is challenging. The primary reason for that is the lack of precise knowledge regarding the quantity and strength of customer demand, the unknown potential for substitute products to enter the market, and fundamental factors such as the risk of transportation times. The main objective of a supply chain structure is to design a system that ensures the service level expected by the customer in the market is provided while simultaneously minimizing

process costs. It is essential to utilize autonomously operating AI technology tools in a reformist network design that fosters collaboration through systematic and strategic coordination of the business functions and plans of the organizations involved to enhance the long-term performance of all organizations within the supply chain. In a highly competitive environment without the guidance of AI support, decision-making moments will undoubtedly lead to bad results, much like a driver will crash while driving closed-eyed and just following their intuitive feeling.

As emphasized throughout this paper, investing in AI technologies alone does not make sense, because AI tools are not a magic wand. First and foremost, it is essential to strategically restructure the supply chain network. The fundamental features of this structure should include the following elements: It is necessary to adopt the principle of transparency in information sharing and to be patient to achieve long-term targets. No participant in the supply chain should be excessively dependent on another; this principle dictates that supplier companies should not maintain a commercial relationship with any firm in the chain that exceeds 60% in terms of quantity or value. For establishing trust among chain members, values such as honesty and friendship must be embraced in a common language. After these fundamental strategic elements are adopted in supply chain design, investments in information and communication technologies, such as AI-supported tools, should be made and integrated between chain participants. By incorporating these technologies effectively, customer-supplier relationships and logistics operations processes will become smooth and competitive. Inter-institutional coordination is particularly critical in managing concerns related to environmental pollution and the sustainability of natural resources, especially in reverse logistics processes.

Planning is fundamental to supply chain management, and during the planning phase, contemporary management philosophies such as total quality management, a systematic

approach, and cost analysis should be incorporated. Total quality management serves a unifying function by implementing a common philosophical framework for ensuring the integrity of the supply chain. A systematic approach necessitates focusing on the impact of decisions on the flow directions within the supply chain. This not only provides a systemic solution but also enables the establishment of a control mechanism within the supply chain that monitors and moderates the system's problems. Cost analysis encompasses topics such as identifying methods to reduce costs in various areas like transportation and purchasing within the supply chain without compromising quality. Therefore, it would be incorrect to assume that simply acquiring AI technologies for the organization would be sufficient without establishing these fundamental philosophies.

In conclusion, the adoption of a management approach based on current accurate information supported by AI technology has become particularly critical in dynamic business environments nowadays characterized by volatility, uncertainty, complexity, and ambiguity. Disruptions like this affect order management within the supply chain. Response times to requests that do not match with the actual completion of a request are likely to result in an adverse situation. For this reason, as mentioned in this paper, decision support systems focused on AI tools that will assist in managing supply chain and logistics processes should be used to enhance efficiency. This way, management decisions such as inventory management, resource allocation for activities, fleet management, vehicle routing, and warehouse planning can be made much more accurately and quickly. The success of all these processes primarily ensures satisfying ultimate market consumers with competitive prices and indirectly leads to much better environmental performance due to the efficiency achieved.

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DESIGNING SUSTAINABILITY INTO BUSINESS MODELS IN EMERGING COUNTRIES

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ABSTRACT

The last decades have been the golden era for global entrepreneurship. Growing entrepreneurship ecosystems have fostered the most successful start-ups and new businesses that have become today's most prominent companies. Each business has a unique business model that creates, delivers, and captures value. However, many business models do often not include the necessary building blocks for integrating sustainability. Sustainable business models differ from traditional business models in that they do not focus solely on creating, delivering, and capturing value but also include sustainability aspects of environmental and social concerns. In addition, they also support the philosophy and principles of the circular economy. The introduction of the United Nations 17 Sustainability Development Goals (UNSDG) has been a significant milestone. The concept of sustainable business models also serves as a tool for businesses to integrate SDGs into their business models. This realm has increased quite rapidly. Researchers have made several attempts to develop a framework for sustainable business models focusing on circular business models. Most of these studies rely on examples from developed countries where sustainability and circularity awareness have been addressed for several years.

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This chapter aims to supplement the existing literature on sustainable business model design frameworks by providing a perspective on circular business models used by start-ups in emerging countries, specifically Türkiye. Following a literature review on circular business models, examples of start-ups and new businesses in Türkiye implementing circular business models in emerging countries will be discussed. This paper will clarify the awareness, implementation, and status of start-ups and businesses implementing circular business models in Türkiye, an emerging economy. The status of circular business model implementation by start-ups and businesses in Türkiye, an emerging economy, will be compared to that of developed economies.

Keywords: Sustainability, Circular Business Models, Start-ups, Business Model Transformation, Emerging economy.

1. INTRODUCTION

In recent decades, entrepreneurship has been a global surge, which many nations view as a key driver of their economic prosperity. Entrepreneurs are the most important actors who engage in entrepreneurial activities and are needed for the formation of small businesses that have the potential to become the global market leaders of the future. Some of these small businesses soon grow into big global companies. Their products or services are being produced and used worldwide while providing immense profits to their owners. Many such examples exist, and new examples are added every day. Google, Microsoft, metaverse, Zoom, and Temu are just a few. These examples were initially predominantly coming from the USA but today we can see companies from many countries around the world. As a result, entrepreneurship has become an area of interest for many parties.

Governments can be considered as the most important player in this regard. They are well aware of the economic and social benefits of increased entrepreneurial activity in their nations. Governments support entrepreneurship by introducing support mechanisms through laws, regulations, funds, incubation centers, techno parks, mentorship, and various types of education.

Young people increasingly embrace entrepreneurship as a career, while even older individuals show growing interest in starting their businesses after retiring. The rise of women's entrepreneurship is also narrowing the gender gap. Additionally, entrepreneurship is recognized for its ability to address important societal challenges such as global economic crises, health threats, and sustainability issues as outlined in the United Nations Sustainable Development Goals (SDGs).

Academics and policymakers are conducting studies to understand the dynamics in this field. However, these studies are being carried out in developed economies such as the USA or Western Europe. The results and proposed implications reflect

the reality for developed economies. Nevertheless, the global economy does not solely consist of developed economies.

A significant number of nations in emerging economies are striving to reach the level of developed economies by imitating the footsteps of developed ones.

As these are happening, a new concern has joined the agenda; sustainability. All of these businesses have adopted a business model to operate and base their unique value proposition. The local and global economic context they are surrounded by is based predominantly on a linear economy. However, the increase in population and businesses has created sustainability-related challenges for humanity and Mother Earth.

Developed economies have been following the principles of linear economy while engaging in economic activities, whether as a start-up or an established global company. For many decades, they have exploited natural resources in the quest for production, polluted the environment, and created huge amounts of waste. Until only some decades ago, this was the dominant production model. Fortunately, a change has started in this regard. Developed economies started to face the reality that their linear economy model focuses on satisfying today's needs by exploiting future resources. They realized that the situation is more severe than ever and there is an urgent need for a new economic model. The solution is to shift to a circular economy. European Union (EU) countries have started this transition phase.

This chapter elaborates on the transition from linear to circular economy from the perspective of emerging economies. For this purpose, definitions of linear economy, sustainability, circular economy, and circular economy models will be given. Next, the transition from linear to circular business models will be approached from both established businesses and entrepreneurial perspectives. Finally, examples of circular business models in Türkiye as an emerging economy and implications for policymakers and practitioners will be given.

2. LINEAR ECONOMY, SUSTAINABILITY, AND CIRCULAR ECONOMY

The current and globally dominant economic model in which businesses operate is a linear economy where new materials and energy sources are used for production and waste is disposed of. Developed countries such as the USA and the countries in the EU have been using the linear economy model that has helped them to grow and prosper economically for several decades now (Lacy et al., 2020). The linear economy has been known for creating economic prosperity for the stakeholders, especially business owners and shareholders. On the other hand, consumers enjoyed the vast amounts of products and services they were able to access, own, use, and enjoy. All parties benefitted from the outcomes and focused on the advantages.

However, nothing comes without disadvantages, which is also true for the linear economy model. In the linear economy model philosophy, there is no focus on how or where resources are exploited, what damages are caused to the environment during production, and the amount of waste created. Thus, the linear economy model is causing several severe global challenges such as intensified environmental pollution, new resource shortages, and increasing climate crises. As stated above, developed economies have been benefitting from the linear economy model and causing a severe threat to the sustainability of our planet Earth. With the problems these economies started to face whilst searching for new resources they needed for production and facing the consequences of environmental problems they caused, they immediately started to search for alternatives.

The initial roots of the concept of circular economy stem from Robert Ayres's (1994) study where he proposed the theoretical foundations of industrial ecology as follows:

> *At the most abstract level of description, then, the metabolism of industry is the whole integrated collection of physical processes that convert raw materials and*

> *energy, plus labor, into finished products and wastes in a (more or less) steady-state condition. (p. 23)*

Until today, many studies have followed and continue to add to the theory of a circular economy. Building a theory takes many years and requires intensive research carried out in different settings. Still, these attempts continue, and it is too early to talk about a well-grounded theory of a circular economy. The starting point for many researchers is to define the circular economy model.

The present literature shows that several researchers have elaborated on the definition of a circular economy but there still seems not to be a consensus on it (Cullen & de Angelis, 2021; Pollards et al., 2021; Özsoy 2018). The most commonly used definition is Kirchherr et al. (2017):

> *A circular economy describes an economic system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/ distribution and consumption processes, thus operating at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity, and social equity, to the benefit of current and future generations (p. 224).*

As Commoner (1971) notes, "*We must learn how to restore to nature the wealth that we borrow from it*" (p. 300).

It can be concluded that a transition from a linear economy to a circular economy is needed and happening. However, this is mostly true for developed economies. As stated earlier, these economies have used and benefitted from the advantages of a linear economy. Emerging economies have followed in their footsteps, hoping to achieve better economic development. Little

concern was placed on sustainability issues as they were also yet to be a concern for developed economies. It can be concluded that the shift to the circular economy in the developed economies will be followed by the emerging ones.

Sustainability concerns and movements for businesses are becoming more visible every other year. The United Nations 17 Sustainability Development Goals (UNSDG) adaptation on January 1, 2016, has been a significant milestone. Governments, businesses, and Non-Governmental Organizations (NGOs) have also adapted and included them in their long-term strategies.

The urge for a new mindset in engaging in economic activities was initiated. In this mindset, the aim should not be only to produce for today's needs by using all necessary resources—this mindset has brought us to this point. This new mindset must include sustainability awareness and ensure that future resources are not exploited for today's production. The solution sought is quickly moving away from the dominant and widely used linear economy. A linear economy is acquiring all the needed raw materials for efficient production. The main goal here is input-output efficiency. The focus is profit maximization. The circular economy offers a new perspective and needs a new mindset (Figure 1).

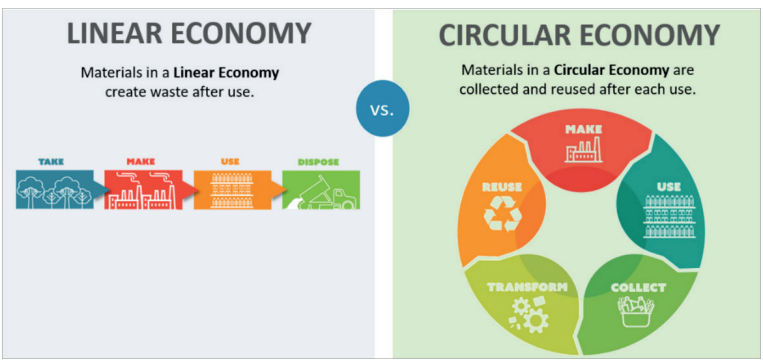

Figure 1. From Linear to Circular Economy

Source: Hi-cone.com

Here, each process needs to include sustainability concerns. This shift in mindset requires support from various actors, both inside the business and intrapreneurs and in the context in which it operates.

One important force helping this change happen is entrepreneurship, the outcome of the entrepreneurial mindset and actions. As suggested in Panchanatham (1999), the definition of entrepreneurship here should be narrowed down to creating new businesses rather than solving problems.

Several models have been introduced that help to execute circular economy principles.

3. CIRCULAR BUSINESS MODELS

Sustainable business models differ from traditional business models in that they do not focus solely on creating, delivering, and capturing value but also include aspects of environmental and social concerns. They are very much needed to achieve the circular economy.

The intentional shift movement from a linear economy to a circular economy has a vast impact on the development of circular business models. The concept of circular business models also allows businesses to integrate SDGs into their business models. This realm has increased quite rapidly. Researchers have made several attempts to develop a framework for sustainable business models. Most of these studies rely on examples from developed countries where sustainability awareness has been addressed for several years.

Sustainable business models that follow the principles of circularity are described as circular business models (Tüzemen & Kunday, 2023). They are classified within the umbrella of sustainable business models.

A more specific description is given by Lahti et al. (2018):

> *A circular business model is designed to create and capture value while helping achieve an ideal state of resource usage (e.g., finding a model that most closely resembles nature and comes close to achieving the complete cycling of materials). Accordingly, the goal of the business model shifts from making profits through the sale of products or artifacts to making profits through the flow of resources, materials, and products over time, including reusing goods and recycling resources (p. 3).*

There is no one fixed circular business model. Businesses prefer different types of circular business models, and new ones are being introduced continuously.

Several scholars have worked on classifying these business models and tried developing a theoretical framework, such as Urbinati et al. (2017) and Pieroni et al. (2020). Urbanati and his colleagues (2017) use classification based on where the sustainability and circularity of the business model are focused. Downstream implies a focus on the sustainability of the product or service offered as well as a focus on the customer. Upstream focuses on sourcing preferences, production-related sustainability issues, logistics-related concerns, and business operations. Businesses that focus on both categories are classified as full circular.

Pieroni et al. (2020) reviewed the literature on various archetypes for circular business models. In their study, they have classified the archetypes based on two criteria: downstream or upstream. As a result, they prepared a list of 20 different archetypes of circular business models. This study alone implies the generous variations that businesses prefer as models to adapt to circular economy principles.

The OECD Report 2019 proposes the most commonly and frequently referred typology classification for circular business models (Table 1).

Table 1. Circular Business Models Addressed in the OECD Report 2019

	Key characteristics	Business case
Classic long life	The expected life of a product is extended through changes in product design	Manufacturers can charge a premium for higher quality, more durable products
Direct reuse	Involves the redistribution and reuse of products that would have otherwise been discarded before reaching their expected end of life	Firms that facilitate transactions of second-hand goods (whether online platforms or physical shops) can charge a percentage of a selling price
Maintenance and repair	By fixing or replacing defective components, maintenance and repair allows degraded products to reach their full expected life	For original equipment manufacturers, extending product care beyond the point of sale may help to promote customer loyalty. In addition, repairing existing products can be a profitable activity for third party repair firms.
Refurbishment and remanufacturing	Gives products a "new life" by restoring them to their original working condition	Refurbished or remanufactured products are sold at a lower price than new ones, buy may generate higher profit margins due to material cost savings

Source: OECD report (2019), p.25

Among all the models, the sharing model has become quite popular in recent decades and is associated with rapid technological and innovative changes. It is also referred to as a sharing economy or gig economy. The range of economies that use this new model is growing daily. The sharing model allows the usage of vehicles, real estate, outfits, education, furniture, and many more services and products with others in return for a pre-agreed payment. The renting parties or companies are generating an additional income while the renter party or companies are benefiting from the service or product at a lower cost as compared to buying it. Both parties benefit from the cost advantage and consider this a win-win situation.

The sharing model can be applied to any sector and does not have any clear-cut boundaries. It serves as an accelerator for generating new employment opportunities. Owners of products that they do not want to own anymore are not becoming a waste but reentering the economy. This means that unnecessary resources for producing these products or services are eliminated. The exploitation of new resources or pollution of the environment is achieved. Additionally, new tax incomes are generated for governments.

Sharing has many advantages for both product owners and tenants, as well as for society. It is possible to list all these advantages as follows:

- It provides financial income by opening new business doors for people renting out their products.
- It allows savings for consumers who choose to rent within their needs instead of purchasing.
- It reduces the need for production by reducing the number of products purchased. This reduces environmental pollution and energy consumption required during the production process, which also contributes to preventing excessive consumption and waste.
- It helps prevent damage to the environment by ensuring greater protection of natural resources.
- Since it allows direct interaction between the owner and the consumer, it prevents possible breakdowns in communication.

In 2022, the sharing model's global market value was estimated at more than 150 billion USD and is expected to reach 2031.1 billion by 2031 (marketresearchfuture.com).

In the Report on Business Models for the Circular Economy (2019), the OECD also uses another classification for business models solely focusing on product life extensions (Table 2). These models help to keep the product within the economy for a more extended period, reducing the need for and exploitation of new resources.

Table 2. Overview Of the Product Life Extension Models

	Circular supply	Resource recovery	Product life extension	Sharing	Product service system
Key characteristics	Replace traditional material inputs with renewable, bio-based, recovered ones	produce secondary raw materials from waste	Extend product lives	Increase utilization of existing products and assets	Provision of services rather than products. Product ownership remains with supplier
Resource efficiency driver	Close material loops	Close material loops	Slow material loops	Narrow resource flows	Narrow resource flows
Business model sub-types	Cradle to cradle	Industrial Symbiosis	Classic long life	Co-ownership	Product-oriented
		Recycling	Direct reuse	Co-access	User-oriented
		Upcycling	Repair		Result-oriented
		Downcycling	Refurbishment		
			Remanufacture		
		Metals	Automotive	Short term lodging	Transport
Main sectors currently applied in	Diverse consumer product sectors	Paper and pulp	Heavy machinery	Transport	Chemicals
		Plastics	Electronics	Machinery	Energy
				Consumer Products	

Source: OECD report (2019), p.29.

4. EXECUTING THE TRANSITION FROM LINEAR BUSINESS MODEL TO CIRCULAR BUSINESS MODEL

During the last two decades, important attempts and initiations have been undertaken to transform from a linear to a circular economy, starting in the EU and spreading globally. Conveying from a linear economic model to a circular economy became a global philosophy. This shift has affected the business models of businesses, whether start-ups, Small and Medium Enterprises (SMEs), or big enterprises. The result of their cumulative behaviors will make this change happen. Each of these actors needs to be aware of and in sync with each other.

This transition needs to be approached from two different perspectives.

Perspective 1: Shift from the legacy linear business model to the new circular business model for established businesses.

The first perspective must focus on the already existing businesses. These businesses are present in various sizes, ages, and industries. Many might be leaders in their markets and regions. This means that established businesses have an already well-functioning legacy business model that most probably is based on the principles of linear economy. This process will be challenging and needs to be planned with precision. Before departing for this journey, the challenges need to be anticipated. As with every case in which a change is involved, success rates are pretty low. Here, to increase the chances for success, the business model transformation from the legacy business model to the circular business model needs to be supported by the right communication principles, organizational design, and change management tools.

Several established businesses are changing their legacy business models to adopt a circular economy and sustainability. This should also be regarded as a pivot in the business model. Usually, a pivot is attributed to a change in behavior in the early phases of a start-up. It is crucial for the business's survival on the way to building a properly functioning business model. During this demanding journey, it is expected to pivot many times. This can be related to the survival attempts of the evolving start-up as explained in the organizational adaptation theory (Chandler, 1962; Lawrence & Lorsch, 1967; Aldrich, 1979; Teece, 2007), a popular theory used to describe the survival behavior of organizations.

Established businesses may need to pivot too. It might happen at any time during the lifespan of a company. The emphasis here is on pivoting towards a sustainable business model. This change is either triggered by internal forces or external ones. This process includes several actors.

Triggering Effect. For any change to happen, there must be a triggering effect. This can be increased operating costs, the introduction of new regulations, a change in market scope and structure, customer tastes, a change in management, change in technology, or many other factors. The triggering effect can be internal or external for a change to happen in the legacy linear business model.

Internal sources can be listed as mostly financially related costs, such as the high burden and costs of accessing new raw materials, high production costs, high energy costs, and problems with waste management. These problems will require new solutions and can be solved by means of circular business models.

External triggering effects arise from the environment in which the business operates. Examples of these external forces are entrance to new markets, changing customer behaviors, new government regulations, international market regulations, and competition.

These forces can also be present in a combined version, i.e., both internal and external. This will make the condition to change even more important and urgent.

These conditions imply to the business that their legacy business model has helped them reach these days but needs to be changed from now on.

Top Management Mindset. Triggering effects discussed in the previous section can be compared to the symptoms that human bodies show whenever they are unhealthy. Businesses show them in the form of symptoms, as mentioned earlier. These symptoms need to be seen, spotted and worked on. The prerequisite is to make top managers aware of them and have developed organizational mechanisms to spot them. The critical responsibility here is in the hands of top management. Top management has to have the necessary knowledge, experience, and skills for this important

responsibility. In any company, only top managers have the authority and power to make this transformation. The same goes for this change. Deming's management theory is another tool that can be used here as a guide. In his early work on transforming a company's quality culture, he proposed that 14 principles are essential for managers to follow if they wish to improve the level of effectiveness in their organizations (Deming, 1986).

Here, a mindset change is also happening. The existing culture of the companies must be changed to a circular culture with top management's leadership and the components' involvement within it. A new culture must be established. This is the culture of circularity throughout the organization. The strategy has to be altered and adapted accordingly whenever needed and accordingly. Strategic planning activities that start with reviewing the organization's mission, values, and vision and result in tactical planning are also to be updated.

Simultaneously with this transformation process, all necessary redesign actions are needed. Based on the type of circular business model adopted, issues regarding organizational design, digitalization, human capital, production processes, and all others are to be planned with precision.

Top management must guide and support all activities if success is to be expected. They only have the power and authority in their hands. Working with the right professionals during this process is crucial to ensure a correct roadmap.

Intrapreneurs. The success of even the best-planned transformation strategies depends on the implementation phase. To start a circular business, the leading actor needed is an entrepreneur. Intrapreneurs are vital actors in inefficiently and sustainably continuing a business. Intrapreneurs behave as entrepreneurs within the firm. They have an entrepreneurial mindset and will assist in every stage of this transformation journey. They can contribute starting from the planning phase. Intrapreneurs possess very similar personality traits to

entrepreneurs. They are creative and visionary risk-takers and can bring new ideas to the organization. Adapting to change is another characteristic they bear and will decrease the resistance to change during this transformation.

Organizations' efforts to increase intrapreneurs are essential. From the initial talent acquisition phase to the organizational development phase, the entrepreneurial mindset should be one of the main competencies focused on.

Additionally, organizational mechanisms should be designed and used to allow intrapreneurs to flourish and retain.

Contextual Support. The transition to circular business models is a natural consequence of the shift from the linear economy model to the circular economy model. We can expect that in economies that use the principles of circularity, more businesses with circular business models are present. Vice versa, we can also propose that more organizations with circular business models exist in environments where the principles of circular economy are implemented.

Perspective 2: Entrepreneurs starting a new circular business, i.e., "born circular start-ups/firms."

New businesses are art pieces of entrepreneurs. Entrepreneurs have a significant role in developing economies through the successful businesses they launch. Lately, they also serve as essential pioneers in increasing the impact area of circular economy model implementation.

By integrating the concepts of a circular economy, they introduce new circular business models to reduce the negative impact of their products on the environment. Whenever possible, sustainable or recycled raw materials are preferred. Processes are redesigned to eliminate waste, natural resource consumption, and energy usage. Their new businesses and start-ups are advancing sustainability along several dimensions of the SDGs.

It is important to define the concepts of circular start-ups, which are also known as born circular firms.

In the existing literature, the term *start-up* is primarily defined along three standard criteria: 1) the age of the business, 2) the innovation that the business is built upon to offer, and 3) its scalability.

Based on these qualities, a typical start-up can be described as:

- a relatively young business (not older than 5 to 10 years, depending on the industry it operates),
- a business that has incorporated innovation into its business model via its product or service offering and
- a business with growth potential and aspirations regarding its number of employees or markets (Steigertahl & Mauer, 2018).

Reflecting upon principles of circularity, the term *circular start-up* (Henry et al., 2020) or *born circular firm* (Zucchella & Urban, 2019) can be used to refer to newly established businesses based on circular business models. The term born circular firm here is used to describe any business that uses a circular business model from the moment it has started. The type of circular business model might change. However, the crucial point is that it has decided on a legacy circular business model and has not changed from linear to circular since its formation. The burden and costs will not be as high as in businesses that have been operating for several decades.

Born circular start-ups can also be classified as start-ups that are established "born" out of the aim to help a circular economy and are based on a circular business model.

It is proposed that two important prerequisites for establishing born-circular start-ups or firms are the entrepreneur and the National Systems of Entrepreneurship (NSEs).

The Entrepreneur. Several attempts have been made to describe the entrepreneur. Gartner (1988), in his study

several decades ago, refers to thirty-two different definitions of entrepreneurship. It would not be wrong to conclude that entrepreneurs cannot be categorized by a unifying approach and are represented on a broad spectrum (Metcalfe, 2004).

Many studies focus on differentiating entrepreneurs from non-entrepreneurs (Mc Clelland, 1961; Collins & Moore, 1964; Brockhaus, 1980). Many studies focus on the personality and behavior of entrepreneurs and show that entrepreneurs have different personality traits than non-entrepreneurs. These studies have shown that entrepreneurs have certain personality traits common to them, such as a need for achievement (McClelland, 1961), locus of control (Rotter, 1966), capacity for innovation (Schumpeter, 1934), and many more. Global studies such as the Global Entrepreneurship Monitor Study have supported the validity and universality of these entrepreneurial personality traits and behaviors.

Furthermore, Metcalfe (2004) defined an entrepreneur as:

> *An 'individual' of some type; he/she is a situated individual working within social and economic constraints and fully subject to the framing, instituted rules of the game. We should remember that methodological individualism is not methodological isolationism, as it often appears in the discussion of economic agency (p. 157).*

Thus, entrepreneurs are influenced by their economic context to some degree. This also implies that the existing economic model (linear or circular) constrains them.

Youssef et al. (2018) in their paper, argue that sustainable entrepreneurs are striving for a balance among economic, societal, and environmental perspectives utilizing the business model they are establishing. Sustainable entrepreneurs, therefore, serve as agents of change from traditional business models to sustainable ones. It is also possible to speak of *circular entrepreneurs*. Circular entrepreneurs can be described as entrepreneurs who "operate a start-up with a business model containing a circularity

approach of slowing, closing or narrowing resource loops through either reduce, reuse, recycle or recover strategies" (Hoogenstrijd, 2019, p. 4).

For circular start-ups or circular-born start-ups, more circularity-oriented entrepreneurs are needed. This is possible by changing the context for entrepreneurs and surrounding them with a more circular entrepreneurship ecosystem. In such a context, the entrepreneur is expected to create more circular businesses.

National Systems of Entrepreneurship or Entrepreneurial Ecosystems. All living beings need to be surrounded by an ecosystem to survive. Along the same token, start-ups are social entities that have the same needs. A separate and well-organized entrepreneurship ecosystem is needed for start-ups to flourish. It is one of the most important prerequisites. Entrepreneurial ecosystem development is very important for start-ups flourishing in nearby areas.

Well-functioning entrepreneurship ecosystems have fostered the most successful start-ups that have become today's most prominent businesses.

Every entrepreneurial ecosystem must have many important dimensions and actors. The existing literature provides many different definitions and classifications of these dimensions. As a result, it is important to clarify how this chapter approaches the entrepreneurial ecosystem. This chapter uses the definition of the Global Entrepreneurship Monitor Project (GEM).

GEM is a research project initiated in 1999 by London Business School (UK) and Babson College (USA) as joint research, with ten other countries joining it in its first year. GEM is known for being the most extensive continuing study on entrepreneurial dynamics globally. Since GEM is still the only and most credible academic study that allows cross-national comparison, their definition is preferred.

It is important to emphasize here that the unit of analysis is the individual entrepreneur. All results are based on the individual entrepreneurs' responses. The aim of including this question is to understand how many such businesses exist and to find out whether this behavior differs by economy.

GEM has identified Several National Entrepreneurship Framework Conditions that constitute an entrepreneurial ecosystem. The condition of these in each contributing nation is identified via a National Expert survey. These conditions are identified as follows (GEM National Report Türkiye 2021-2022, 2022):

- A1. Entrepreneurial Finance: *Are there sufficient funds for new startups?*
- A2. Ease of Access to Entrepreneurial Finance: *Are those funds easy to access?*
- B1. Government Policy Support: Support and Relevance: *Do they promote and support startups?*
- B2. Government Policy: Taxes and Bureaucracy *Or are new businesses burdened?*
- C. Government Entrepreneurial Programs: *Are quality support programs available?*
- D1. Entrepreneurial Education at School: Do *Schools Introduce Entrepreneurial Ideas?*
- D2. Entrepreneurial Education Post School: *Do colleges offer courses in starting a business?*
- E. Research and Development Transfers: *Can research be translated into new businesses?*
- F. Commercial and Professional Infrastructure: *Are these sufficient and affordable?*
- G1. Ease of Entry: Market Dynamics: *Are markets free, open, and growing?*
- G2. Ease of Entry: Burdens and Regulation: *Do regulations encourage or restrict entry?*

- H. Physical Infrastructure: *Is this sufficient and affordable?*
- Social and Cultural Norms: *Does culture encourage and celebrate entrepreneurship?*

Entrepreneurial ecosystems around the world are at different levels. According to GEM 2023/2024 data, the top five entrepreneurship ecosystems in the world are:

1. United Arab Emirates
2. India
3. Saudi Arabia
4. Lithuania
5. Qatar.

The United Arab Emirates has been at the top over the last three years.

The GEM study has started to include the SDG concerns of entrepreneurs in its agenda (GEM Global Report 20221/2022). Starting in 2021, questions were asked to measure whether any of the SDGs are a priority for their businesses. These questions were addressed to individuals starting and already running a new business.

GEM results propose that the highest levels of business SDG concern are reported in South Africa, China, Thailand, Canada, Lithuania, and Mexico. The nations ranked lowest are the Republic of Korea, Estonia, and Colombia (GEM 2023/2024).

The role of the entrepreneurial ecosystem in shaping entrepreneurial behavior is significant. With the increase in circularity awareness and support from the entrepreneurial ecosystem, in addition to the increase in circularity in the economic and legal environment, a considerable increase in circular entrepreneurs is expected. More research in this field must be carried out to measure this. It is also crucial that these studies are carried out in different developed, emerging, and developing economies.

5. ADAPTATION OF CIRCULAR ECONOMY STRATEGIES BY CIRCULAR START-UPS IN TÜRKIYE, AN EMERGING ECONOMY AND IMPLICATIONS

Türkiye is an emerging country listed as the world's 17th largest economy (worldbank.org). Circular economy and circular business models are still new concepts in Türkiye. The roots of these concepts' entrance to policy policymakers' agenda can be traced back to 2015 and the Circular Economy Action Plan of the European Commission (Ünlütürk et al., 2021). Türkiye is one of the top trading partners with European countries. The EU shift to a circular economy model affected Turkish companies doing business with these countries (Veral, 2021). Still today, there is no officially declared Circular Economy Action Plan, but the EU Green Deal is officially supported. Business Council for Sustainable Development Türkiye (SKD Türkiye) and the European Bank for Reconstruction and Development (EBRD) are two pioneering organizations that support introducing sustainability and circularity concepts in Türkiye. The National Recycling Strategy and Action Plan (2017) and establishing the Turkish Environment Agency in 2020 are essential steps. Both support the circularity and zero-waste principles (Blau & Jansen, 2020).

Several Turkish NGOs have supported the transition to a circular economy in recent years in different ways. The Turkish Industry and Business Association (TUSIAD) is an impactful organization actively promoting the circular economy model in Türkiye. They prepared several publications reflecting on the Circular Economy Action Plan for businesses in Türkiye. Furthermore, for policymakers, TUSIAD proposed a declaration of Attitude for the Transition to Circular Economy in Türkiye (TUSIAD, 2021).

Turkish companies of different sizes started showing interest in adapting the circularity principles of the circular economy

model (Tüzemen & Kunday, 2023). Vestel, Sütaş, Arçelik, and Şişecam can be named as large-scale and well-known Turkish companies that initiated circular economy support programs. Many Turkish companies that have significant export activities to EU countries have also started to adopt circularity principles due to EU policies. This can be considered a spillover effect on circularity movements in the EU to Türkiye.

As for start-ups, there is a growing interest in circular start-ups in Türkiye. The study by Tüzemen & Kunday (2023) is among the pioneers in exploring the circular start-ups in Türkiye to assess their circularity strategies and circular business model typologies.

Based on Potting et al.'s framework (2017) and Pieroni et al.'s archetypes (2020), they developed a theoretical framework for categorizing circular start-ups (Figure 2).

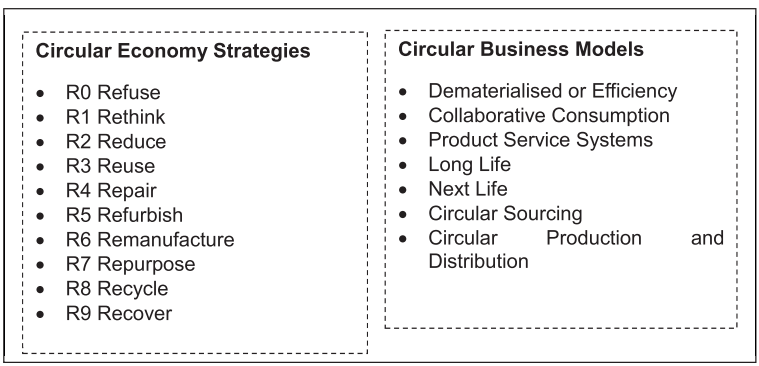

Figure 2. Theoretical Framework Used in Categorizing Circular Start-ups

Source: Tüzemen & Kunday (2023), p. 227.

The research results by Tüzemen and Kunday (2023) propose that recycling is the most commonly applied circularity strategy by Turkish circular start-ups. Recycling is used by (43%) of the start-ups in their research sample. The second most applied circularity strategy is *Rethinking,* used by (36%) of the start-ups in the sample. The following strategies are most preferred: reduce and reuse

strategies. Interestingly, recovery and repurpose strategies are not that common among Turkish circular start-ups and make up only %2 of the start-ups. As for the circular business models that Turkish circular start-ups use, the first common one is Next Life-Extending Resource Value (%30), the second is Collaborative Consumption-Sharing Platform (% 23), and the third most preferred is Circular Sourcing-Circular Supplies (%21).

One of the main differences between entrepreneurs in developed economies and emerging economies is their contextual environment. Developed economies have adopted several laws and regulations that are forcing businesses to be more sustainable. The awareness of circularity principles is more developed. This context influences the behavior of the business within this ecosystem.

Previous research on circular start-ups in emerging economies shows that communication efforts on circularity are valuable and necessary for the transition towards a circular economy (Mehrotra & Jaladi, 2022). Indeed, the activities of circular start-ups are empirically observed to have a positive impact on other actors in the environment and help institutionalize circular economy-friendly practices (Närvänen et al., 2021).

Another way is joining local engagements with the community to build collaborative networks and partnerships with businesses that share the same level of awareness. Entrepreneurs, NGOs, government agencies, and local communities can collaborate to tag sustainability issues to assist, for example, local agriculture or improve processes in local waste management. This method will also be considerable for cities that are known for their emphasis on sustainability and have been granted the notion of being cittaslow cities.

The important point here is that entrepreneurs also show visionary behaviors without expecting an external force. By external force, we mean the existence of sustainability-related local laws and regulations or the presence of a sustainability-aware consumer size.

When local authorities start to introduce these external forces, the process of establishing sustainable new businesses will flourish substantially.

ABOUT THE AUTHOR

After completing her high school education at Deutsche Schule Lissabon in Portugal, **Prof. Dr. Özlem Kunday** graduated from Gazi University with a degree in Economics in 1994. She earned her Master of Business Administration (MBA) from Southern Illinois University at Carbondale in 1996. In 1997, she began her doctoral studies at U.S. International University in San Diego, specializing in the Strategic Management program led by Prof. Dr. Igor Ansoff, where she had the privilege of taking courses with him. Upon returning to Türkiye in 2000, she commenced her career as a research assistant and lecturer in the Department of Business Administration at Yeditepe University. She completed her doctoral studies in the same department and graduated in 2008. She was granted the title of Associate Professor in 2015 and Full Professor in 2021. As of October 2022, she has been appointed as the Director of the Institute of Graduate Studies at Istanbul Topkapı University.

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HOW IS AI IMPACTING THE SDGS?

Esin YÜCEL[3], Murad CANBULUT[4]

ABSTRACT

Artificial intelligence (AI) applications, which are widely used today, support the development of solutions to urgent problems on the world agenda. Today, it is important to consider the opportunities and limitations of artificial intelligence systems in relation to the 17 SDGs (Sustainable Development Goals), the United Nations' most comprehensive call to action to achieve economic, environmental, and social sustainability by 2030. SDGs consist of 17 goals and 169 targets. In this direction, it is aimed to end all forms of poverty, economic development, and a series of social rights such as education, health, providing job opportunities, combating inequality and injustice, as well as combating climate change and addressing strategies for environmental protection. These 17 Goals are interlinked and the realization of one provides the basis for the realization of the other goals (UNDP, 2023). In this study, it is aimed to evaluate the role and integration of artificial intelligence applications in the realization of SDGs and to provide a projection for the positive and negative impact of artificial intelligence on the realization of these goals in a balanced, sustainable, and accessible manner for all. Although artificial intelligence applications have positive contributions

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to the realization of SDGs, they also bring with them a number of risks. For instance, in a study conducted by Vinuesa et al. (2020), it was concluded that 134 out of 169 objectives of 17 SDGs, i.e., approximately 79%, were positively affected by artificial intelligence applications and facilitated their realization; however, 59 objectives, i.e., 35% of all objectives, were negatively affected by artificial intelligence applications. At this point, another aim of this study is to contribute to decision-making and policy development processes by drawing attention to these risks.

Keywords: Artificial Intelligence, Technology, Sustainable Development Goals, SDGs, United Nations (UN)

1. INTRODUCTION

Throughout history, the demands of social and communal life, along with scientific and technological advancements, have enabled and steered industrial revolutions. Similar to how the invention of the steam engine and the Industrial Revolution left the labor force in the open in rural areas and ushered in the new Industrial Revolution known as Industry 4.0 after the three major industrial revolutions that preceded it, the widespread use of artificial intelligence and the automation it brings with it has created a similar process. The foundation of Industry 4.0 is the integration of machines through cyber-physical systems, cloud computing for big data management, and the Internet of Things (IoT) for machine-to-machine communication (Kamble et al., 2018).

The rapid development of artificial intelligence technologies is increasingly shaping daily life in many areas. In this context, artificial intelligence applications are actively used in daily life in numerous fields such as e-commerce applications, voice response systems, location and navigation systems, face recognition, security, voice and text processing systems, transport, insurance, and finance. Artificial intelligence systems are also increasingly being used in the context of economic, environmental, and social sustainability (Goralski & Tan, 2020).

2. LITERATURE REVIEW

2.1. Artificial Intelligence

Societies' capacity to quickly adapt to changes in technology, society, politics, and culture is closely correlated with their ability to stay up with the times. The duration of the shift from hunter-gatherer to agricultural society is unclear. Although it took roughly 5000 years for the first industrial society to emerge from agricultural society, the second and third industrial revolutions occurred 200–300 and 80–100 years later, respectively. With the

advent of the fourth revolution, the rate of change has accelerated even further, and the changes have begun to show within the last 30 to 40 years. The world appears to be swiftly transitioning from the "information society" to the "innovation and wisdom society" (Figure 1).

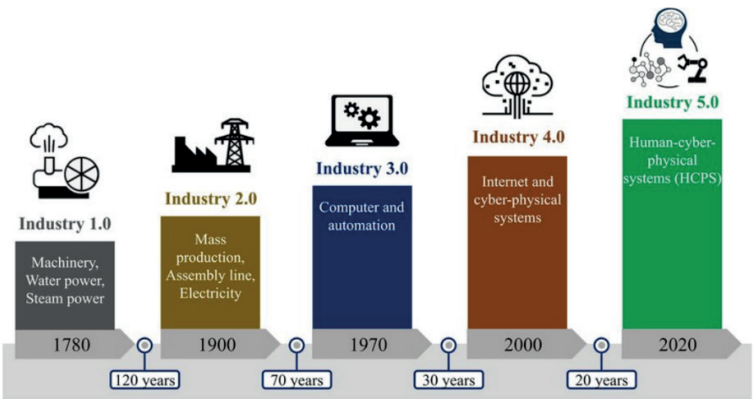

Figure 1. Industrial Revolutions in Human History

Source: Chen et al. (2021)

As stated in a comprehensive literature review by Öztemel and Gürsev (2020), the most fundamental components of the fourth revolution are the 'Internet of Things', 'cyber physical systems' and 'unmanned factories' dominated by 'autonomous machines.' With cloud computing technology, the concept of 'big data' has been introduced. This has led not only industrial organizations but also all segments of society to clearly see the importance of data. It is now possible to process incredible amounts of data, derive meaningful information and make decisions based on many different dimensions.

The most important guiding technologies that trigger the fourth transformation are:

- Artificial intelligence studies,
- Information technologies,
- Developments in robotics and sensor systems.

The innovations resulting from the integration of the above-mentioned guiding technologies with knowledge-intensive approaches give continuity to the transformation. Not only in the world of science but also in all segments of society, it is clearly seen and accepted that the energy of the fourth transformation is 'information'. Since artificial intelligence is basically a technology based on the ability to process information, all developments are naturally shaped on its axis.

Artificial intelligence is a discipline based on philosophy, mathematics, psychology, linguistics and computer science and was officially established in 1956 (McCorduck et al., 1977). Abbas (2006) stated that the 'artificiality' of artificial intelligence is based on the fact that the intelligent system created does not have a natural history, a biological order, and is designed and structured synthetically by human researchers.

Boden (2014) stated that the field of artificial intelligence is a branch of science that aims to illuminate the powers of the mind, not the development of intelligent machines for the benefit of society or to generate commercial income, which is the common view. Whitby (2005) stated that the ultimate goal of artificial intelligence is 'to provide a complete scientific explanation of human, animal and machine intelligence, showing the common principles that underlie all three'.

The field of artificial intelligence interacts with many disciplines. In Russel and Norvig's (2010) classification, the disciplines contributing to artificial intelligence are analyzed under nine headings: philosophy, mathematics, economics, psychology, neuroscience, computer engineering, control theory and cybernetics and linguistics.

Although artificial intelligence is known as one of the newest fields today, the first studies on the concept of artificial intelligence date back to the 1950s. Alan Turing and other scientists started writing computer programs to mimic human thought and behavior and developed the Turing test to test whether

a machine had the ability to think. The Dartmouth Conference, organized by John McCharty in 1956 and lasting six weeks, determined and pioneered the artificial intelligence research to be conducted in the next 20 years. The Dartmouth Conference also represents the establishment of artificial intelligence as a discipline (Brooks, 1991). John McCharty was the person who used the term 'artificial intelligence' in the studies conducted in this field and introduced the term to literature (McCorduck, 1977). The first book on artificial intelligence programs was Computers and Thought, published by Edward Feigenbaum and Julian Feldman (1963). The book contains 21 articles that made a significant contribution to the development of the field of artificial intelligence, which examines intelligent behavior in humans and computers.

Today, artificial intelligence can be divided into two types: weak artificial intelligence and strong artificial intelligence. Weak AI refers to machines that simulate thinking and pretend to be intelligent and can mimic human logic by analyzing large amounts of data. In contrast, the existence of strong AI suggests that machines have a conscience and can actually think. Weak AI can act as a decision maker when the required decision process is rational, hence can be automated. However, it can support the decision maker by providing predictions and suggesting different scenarios.

When the development of artificial intelligence is analyzed, a process of ups and downs, divided into periods with the names of seasons, is encountered. In the process experienced in this direction, artificial intelligence with its scientific basis is referred to as the beginning in the 1950s, winter between 1970 and 1980, spring between 1990 and 2010, and summer after 2010 (Say, 2018; Ünal & Kılınç, 2020). The aforementioned process can be seen in Figure 2 (TRAI, 2024).

Figure 2. Artificial Intelligence Timeline

Source: Türkiye Yapay Zeka İnisiyatifi (TRAI), https://turkiye.ai/kaynaklar/yapay-zeka-zamancizelgesi/, 14.11.2024.

As can be understood from Figure 2 (TRAI, 2024), significant developments have been made in the development process of artificial intelligence until today. Especially in recent years, technological advances such as machine learning, big data, cloud computing and deep learning and the capabilities brought by different new techniques have greatly increased the power of artificial intelligence. In addition, cost-effective sensors and the ever-increasing volume of big data also contribute to the rapid development of artificial intelligence (OECD, 2019). Examples of artificial intelligence applications developed in different fields include autonomous driving systems, natural language processing, prediction and reasoning software, face detection and recognition, and chatbots/digital assistants (Siri). At this point, it is deemed necessary to include different techniques and algorithms that have an impact on the development and progress of artificial intelligence technologies.

2.2. Sustainable Development Approach

The 1987 study "Our Common Future" was released by the World Commission on Environment and Development (WCED). The Brundtland Report is another name for this report. "Meeting

the needs of the present without compromising the ability of future generations to meet their own needs" is the definition of sustainable development, a notion that is widely discussed in this study (WCED, 1987). Despite the report's exclusive environmental focus, the concept of sustainable development expanded and strengthened during the 1990s. Sustainable development, which calls for the integration of economic, social, and environmental challenges across all societal spheres and levels in the short and long term, became a well-known model of social guidance after the 2000s (Steurer et al., 2005).

There are three generally accepted dimensions of sustainable development. These dimensions (Harris, 2000):

Environmental Dimension. A stable resource base, avoiding overuse of renewable resource systems or environmental sink functions, and using non-renewable resources only to the extent that the investment is transformed into insufficient alternatives are all components of an environmentally sustainable system. Protecting biodiversity, atmospheric stability, and other ecosystem services that aren't typically categorized as economic resources are part of this.

Social Dimension. Equal distribution, sufficient social service delivery, such as health and education, gender equality, and political accountability and engagement are all necessary for a socially viable society.

Economic Dimension. Being able to continuously generate products and services, keeping government and external debt levels under control, and steering clear of extreme sectoral imbalances that jeopardize industrial or agricultural output are all characteristics of an economically sustainable system.

The 15-year performance of the Millennium Development Goals (MDGs), which were adopted in 2000, was assessed globally at the United Nations (UN) Sustainable Development Summit in September 2015. It was determined that the performance in terms of accomplishing these goals fell well short of providing the anticipated solutions to the economic, social, and environmental issues that confront our world. It was noted at the Summit that

inclusive sustainable development objectives that would address the world's current issues are essential, given the lessons learnt from the sustainable development process started with the MDGs. The 2030 Sustainable Development Goals (SDG 2030), which comprise 169 targets and 17 primary goals, were adopted with the signatures of 193 member states, including Türkiye. By 2030, this new global agenda aims to influence nations' development plans and policies with a perspective that prioritizes the idea of human rights for all (UN, 2015).

The new global goals emphasize that social, environmental, and economic issues are shared by all people on the planet, placing sustainability at the forefront of development. This idea is now based on a new interpretation of basic human needs, climate change, environmental protection, peace, democracy, and fundamental rights and freedoms, rather than just the conflict between the economy and the environment, thanks to the identification of a comprehensive set of goals related to sustainable development. Through the Vision of a Better World in 2030, the world hopes to create a conversation on sustainable development.

Figure 3 below lists the 17 primary SDG 2030 targets, which are also known as the new global agenda goals.

Figure 3. Sustainable Development Goals

Source: UN Global Sustainable Development Report 2015, https://sdgs.un.org/publications/global-sustainable-development-report-2015-advance-unedited-version-gsdr-2015-17874, 14/11/2024.

3. ASSOCIATION BETWEEN ARTIFICIAL INTELLIGENCE AND SDGS

Sustainable development has become a critical goal on a global scale today. The use of innovative technologies, especially the role of artificial intelligence (AI), is becoming increasingly important in achieving all the sustainable development goals. AI has become an important driving force of sustainable development with the advantages it offers in data analysis, automation and decision-making processes.

A study that was published in Nature suggests that 79% of the Sustainable Development Goals (SDGs) might be accomplished with the aid of artificial intelligence (WEF, 2023).

In the agricultural sector, AI offers many innovative solutions to increase productivity. AI applications, supported by sensors and drone technologies, can perform tasks such as monitoring soil health, determining irrigation needs and detecting pests. For example, Precision Agriculture applications increase the productivity of agricultural lands and prevent the waste of resources such as water and fertilizer. Research predicts that AI-based systems and automation techniques can increase agricultural productivity by 20-30%.

The integration of renewable energy sources is an important application area of AI. AI can be used to predict and save energy consumption and optimize demand management. Load balance and energy storage solutions on energy grids are managed more effectively with AI. AI-based systems can help users reduce energy costs by analyzing energy consumption data. According to International Energy Agency reports, energy efficiency can be increased by 15-20% with AI.

In waste management and recycling processes, AI provides significant efficiency. AI increases recycling rates by recognizing waste types and thus encourages the reuse of valuable materials. In addition, by monitoring the amount and types of waste in real time, it enables more informed decision-making for

municipalities and businesses. In this way, waste management can be carried out in a more efficient, environmentally friendly and sustainable manner.

Artificial intelligence also stands out as an effective tool in wastewater transformation. It optimizes treatment processes by analyzing chemical and biological components and detects potential problems early with real-time monitoring. This significantly reduces energy and chemical consumption. It also makes it possible to manage the capacity of plants more efficiently by predicting wastewater flow quantity and quality with forecasting models. Automation makes processes more reliable and minimizes human error. AI also makes significant contributions to the protection of water resources by making wastewater treatment more efficient and sustainable.

AI plays a critical role in improving healthcare services. It offers effective solutions by processing big data in areas such as early diagnosis of diseases, personalization of treatment processes and increasing access to healthcare services. For example, IBM's Watson platform supports doctors' decision-making processes by making recommendations for cancer treatment. In addition, AI-based image analysis systems enable faster and more accurate diagnosis of diseases in areas such as radiology and pathology. In this way, the effectiveness of treatment processes increases, and patient outcomes are improved.

AI in education optimizes learning processes by providing personalized learning experiences. AI applications that offer content according to the individual needs of students can create a more inclusive educational environment by improving the quality of education. For example, AI-based education platforms offer the most appropriate learning methods by analyzing students' strengths and weaknesses.

AI makes significant contributions to making cities smarter and more environmentally friendly, supporting the goal of sustainable

cities and communities. In traffic management, it optimizes traffic flow using real-time data, thus reducing congestion and air pollution. In waste management, it improves waste collection routes with sensor technology and makes waste management more efficient by increasing recycling rates. In terms of energy efficiency, it monitors and optimizes energy consumption through smart buildings and networks, preventing unnecessary expenditures. In addition, it improves the sustainability and quality of life of cities by providing effective solutions in areas such as public safety and disaster management. The use of AI in these areas ensures more efficient use of resources, minimizes environmental impacts and helps cities prepare for the future.

McKinsey's 2023 AI report on the transformative role of AI predicts a massive global AI market of $1.87 trillion by 2032. Beyond operational efficiency, AI stands out as a powerful catalyst for reshaping the sustainability of society.

Considering all general discussions on the topic, our proposed application and discussion for linking each Sustainable Development Goal (SDG) to AI is as follows:

SDG 1-No Poverty

While nearly 700 million people, or 8.5% of the world's population, live on less than $2.15 per day, which is the extreme poverty threshold applicable to low-income nations (World Bank, 2024), the proposed aim of this SDG is end poverty in all its forms, wherever it occurs.

With the help of AI, financial inclusion can be provided to offer microloans to excluded regions. KIVA, being a recent example, underlines their role as changing lives through financial inclusion, and aiming to reach around 500.000 refugees and displaced individuals (kiva.org). The challenge here may appear is the bias in AI algorithms which keep creating barriers for marginalized individuals.

SGD 2-Zero Hunger

An estimated 750 million individuals, or 9.2 percent of the world's population, are thought to have experienced hunger in 2023. In addition, 2.33 billion people, or 28.9 per cent of the world's population, are estimated to be in a situation where they do not have regular access to enough food (FAO, 2024). In the light of these facts, SGD 2 aims to end hunger, achieve food security, improve nutrition and promote sustainable agriculture.

AI's role in this specific SDG is to analyze soil health and condition and weather patterns which have a direct and indirect effect on agricultural production. AI also plays a significant role in the optimization of supply chains through ensuring efficient distribution systems and reducing food waste. IBM's Watson is a recent application to help farmers to reach the relevant data and make complex decision-making processes easier using that data (IBM n.d). In this case the main barrier could be the limited infrastructure in rural areas.

SDG 3-Good Health and Well-being

This specific SDG aims to ensure healthy lives and promote well-being for all ages. Through the efforts of numerous stakeholders, lifespans continued to increase until 2019. Long-term gains in promoting healthy longevity were nearly undone by the COVID-19 pandemic (WHO, n.d)

In the case of Good Health and Wellbeing, AI-powered diagnostics and personalized medicine could be a useful tool for early detection of diseases like cancer or diabetes. Another example is that telemedicine solutions in remote areas can help us to enhance health services. A recent application in this field is Google DeepMind's AlphaFold predicts protein structure and Ada (an AI chatbot) provides health support for better outcomes (ada.com, n.d.). Data privacy and ethical concerns, as well as problems of access to these sources in developing or underdeveloped regions, are some of the main barriers to the spread of applications.

SDG 4-Quality Education

By 2023, 249 million children and adolescents aged 6-18 are expected to be out of school worldwide (UNESCO, 2024). Ensuring inclusive, equitable and quality education and promoting lifelong learning opportunities for all are the main goals of SDG 4. With technologies such as speech-to-text for students with learning difficulties or other disabilities, AI can help create tailored learning systems that take into account individual needs and promote diversity. Recent examples include the machine learning system used by Duolingo and the AI-powered tutors on the Khan Academy platform. Inequitable access to technology can create certain barriers, even if it creates some important opportunities for the SDG in question.

SDG 5-Gender Equality

The cost inequality is much greater than expected. For example, not investing in women's rights costs around $10 trillion for the global economy. In addition to that an equal world means better and healthier economies (UNWomen, 2024). SDG 5 is committed to empowering women and girls worldwide and achieving gender equality, and AI offers creative ways to help achieve this goal. Through chatbots and applications, AI can help victims of gender-based violence, identify and reduce gender bias in recruitment processes, and use predictive analytics to create policies that support gender equality. In order to analyze social trends affecting women, UN Women utilizes AI. In another case tools like Textio are used to ensure fairness in recruitment processes. However, the reinforcement of gender biases in poorly designed algorithms and unequal access to AI technologies for women especially in developing regions are some of the barriers while implementing these tools.

SDG 6-Clean Water and Sanitation

This goal focuses on providing access to clean water and sanitation for all, and AI is essential to achieving this

goal. Real-time monitoring of water quality is enabled by AI-driven technologies that use sensors to identify pollutants and predictive models to maximize flood control and water resource management. FAO's AquaCrop, which improves water efficiency in agriculture, is a recent innovative example from the field. The European Commission is actively using AI in its IMM frameworks, with a particular focus on access to clean water and improved sanitation facilities. Despite the benefits, the high cost of operating AI in rural and underdeveloped areas is a major barrier to the widespread use of these tools.

SDG 7-Affordable and Clean Energy

This specific SDG aims to ensure that everyone has access to affordable, reliable, sustainable, and modern energy. In this case AI can play a significant role in optimizing energy distribution with the help of AI-powered smart grids or predicting maintenance of renewable energy systems and finally developing energy efficient buildings with AI-driven automation. Some recent examples are Google's use of AI to reduce energy consumption in its data centers and software that optimizes solar panel performance. High energy demands of computational systems and limited accessibility of these technologies in both developing and underdeveloped regions are some main shortcomings of the use of these technologies.

SDG 8-Decent Work and Economic Growth

SDG 8 promotes sustainable and inclusive economic growth, productive employment and decent work for all. AI-powered tools can help improve workforce development by personalizing reskilling programs and enhancing productivity in manufacturing or logistics. For demand forecasting, AI can be used in e-commerce or tools like HireVue can be implemented for hiring in an automated environment. Despite these benefits, job displacement and ethical concerns about the processes are still major barriers to these technologies.

SDG 9-Industry, Innovation, and Infrastructure

Industry, Innovation and Infrastructure goal is focused on building resilient infrastructure, promoting sustainable industrialization and improving innovation. AI can support by predicting maintenance, ensuring the longevity and reliability of critical infrastructure, and drives efficiency in logistics and supply chains through optimization and automation. The use of 3D printing in sustainable construction and autonomous vehicles in logistics are some of the applications in the field but unequal access to AI-enabled infrastructure improvements and the need for private sector's investment in these technologies can be identified as a barrier.

SDG 10-Reduced Inequalities

SDG 10 focuses on reducing inequalities within and between countries and individuals. For this specific SDG, AI may provide valuable tools to promote inclusivity and social justice. Real-time language translation and sign language translation services improve accessibility, enabling marginalized or underrepresented groups to have better access to various services. However, if AI technologies are not distributed equitably, the use of mentioned technologies and tools may deepen the inequality between individuals or countries.

SDG 11-Sustainable Cities and Communities

Sustainable Cities and Communities goals focus on creating inclusive, safe, resilient and sustainable cities and communities, with AI playing a critical role in urban transformation. In urban transformation, AI applications can play an important role in urban planning by developing traffic management systems and air quality monitoring. These systems would be beneficial while optimizing resources and improving living conditions. AI tools for monitoring deforestation and urban sprawl are an example of how AI technologies can be used efficiently. Privacy concerns raised by AI-based surveillance need to be carefully addressed to ensure equitable benefits for all residents and to avoid challenges.

SDG 12-Responsible Consumption and Production

Aiming to promote responsible consumption and production, AI's role in this case is to help improve supply chain transparency by tracking the flow of goods and ensuring ethical sourcing during the process. To achieve this goal, predictive models may be used to optimize resource use and minimize waste. Some AI-powered recycling systems that sort and process materials more efficiently are mentioned as an application of these technologies. However, lack of consideration of consumer privacy with the extensive data collection is considered to be major barrier of these technologies to the widespread use of these technologies.

SDG 13-Climate Action

With an aim to take urgent steps to fight climate change. AI applications in climate modelling may be beneficial to predict extreme weather conditions and recognize climate patterns. Using AI to detect, verify and classify forest fires in real time, Pano AI contributes to global resilience against the increasing frequency and intensity of climate-related disasters caused by forest fires. One example is DeepMind's AI to improve the performance of wind turbines, and another one is Microsoft's AI for Earth initiative, which is utilized to address environmental challenges. The training of large AI models, which can contribute to carbon emissions and create a huge environmental cost in case of unsustainable management. This is still a key concern for the users.

SDG 14-Life Below Water

While focusing on the protection and sustainable use of oceans, seas and marine resources. AI can be used to monitor marine biodiversity through underwater sensors, and to tackle illegal fishing through predictive analytics by tracking and predicting fishing activity. AI-powered drone systems are tools used to monitor marine pollution, helping to identify and recognize environmental issues. Addressing the least funded

SDG, underwater life, Stream Ocean uses artificial intelligence for real-time monitoring of marine biodiversity through underwater video cameras. AI helps coral restoration projects by providing advanced ocean data analytics, including biodiversity metrics, in real time. High implementation costs of AI technologies and technological barriers are limiting the widespread adoption of these technologies.

SDG 15-Life on Land

While aiming to protect, restore and ensure sustainable use of terrestrial ecosystems, addressing issues such as deforestation, land degradation and biodiversity loss, AI can be a beneficial source to protect wildlife by tracking poaching activities and monitoring deforestation and land degradation in real time. Some applications of AI may include AI tools for wildlife monitoring and AI-enhanced satellite imagery for environmental protection. If economic interests are prioritized over environmental protection, this will lead to the risk of misuse by commercial or government entities. This is why there is a need for ethical governance and accountability in AI-driven conservation efforts.

SDG 16-Peace, Justice, and Strong Institutions

This SDG aims to promote justice, peace and robust institutions. AI is taken into account as a valuable tool for improving social stability and governance in this specific case. By identifying questionable trends and transactions, AI has the potential to detect any anti-corruption and fraud related activities. AI can be used in the process of creation of safer online environment, to do this AI would monitor hate speech and false information online which is a widespread issue. One possible example would be AI-enabled election monitoring technologies that could be a guarantee of impartial and open processes. But there are still difficulties. One of the biggest concerns today is the possibility of AI being misused for surveillance.

SDG 17-Partnerships for the Goals

While strengthening global partnerships for sustainable development AI enables countries, organizations and businesses to work together towards common sustainability goals by facilitating data sharing and supporting platforms for global collaboration. AI systems that provide transparent, real-time reporting on progress towards the SDGs, ensuring accountability and informed decision-making can be discussed as an example. Some challenges are considered to be the lack of standardization in AI implementation across regions. This can hinder effective collaboration and scaling of solutions, highlighting the need for global frameworks to ensure consistency and equity in AI implementation.

Taking AI's role in creating tools for each SDG, the below Table 1 summarizes what current technologies are used in the field and brings some questions to answer for a better and efficient use of AI technologies.

Table 1: A summary of potential AI applications and some questions to answer

SDG	Potential AI Applications	Questions to Answer
No poverty	Financial Inclusion tools	How can we alleviate bias in AI algorithms?
Zero hunger	Precision agriculture and supply chain optimization	How can we develop technological infrastructure in rural areas?
Good health and well-being	AI-powered diagnostics and personalized medicine	How can we deal with data privacy and ethical concerns and equal access?
Quality education	Speech-to-text and tailored learning systems	How can we deal with inequitable access to the technology?
Gender equality	Chatbots, predictive analytics and fair recruitment tools	How can we eliminate gender bias in algorithms?
Clean water and sanitation	Real-time monitoring tools, predictive analytics	How can we decrease the implementation costs? Who is going to pay?
Affordable and clean energy	AI-powered smart grids, AI-driven automation	How can we deal with the high energy demands of computational systems?
Decent work and economic growth	AI-powered personalized reskilling programs	How can we alleviate ethical concerns?
Industry, innovation and infrastructure	3D printing in sustainable construction	How can we improve equal access to tools?
Reduced inequalities	Real-time language translation and sign language translation	How can we distribute AI technologies equitably? Who will ensure equitable distribution?
Sustainable cities and communities	Traffic management systems and air quality monitoring	How can we alleviate ethical concerns?
Responsible consumption and production	Tracking the flow of goods and ethical sourcing	How can we alleviate ethical concerns?
Climate action	Climate modelling	How can we reduce the carbon footprint of training large AI models?
Life below water	Underwater sensors and predictive analytics	How can we decrease the implementation costs? Who is going to pay?
Life on land	Wildlife monitoring and AI-enhanced satellite imagery	How can we deal with the misuse of the data?
Peace, Justice, and Strong Institutions	Detection tools anti-corruption and fraud	How can we help to prevent surveillance from being misused?
Partnerships for the Goals	Decision-making tools	How can we ensure consistency and equity?

Source: Generated by Authors

4. CONCLUSION

Artificial intelligence offers many benefits that facilitate the achievement of sustainable development goals. AI reduces waste and increases efficiency by enabling more effective use of resources. For example, AI applications in energy and water management reduce waste and minimize environmental impacts. Supporting fast and effective decision-making processes by analyzing large data sets, AI saves time, especially in critical areas such as emergency management and resource allocation. It also has the potential to offer innovative solutions to complex problems. AI-based models developed to combat climate change enable the prediction and mitigation of environmental impacts. AI reduces resource use and waste by optimizing production processes, improving recycling processes and contributes to the spread of sustainable practices by analyzing consumption habits. In addition, AI increases inclusiveness by reaching wider masses in health, education and social services and facilitates access to services for disadvantaged segments of society.

As a result, AI stands out as an important tool in achieving sustainable development goals. With its applications in areas such as agriculture, energy, health and education, it increases efficiency, manages resources better and develops innovative solutions. However, ethical and social dimensions should also be taken into consideration for the sustainable use of AI. Policy makers and stakeholders should manage potential risks while utilizing the potential of AI. In this context, the development of policies and regulations will further strengthen the contribution of AI to sustainable development goals. Collaborations and innovations in the field of AI and sustainable development will be an important step towards creating a greener and more inclusive world in the future.

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AN EXPLORATORY STUDY OF PLASTIC WASTE MANAGEMENT IN TÜRKİYE

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ABSTRACT

Management of plastic waste has long been an issue that is yet to be resolved. Bans, tighter controls, and changes are expected to affect plastic waste trade globally, regionally, and nationally in several industries including plastic, cement, and recycling.

In this study we attempt to investigate plastic waste process in Türkiye, and answer some of the questions on the main source of motivation on waste management; the way inter-institutional relations on waste management work; and factors that affect the implementation as well as the legitimization of waste management in Türkiye. This study applies a modified document analysis design by utilizing secondary data as a means to explore how the current situation in Türkiye is interpreted. Thus, the research aims to create a foundation that further investigations of organizational and managerial aspects of sustainable technologies can be based on.

Keywords: Plastic Waste Trade, Plastic Waste Management, Organizational Field, Institutional Theory.

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1. INTRODUCTION

Each year, 350 million metric tons of plastic waste, which is equivalent to over 10 million fully loaded garbage trucks, is produced worldwide. Contrary to popular belief, only a small portion of this waste is recycled, and 2% of this is traded internationally. Most of this plastic waste is either incinerated or sent to landfills which eventually pollute the air, land, and oceans (WEF, 2023).

Although 9.2 billion plastics have been produced since the 50s, and the recycling of plastic waste has been advocated for years, it is clear that we are now in a plastic waste crisis and recycling is not a sustainable method (Brown, 2024).

Allen et al. (2024), rather controversially, argue that recycling plastic is neither a technically nor economically viable solution. Though petrochemical companies, industry trade associations, and front groups are said to engage various marketing and public education campaigns to portray the viability and legitimacy of plastic recycling. It is now understood that plastic has over a thousand different types, and they cannot be recycled together; and a meticulous separation process is required. This separation process is very costly and the required materials (e.g. chemicals) for this process can only be used once or twice as they later degrade and become toxic.

Bergmann et al. (2023) emphasize the need for policies to be developed to reduce plastic pollution efficiently and economically. They argue that the focus should be placed on prevention and reduction in upstream production, rather than cleaning downstream pollution which includes disposal and recovery techniques.

Our research indicates that organizational field of plastic waste management in Türkiye emerged alongside the discussions about plastic pollution, and its impact on global warming. Societal and political pressures further accelerated the research and the

critical interpretations and approaches to the topic. Societal and political pressures also forced governments and their agencies to take actions and to institute waste import restrictions. However, industrial communities were against these restrictions and lobbied with governmental agencies to facilitate the import of waste. On the other hand, governmental agencies were motivated to maintain regulative authority over industry organizations.

At the same time, discussions about business and entrepreneurial initiatives towards the circular economy gathered more momentum. Circular economy can be summarized as the process where products are made and consumed in a way that minimizes the use of resources, cuts waste and reduces carbon emissions through repairing and recycling. Universities, along with various research groups contributed the debate with survey research, review papers, and other scholarly work; most of which focused on the impact of plastic pollution as well as the effects of plastic waste trade on social, ecological, and economic processes. However, the main source of motivation to mobilize organizations towards waste management is yet to be clear.

This ambiguity may be a key reason underlying the lack of research about inter-organizational relations that is affecting global plastic waste management. Therefore, it may be beneficial to conceptualize inter-institutional relations within an organizational field perspective and examine how organizational fields influence the process as a means to create research spaces in global climate literature.

Therefore, it is hoped that starting with this study, we will be able to understand the managerial and organizational issues around waste management, with a focus including but not limited to, main issues in plastic waste management; organizational structures; and matters that influence decision making process in waste management in Türkiye.

In order to do this, we followed an exploratory approach with an aim to explore the organizational and institutional factors

that affect the implementation as well as the legitimization of waste management in Türkiye. It investigates the practices and discussions of individual populations that shaped an organizational field managing plastic waste. In so doing, it focuses on the Turkish context to help readers examine the organizational and institutional forces behind plastic waste trade practices.

2. LITERATURE REVIEW

Organizational field is a prominent construct in institutional theory. It facilitates the analysis of inter-organizational relations to answer how choices are formed. Scott (1995) defines the organizational field as 'a community of organizations that partakes of a common meaning system and whose participants interact more frequently and fatefully with one another than with actors outside the field' (Scott, 1995: 56).

According to DiMaggio and Powel (1983) at the heart of the organizational field is the notion that organizational structures, which were used to arise from the rules of efficiency in the marketplace, now arise from legitimacy concerns. Companies evaluate their decisions based on customer perceptions, government demands, investor and shareholder needs, and make these decisions to appear legitimate to them. From DiMaggio and Powell's (1983) perspective, understanding the dynamics of isomorphism should be the main purpose. They argue that attempts to legitimize business processes result in companies sharing structural homogeneity. However, there are also external forces such as coercion, imitation and professionalization, that determine the rules of this homogenization. For example, in the case of waste management, the struggles to deal with new export regulations on plastic waste, or technological developments in recycling plastic waste, result in changes in organizational behavior, such as compliance to new business systems, imitation of social projects, emphasizing recycling practices, or developing

training and allocating resources for the use of clean energy technologies. Therefore, we believe that institutional forces such as governments, pressure groups, profession associations influence organizations and their decision making towards developing similar behaviors as a means to minimize the risks of uncertainties and reactions like public protests or legal sanctions.

It is necessary to understand the change processes of institutions and organizations. Hoffman (1999) attempts to analyze institutional and organizational change in the American chemical industry, focusing on the possibility that change can develop through "disruptive events". It is stated that these "disruptive events" also cause the organizational field to be restructured and the agendas of the organizations, the decisions taken, in short, the behaviors to change. As a result of his analysis, he determined the existence of an organizational field consisting of the government, the petrochemical industry and non-profit organizations, and the institutions. He argues that this organizational field shapes the behaviors of the chemical industry, and it also affects decisions made in order to provide solutions to environmental problems.

Based on these views, we conceptualized an organizational field for plastic waste management in Türkiye, which includes state, government agencies and municipalities; non-governmental, national and international organizations; universities and research groups; media; and industry chambers.

An ecological practice, which is seen as a trend of a particular period, may not be interpreted as a sustainable solution in later years. Eventually this may motivate organizations towards changing strategies, decisions, behaviors, and courses of action. For example, in the Centre for Climate Integrity (CCI) report, Allen et al. (2024) state that since 2017, as a result of the backlash from the communities, governments, and environmental groups, most petrochemical companies in the industry began to use the term "advanced recycling" or "chemical recycling" as an umbrella term for plastic waste that is difficult or not possible to

recycle. However, these "new" terms which indicate and suggest that advanced technological process are used to tackle plastic waste management, are simply misleading and misinforming. These processes have proved to be far from being advanced or environmentally friendly. On the contrary, they can produce more waste and/or more pollution as the processes involve hazardous products.

Concerns on plastic waste management and its effects on global warming has gained prominence in North American and European academic research, but it has only been gaining popularity in Türkiye recently. Banar et al. (2009); Bilgili and Çetinkaya (2023); Özer and Yay (2021) are some of the examples to this research that provide several scenarios and alternative systems and solutions, consequences, and future projections emphasizing the importance of life cycle perspective.

Organizational approaches to the subject are very limited. For example, Banar et al. (2009) state that in addition to the evaluation of technical and economic issues, environmental issues should also be taken into account in waste management planning, authorities, communities, industry and waste management companies should take the lead.

Yay (2015), states that the fatal accident in Istanbul in 1993 caused an explosion with the compression of methane gas in a landfill, causing municipalities to address the solution of the solid waste problem. The disposal strategies in Türkiye are landfill, incineration and composting; and compared to other countries, these strategies are lagging behind; and it is argued that recycling activities should be improved by separating wastes at their source (e.g. different recycling bins at homes for different materials) and public awareness should be raised through media and education.

Özer and Yay (2021) state that interest in life cycle analysis models has increased since the 90s, however, they argue that scenarios that can be applied in Türkiye are insufficient. Four scenarios were carried out with limited disposal methods such as

collection, transport, waste treatment options (biomethanisation, and incineration) and landfilling. It is emphasized that an integrated solid waste management system that covers all stages from waste generation to disposal, including energy recovery processes, can solve the waste related problems in Turkish municipalities.

Yakışık (2023) reviewed the previous Five-Year Developmental Plan for Türkiye which revealed that environmental requirements and agreements have not been fulfilled. It is understood that Five Year Developmental Plan puts the main responsibilities for waste management on the shoulders of municipalities; however, it is argues that municipalities are not able to cope with the increasing demands with decreasing budgets and resources and a more coordinated effort between the municipalities and the central government is necessary in order to provide a long lasting solution or a realistic road map for plastic waste management.

In addition to plastic waste management on land, there is research focusing on marine pollution in Türkiye. For example, Aydın et al. (2023) focus on the issues contributing to the microplastic pollution of the aquatic ecosystem ion Türkiye. They argue that the consideration and implementation of the recommendations of the European Commission, the Barcelona Convention, the Izmir Protocol, and the Bucharest Convention, the UN Plastic Treaty, and the development of coordinated practices by the relevant institutions in Türkiye would contribute to solving the problems. Furthermore, Strokal et al. (2022) considered the plastic pollution in Black Sea region, and it is predicted that European and Asian countries, including Türkiye, will need to develop coordinated practices by 2050 which may include making new policies, focusing on sustainable consumption, and production of plastics, plastic waste import, setting up zero waste targets, and sustainable landfilling practices.

3. RESEARCH METHOD

This study was exploratory in nature, and a modified document analysis was implemented. Saunders, Lewis and Thornhill (2019) state that exploratory studies can be used to gain insights about a topic of interest. and to clarify the researchers' understanding of an issue and problem about it. Therefore, an exploratory research design was utilized to formulate the research questions and gain understanding of the issues, as well as the key participants. This study also adopted a deductive approach, using institutional theory and organizational field perspectives previously, as analytical tools to collect data (Kennedy, Thornberg, 2018).

Bowen (2009) explains document analysis as "a systematic procedure for reviewing or evaluating documents, both printed and electronic material". Accordingly, a document secondary data set is collected from online sources published between 2008 and 2024, including news portal websites, non-governmental organization web sites, press briefings, research reports, governmental web sites, and academic journals.

The process started with reviewing news articles of interest and then formulating a data set, and data themes for further analysis. We followed the iterative process of document analysis involving elements from content and thematic analysis as suggested by Bowen (2009). Due to the nature of this research, meaning that the research revolves around gaining insights about the topic of interest and relationships among participants rather than the frequency of the words used, the elements of thematic analysis are adopted to facilitate the analysis. Braun & Clarke (2006) explain that a thematic analysis involves six phases: familiarizing with data, generating initial codes, searching, reviewing and defining the themes, and reporting them. Accordingly, the data collected were re-read to familiarize with the topic and the issues. Then, both data-driven and theory-driven codes were prepared as the text were read. After the coding process ended, codes were read, and themes were formed in relation to the codes. Then the themes

were reviewed to categorize themes to discover main ones. Finaly the themes were refined, and the tables were formed.

4. RESULTS

The following table (Table 1) shows the themes emerged from the analysis.

Table 1. Document Analysis

SOURCE	TYPE	THEMES
Allen et al. (2024)	Organization report	Plastic recycling
Altay (2021)	Organization article	Lobby activities - plastic waste import ban
Anka (2023)	News article	Plastic waste trade – zero waste project – government agenda
Aposto (2021)	Organization article	Lobby activities
Aydın et al. (2023)	Academic article	Marine microplastic pollution
Banar et al. (2009)	Academic article	Life cycle assessment
Bergmann et al. (2023)	Academic article	Plastic prevention
Bildircin (2021a)	News article	Plastic waste trade – government agenda
Bilgili & Çetinkaya (2023)	Academic article	Life cycle assessment
Brown (2024)	Organization article	Plastic life cycle
Çelik (2021)	News article	Plastic waste trade
Chellel & Moskwa (2022)	News report	Plastic waste trade
Crawford (2020)	News report	Plastic waste trade - plastic pollution
Doherty (2021)	News article	Plastic waste trade
EuroNews (2021a)	News article	Plastic waste trade
Gazete Duvar (2021)	News article	Plastic waste trade – government agenda
Geri Dönüşüm Ekonomisi (2021)	Organization article	Plastic waste trade – plastic import quota
Goebel (2021)	News article	Plastic waste trade
Greenpeace (2021a)	Organization report	Plastic waste trade - plastic pollution
Greenpeace (2021b)	Organization report	Plastic waste trade
Greenpeace Türkiye (2022)	Organization article	Plastic waste trade
Gündoğdu & Walker (2021)	Academic article	Plastic waste trade - plastic waste import ban
Gündoğdu (2021)	Organization report	Plastic waste trade

SOURCE	TYPE	THEMES
Gündoğdu (2024)	News article	Microplastic pollution – chemical recycling - plastic waste trade
Laville (2021)	News article	Plastic waste trade
MAG (2021)	Organization article	Lobby activities
Marino (2021)	News article	Plastic waste trade
McGlone (2022)	News article	Plastic waste trade
Özer & Yay (2021)	Academic article	Life cycle assessment
PAGEV (2021)	Organization article	Lobby activities
Snowdon (2021)	News article	Plastic waste trade
Sol (2021)	News article	Lobby activities
Sözcü (2021)	News article	Lobby activities - zero waste project – government agenda
Strokal et al. (2022)	Academic article	Marine microplastic pollution
TC (2024a)	Organization article	Zero waste project
TC (2024b)	Organization article	Zero waste project
TRTHaber (2020)	News article	Plastic import quota
Turapoğlu (2020)	News article	Plastic import quota
Ünal (2021a)	News article	Lobby activities - plastic waste import ban
Ünal (2021b)	News article	Plastic waste trade – plastic waste import ban
WEF (2023)	Organization article	Plastic waste trade
Wen et al. (2021)	Academic article	Plastic waste trade – plastic waste import ban
Wylie (2021)	News article	Plastic waste trade
Yakışık (2023)	Academic article	Plastic waste management - municipal work
Yay (2015)	Academic article	Life cycle assessment
YeşilGazete (2021)	News article	Plastic waste trade
Yeşiller (2021)	Organization article	Lobby activities
Yiğitcan (2021)	News article	Lobby activities - plastic waste trade
Zhao et al. (2022)	Academic article	Plastic waste trade - plastic waste import ban

The main theme that stands out from various sources, especially of news portals and non-governmental, international organizations is the plastic waste trade and its impact in increasing plastic pollution and illegalities in waste management. Research shows that there has been an increasing attention to plastic waste trade. News portals, academics, researchers, and non-governmental organizations are monitoring the waste import bans as well as the illegal trade and dumping of plastic wastes.

Wen et al., (2021) reported that Chinese annual imports of plastic waste reached 8.88 million tons before 2017. As a result, "Prohibition of Foreign Garbage Imports: the Reform Plan on Solid Waste Import Management came into force. This was commonly known as the "Chinese ban" (Wen et al., 2021). Zhao et al. (2022) argue that with the Chinese ban, several countries in the West (e.g. the UK and Germany) traded their plastic waste to various other overseas countries including Türkiye.

Gündoğdu and Walker (2021) state that after the Chinese ban, plastic exports to Türkiye from other countries have doubled. This increase created various managerial and organizational issues in the plastic waste management process, which led to the introduction of quotas. The Ministry of Environment, Urbanization, and Climate Change imposed an 80 percent quota limit on increased waste imports that negatively affects domestic waste collection activities, and it was determined that, at the time, eight waste importing companies exceeded the quota limitation. These eight companies were fined a total of 5 million TL, and their "Waste Importer Registration Certificates" were written off. In addition, these companies were prohibited from importing waste until the end of the year and the new quotas to be issued next year were arranged in a way that would have a 10 percent lower allocation (TRT Haber, 2020). Again, in the same year, the waste import quota was reduced from 80% to 50% that allowed waste importing companies to import waste at a maximum of 50 percent of the facility consumption capacity; and with the new 50 percent quota, the recycling sector will be able to meet half of its annual raw material needs from the domestic market (Turapoğlu, 2020).

A BBC investigation (Crawford, 2020) highlighted that Adana province of Türkiye faced several illegal dumping and incineration practices, indicating that the regulative implementations like quota restrictions did not aid the problems. One year later from this news report Greenpeace (2021a) revisited the same province and reported that no significant measures were taken to remedy the situation and illegal dumping

and incineration practices continued. This was also reported by local news agencies and attracted considerable backlash from the local population (GeriDönüsümEkonomisi, 2021). As a result, the Ministry of Environment, Urbanisation, and Climate Change teams inspected 139 facilities, and imposed a fine of 7.9 million TL (approx. £186,000 or $238,500) on 32 businesses and suspended another 29.

The other distinctive theme that emerged from our analysis is the lobbying activities of intermediaries and organizations in the industry. As the country introduced an import ban in 2021, plastic and recycling industry organizations interpreted the ban as a hindrance to their economic growth (PAGEV, 2021). It is discussed that the ban resulted in a conflict between plastic industry organizations and petrochemical cartels. Cartels claimed to reduce the supply and caused raw material prices to rise. Therefore, Turkish Plastics Industrialists' Research, Development and Education Foundation (PAGEV) (2021), advocates that monitoring mechanisms should be introduced instead of a ban. The article states that previously importing companies could import up to 50 percent of the production capacity obtained with crushing machines in the past, and that the remaining part could be supplied domestically. With the relevant draft law that is supported by the lobby, the import rate will be determined based on the heat treatment capacity, which requires a larger investment and has more added value, rather than the crushing machine capacity. Thus, the amount of imports is expected to be reduced. According (PAGEV, 2021) another important development is the Mobile Waste Tracking System (MoTAT) used by the Ministry of Environment, Urbanisation, and Climate Change in hazardous waste transportation to track imported waste. Thus, imported plastic waste will be tracked with a chip system until it goes from the port to the factory as a means to stop illegal trading.

As a result of these academic research and the Greenpeace investigations, significant attention among national and local

news portals, governmental and non-governmental organizations to waste management in Türkiye, to understand the effects of the industry, the trade, and government relations at local, national and international levels (Çelik, 2021; Doherty, 2021; Laville, 2021; Marino, 2021; Wylie 2021). It was not only the ecology news portals that discussed the plastic waste trade, but business news portals also contributed to the field.

Latest news revealed that several Turkish business and non-governmental organizations in Turkish plastic industry and industry chambers lobbied with governmental organizations to reverse this economic trend. They pressured governmental agencies towards cancelling the Turkish waste trade import ban, which led the government to cancel the ban and exercise tighter controls (Altay, 2021; Aposto, 2021; Gundogdu and Walker, 2021; MAG, 2021; Sol, 2021; Sözcü, 2021; Ünal, 2021a; Yiğitcan, 2021).

5. DISCUSSION AND CONCLUSION

As Hoffman (1999) suggested, organizational fields create a field of dialogue and discussion among organizations that are influential in solving specific issues. Field participation can be considered as organizations urge discussing the issues. Participation in conventions related to the management of plastic waste, discussing these conventions, or mentioning the related organizations during these dialogues can be given as an example. According to the World Economic Forum (WEF) (2023) report, in 2000, Türkiye ranked 2nd among the countries that import the most plastic waste in the world. Gündoğdu (2024) covers various plastic waste related issues and topics in his articles, where he explains his impressions of the Basel Convention 14th Working Group Meeting. Firstly, he argues that although Türkiye ranks in the top 3 destinations where countries export their waste to, there was insufficient number of Turkish representatives in the Convention. Secondly, he states that despite the plastic waste regulation law that came in force in 2021, there was no

significant reduction in waste transfers in Türkiye, which is rather intriguing, and spawns various questions as to why the new laws and regulations are not enabling significant changes. Thirdly, Gündoğdu (2024) highlighted three main problems, the illegal methods in handling and disposing waste, the inadequacy of data on plastic waste management, and the Turkish government's leaving the responsibility solely to the waste importers.

Zero Waste Regulation came into force when it was announced in the Official Newspaper on 12 July 2019. As part of this regulation, Zero Waste Information System was set up, which enables the review and control of waste information of all public and private sector organizations in Türkiye (TC, 2024a), and this regulation was welcomed as a firm step in the right direction.

According to the data provided by the Ministry of Environment, Urbanisation, and Climate Change of the Turkish Republic, from June 2017 to date 185,000 buildings/dwellings have transferred to the zero-waste management system; and almost 21 million people have been educated in zero waste management related topics. The data also show that in 2017 recycling in Türkiye was about 13%, which then increased steadily to 27.2% in 2021; and 30.13% in 2022; and 34.92% in 2023 (TC, 2024b).

The ministry also stated that, since the beginning of the Zero Waste Management Project, a total of approximately 60 million tons of recyclable waste, including 29.3 million tons of paper-cardboard, 7.8 million tons of plastic, 2.9 million tons of glass, 3.7 million tons of metal; and 16.2 million tons of organic and other recyclable wastes, were processed by the enterprises licensed by the Ministry and brought back into the economy. In addition, from the collected waste; 185 billion Turkish Liras (£4,3 billion; or $5,5 billion) of economic gain was achieved, 2.6 billion kWh of energy saved, 819 million m3 of water saved, 104 million m3 of storage space saved, 5.9 million tons of greenhouse gas emissions were prevented, 498 million trees were saved, and 127

million barrels of oil were saved (TC, 2024b). In short, Turkish Government tries to show that systematic measures are in place to manage plastic waste.

However, despite the data showing improvements, in 2023, various political parties which are members of the Turkish Grand National Assembly, brought the issue of plastic waste import to the agenda of the Turkish Grand National Assembly and submitted numerous question proposals. In one of the question proposals, it was stated that the Ministry of Environment, Urbanisation, and Climate Change should implement an urgent action plan and prohibit the import of waste, eliminate single-use plastics with a plan, restrict their production, and investigate the effects on soil, water and public health due to environmental breakdown and pollution caused by imported plastic garbage (Anka 2023).

Several patterns can be seen, and assumptions can be made when research findings and the theoretical framework are linked. One of the isomorphic changes Dimaggio and Powell (1983) observed is coercive. Coercive pressures can be persuasive or enforcing towards implementing procedures, standards, rules. It is significant in the political arena that the field attempted coercive change in terms of the maintenance and improvements in waste management. Therefore, it may be suggested that the news articles created the relations between civil society organizations, news media and Members of the Turkish Grand National Assembly who have called regulative action towards heavier sanctions for illegalities or complete import restrictions. Several press briefings concerning political campaigns and field research mentioned that news articles succeeded in affecting governmental agenda, decision making, and directed governmental agencies towards import bans (GreenpeaceTürkiye, 2022; Gündoğdu, 2021; McGlone, 2022).

Dimaggio and Powell (1983) also argued that another institutional pressure is related to mimetic change. In times

of greater uncertainty organizations tend to imitate others. Organizations tend to imitate others as they perceive the organizations they imitate to be successful. For example, plastic waste problems and issues concerning Türkiye peaked in 2021. Greenpeace (2021a; 2021b) reports proved that plastic bags and packaging from countries such as the UK and Germany were dumped and burned illegally in southern Türkiye. The success of Greenpeace reports illustrating the illegal processes concerning plastic waste management, the struggle of Greenpeace were imitated and responded as headline news in many countries, including Türkiye, an example of which was Goebel's (2021) report in WirtschaftsWoche Magazine, that brought a company, which imported 140 containers of garbage from Germany to Türkiye to the spotlight; and as a result Turkish press and the main opposition party brought this report to the official Turkish Grand National Assembly agenda (EuroNews, 2021a; Snowdon, 2021; YeşilGazete, 2021; GazeteDuvar, 2021; Bildircin, 2021a). Following these news Ministry of Commerce removed ethylene polymer waste imports from the list of "wastes subject to import conformity control" and included in the list of "other wastes prohibited from import" (Ünal, 2021b).

According to Dimaggio and Powell (1983), normative change arises with concerns to control production and legitimate authority in a certain field. The lobbying attempts can be visualized as the normative pressures of associations and government agencies to control the management of plastic wastes and strengthen political authority. After the above-mentioned decision of the Ministry of Commerce, which came under the pressure of environmental organizations, media outlets, politicians and the public, lobbying activities gained momentum in Türkiye. In the same year, an agreement was reached to cancel the ban decision between the Ministry of Commerce, Industry and Technology, and the representatives and creditors of the industry including Turkish Plastics Industrialists' Research, Development and Education Foundation (PAGEV), the Union

of Chambers and Commodity Exchanges of Türkiye (TOBB), Ankara Chamber of Industry (ASO), Plastics Industrialists' Federation (PLASFED), Plastics Industrialists' Association (PAGDER), and Recycling Association (Euronews, 2021b; Bildircin, 2021b; Ünal, 2021a; Sözcü, 2021; Altay, 2021; MAG, 2021; Aposto, 2021; Sol, 2021). With the new application, it is stated that all licenses of the existing 1350 recycling companies will be reviewed, a letter of guarantee will be required for these companies, and waste imports will be tracked with a chip system from the time they arrived at the port until they go into the factory (Yiğitcan, 2021).

Hoffman (1999) expressed that institutions of a field are both specific to the issue-based field and competing. Research findings revealed that there were contradictions in interpretations and practices between individual populations. While, most academic sources, news portals and several non-governmental organizations published negative views about the plastic waste imports and supported the bans, other non-governmental organizations, plastic industry organizations and members of the industry chamber favored open import systems and lobbied governmental agencies against import bans.

The outdated recycling habits and norms as well as plastic overproduction seem to prevail in the Turkish setting. This may be due to inadequate infrastructure structures or the insufficiency of a critical academic, media and political agenda. According to Greenpeace practices like composting have not been institutionalized in Türkiye yet (Çelik, 2021). It is reported that Turkish municipalities are the main organizations that have an impact in the collection and the transportation of plastic wastes.

However, the current numbers reveal that the progress is highly limited at 10 to 20% rates (Karlsson et al., 2023). Moreover, the limited budgets of these municipalities hinder them from acting further, as the recovery of the wastes are neglected (Ecostar, 2023). Accordingly, with the latest elections,

Türkiye decided to progress with the same government. It may be argued that, as a consequence, the political agenda will not see a dramatic change in the near future, and the municipalities will maintain limited output levels. Though, action towards plastic recycling may shift to a faster pace, unless the academic and media attention is lost.

Secondly, most academic work neglects profit seeking behavior in waste management. Several governmental agencies contributed to the discussions by providing press briefings and reports about the benefits of waste imports. For instance, Turkish Court of Accounts interpreted the increase of waste imports due to the increase in the number of licensed waste treatment facilities and the emergence of opportunities to obtain cheap raw materials (Kaşka, 2022), news about plastic waste trade rocketed around the days of the ban of wastes in the ethylene polymer group, and its cancellation (Bia News, 2021; Bildircin, 2021b; Erem, 2021; Euronews, 2021b; Goebel, 2021; Gundogdu, 2021; Kaska, 2021, 2022; Ocak, 2022; Unal, 2021; Yesil Gazete, 2022; Yiğitcan, 2021). However, news portals also reported that government agencies have not yet announced official information regarding company names, import rates or the quotas used. (Ocak, 2022). Waste entrepreneurs and traders made superior profits from the trade of non-recyclable plastics, which high-income countries have tried to dispose of for many years. (Chellel, and Moskwa, 2022; McGlone, 2022; Naayem, 2021).

Instead of adapting sustainable recycling and clean fuel practices, utilizing domestic treatment facilities, or implementing circular plastic economy strategies, countries such as the UK and Germany exploited regulative deficits and exported tons of waste to overseas. For example, Tesco, a large UK based retailer, attracted significant media attention to problems emerging from exporting waste to overseas countries including Türkiye, on how intermediaries, including contractors and waste brokers could exploit the deficits of audit and regulative systems (Chellel

and Moskwa, 2022). It is argued that exporting waste is more profitable due to the fact that domestic recyclers are paid for after the material undergoes certain processes, while overseas traders are rewarded as the waste, either unprocessed or not (Chellel, and Moskwa, 2022). Nevertheless, it was mainly the news articles that highlighted the weakness of regulative systems in relation with sanctions, auditing of packaging recovery notes, control of the changes made to banned product codes or customs inspections (Bildircin, 2021b; Daniels, 2021; Kaşka 2021; McGlone, 2022; Syberg et al., 2021).

Thirdly, it can be expected that the exportation of waste to low-income, underdeveloped countries will increase. However, it is not solely dependent on the economic levels of countries, new trade routes or the mismanagement of waste that Zhao and Friends deliberated (2022), it is also due interorganizational relations. When lobbying attempts of plastic industries and industrials chambers amplify, when broker facilities become full to overflow, when the costs of trades with cement industry organizations rise, firms will be more inclined to dispose of wastes to countries lacking import controls (Brock et al., 2021; Chellel, and Moskwa, 2022).

Similar arguments can be made as cement and recycling industries, waste brokers, governments and academicians continue to fail to address transparency issues regarding numbers of wastes traded and recycled, the areas impacted by waste dumping, the ecological outcomes of plastic waste incineration (Brock et al., 2021; Gundogdu and Walker, 2021). In its infancy, the organizational field may reduce profit seeking behavior when government agencies impose heavier sanctions for illegal trade activities and support industrial infrastructure for recycling plastic wastes.

Lastly, it is also evident that only a few organizations discussed the opportunities regarding recovery of plastic waste. Even though circular economy models are discussed among academic

environments, business and entrepreneurial organizations remain silent. Instead, cement industry organizations and multinational companies have supported the incineration of nonrecyclable plastic waste using cement kilns (Brock et al., 2021). However, environmentalists have questioned the sustainability of this energy source and debated about harmful air emissions as well as their impact on global efforts on waste reducing (Brock et al., 2021; Chellel, and Moskwa, 2022). Furthermore, governmental organizations interpreted the economic opportunities and demonstrated the increase in waste facilities (Kaşka, 2022).

Nevertheless, only a few academics interpreted the situation as an opportunity and directed attention to circular plastic economy (Mihai et al., 2021). On the contrary, news portals and civil society organizations discussed the transparency issues of trade and waste recycling in Türkiye, as a barrier in the development of sustainable recycling technologies to support circular economy.

In regards, Mihai et al. (2021) review current literature to direct scholars on conceptualizing sustainable technologies towards reducing plastic waste. The study demonstrates the role of entrepreneurs and industrial communities in the development of domestic management systems and attempts to raise awareness about circular economy models and encourage collaborative community work to manage waste. Nevertheless, more research is needed in this area to develop how the technologies can further mitigate plastic waste management.

The organizational field we attempted to illustrate shows not only the old institutional actors of state, government, municipalities, but also new institutional actors which include non-governmental, national and international organizations; universities and research groups; media; and industry chambers. This not only expands the field but also changes the levels of power and influence within the groups involved. This supports the notion that institutional theory is relevant in explaining

activities related to the topic at hand. It shows that environmental problems cannot be addressed in isolation; governmental and non-governmental institutions and their structures and frameworks need to transform and adapt to rapidly changing social, political, technological, and environmental conditions. These conditions continue to unfold, and our organizational field offers the potential for creating a framework to position these institutional forms and structures. It is through this framework that we ground our understanding for the new and changing organizational field that tension and negotiations emerge that guide the rules and processes of plastic waste management; shapes the behaviors and the decision making to provide solutions to environmental problems in Türkiye.

Most academic work followed quantitative approaches, and they either reviewed existing literature to discuss sustainable solutions or predicted the future of waste management. However, the neglect of a longitudinal qualitative study in the waste trade literature is apparent. Organizational field studies have been conceptualized to observe longitudinal changes of field practices, since they are concerned with institutional effects and change. In this sense, the study is limited to the examination of the discussions of Turkish organizational field in the years between 2021 and 2024. Future research may benefit from adopting organizational field theory and investigating interaction patterns of the waste management field in longer periods, to reveal the institutional and competitive forces that govern and evolve the field. Discursive dynamics can be analyzed to determine the forces that hinder or encourage the development of sustainable practices in recycling plastic waste both in global and national contexts.

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TRENDS IN E-COMMERCE SALES AND ITS CURRENT AND FUTURE SUSTAINABILITY EFFECTS ON TRANSPORTATION AND STORAGE EMPLOYMENT

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ABSTRACT

Recently, there has been an increasing trend in e-commerce due to the changing shopping habits and the COVID-19 pandemic, and reshaped supply chains are more on the scene across Europe than ever. Additionally, the impact of e-commerce on employment is uncertain. This study investigates e-commerce sales and employment trends in selected thirteen European countries from 2013 to 2022. Using descriptive statistics, figures, and tables, the countries are compared, and which sector of e-commerce activity leads to an increase/decrease in transportation and storage employment is investigated. From this point of view, this study initiates other studies related to labor and logistics literature. Our findings show that e-commerce

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sales percentages differ depending on the sector. The highest percentages belong to manufacturing. In addition, Ireland and Czechia have the highest e-commerce sales percentages in this sector. In the case of the accommodation and food, Croatia takes the first place. The trend of e-commerce sales percentages in accommodation and food was steep during COVID-19. On the other hand, the e-commerce sales percentage in Cyprus decreased. Moreover, the e-commerce sales percentages have decreased in most countries investigated after COVID-19. The last finding is related to the share of transportation and storage in employment. Generally, the shares of transportation and storage are not higher than 10 percent. The highest shares belong to Estonia and Lithuania. Additionally, e-commerce and employment in transportation and storage have implications for the circular economy. E-commerce can increase transportation and jobs in transportation while it can decrease physical stores therefore depending on which one has a stronger impact on the environment, the whole e-commerce effect on the environment can be observed. To ensure e-commerce's sustainable growth, policies should focus on reducing its environmental footprint, such as incentivizing businesses to adopt sustainable logistics solutions and promoting the use of renewable energy within the supply chain.

Keywords: E-commerce, Employment, Transportation and Storage, Environment, Sustainability

1. INTRODUCTION

The e-commerce revolution has created busy markets and complex logistical networks, making society more aware of sustainability and environmental issues. This heightened awareness has driven businesses and consumers to prioritize eco-friendly practices, such as reducing packaging waste, optimizing delivery routes to lower emissions, and promoting sustainable supply chain solutions. Moreover, the fast development of online shopping has greatly changed contemporary society, impacting how people communicate, shop, and do business. From this point of view, the transportation and storage (T&S) industry has been influenced by this digital progress. Digitalization not only connects countries doing their business but also affects employment trends. At the same time, digital innovation encourages the integration of green technologies in the T&S industry, such as electric vehicles and energy-efficient warehouses, aligning the sector with sustainability goals. This motivates us to examine e-commerce sales and employment trends in thirteen European countries (Bulgaria, Croatia, Estonia, Hungary, Ireland, Italy, Romania, Slovakia, the Netherlands, and Lithuania) from 2013 to 2022**.** Different countries are analyzed in which e-commerce activity in different sectors such as manufacturing, food, services, and transportation leads to an increase/a decrease in employment in transportation and storage are investigated using descriptive statistics, figures, and tables. The employment arrangements in these countries from 2013 to 2022, tracking the rise and fall of T&S occupations against the backdrop of rapidly expanding e-commerce (Eurostat, 2023). This broad span allows us to capture the changing interaction between these forces throughout notable e-commerce growth.

To reveal the relationship between e-commerce and T&S, Forrester (2023) investigates the effects of regulatory frameworks, infrastructure, and labor market circumstances. These regulatory frameworks increasingly emphasize sustainability, such as carbon emission limits and incentives for adopting eco-friendly logistics

solutions. Three main industries, such as manufacturing, food, and services, should be examined since these industries have different employment arrangements and logistical wants (OECD, 2022). For instance, if there is a rise in food e-commerce, it will affect food delivery leading to an increase in the number of help couriers and warehouse workers. In addition, having an impact on heavy machinery production requires specific logistical knowledge, and it will give rise to creating job profiles. Such roles increasingly incorporate expertise in green supply chain management and energy-efficient practices. In this study, the relationship between e-commerce activity in manufacturing, food, services, and transportation leading to an increase/a decrease in employment in transportation and storage is analyzed by using descriptive analysis.

Eurostat's (2023) report stated that in examining the relationship between employment in T&S and e-commerce, not only automation and logistics techniques but also seasonal changes should be considered. Sustainability considerations also play a vital role, as seasonal surges in e-commerce demand often necessitate strategies to minimize environmental impacts, such as optimizing delivery routes and using eco-friendly packaging materials. This phenomenon may lead to a rise in T&S employment. On the other hand, as more automated sorting and delivery systems are utilized, fewer manual labor duties are used, and this requires a change in T&S labor skills. These changes highlight the importance of sustainable workforce development, where training includes skills for operating green technologies like electric vehicles and renewable energy-powered logistics systems. This paper summarizes the relationship between e-commerce and the European labor market. The contribution of the expansion of e-commerce to the development of T&S jobs is one of the developing sustainable employment initiatives that need to be studied. Promoting sustainable employment not only supports workforce adaptation but also ensures alignment with environmental goals, such as reducing carbon footprints across

the logistics chain. Policymakers may use this information to assist the growth of the T&S workforce and thus provide individuals with the tools they need. Those individuals are more likely to adapt to the rapidly changing digital environment. During the technologically changing era, individuals may need to be trained in data analytics, logistics management, and automation. Incorporating sustainability-focused training, such as energy efficiency optimization and waste reduction in logistics, can further enhance the workforce's relevance in this evolving landscape. Consequently, companies will probably use this knowledge to guarantee a smooth transition to the era.

This research is focused on sales of e-commerce and employment trends in thirteen European countries (Bulgaria, Croatia, Estonia, Hungary, Ireland, Italy, Romania, Slovakia, the Netherlands, and Lithuania) from 2013 to 2022. This study uses descriptive statistics, figures, and tables to investigate which e-commerce sales in food, manufacturing, services, and transportation sectors lead to an increase/a decrease in employment in transportation and storage. This paper involves five sections. In the introduction, brief information on e-commerce and employment and the study's aim is given. Following the introduction, the articles on e-commerce, delivery, inventory and transportation management, and employment are evaluated. In the next step, the research method and the tables of e-commerce activity in terms of sales and employment trends in selected thirteen European countries (Bulgaria, Croatia, Estonia, Hungary, Ireland, Italy, Romania, Slovakia, the Netherlands, and Lithuania) from 2013 to 2022 is presented using descriptive statistics. Then, the results and limitations are shared. Comparing accommodation and food and information and communication, manufacturing has the highest percentages. The rise in e-commerce has also led to greater awareness of sustainable packaging, efficient logistics, and eco-friendly transportation methods, crucial in reducing the environmental impact of growing sales. In addition, the highest percentages of e-commerce sales are in Ireland and Czechia. In the

case of the accommodation and food, Croatia takes the first place. The trend of e-commerce sales percentages in accommodation and food has been steep during COVID-19. Interestingly, the e-commerce sales percentage in Cyprus has decreased. Moreover, the e-commerce sales percentages decreased in most investigated countries after COVID-19. This phenomenon is probably due to the individuals' returning to their previous shopping habits. This shift also reflects a change in consumer awareness of sustainability and the environmental cost of fast delivery and overconsumption. The last finding is related to the share of transportation and storage in employment. Generally, the shares of transportation and storage are not higher than 10 percent. Even if the values are small, there is a slightly increasing trend in most countries. The highest shares belong to Estonia and Lithuania.

2. LITERATURE REVIEW

The rapid evolution of e-commerce has significantly transformed modern life, influencing communication, shopping habits, and conducting business. One of the most affected sectors is transportation and storage (T&S), where the impact of digital advancements has been profound and varied. As e-commerce drives demand for faster delivery and more efficient logistics, it also brings about new challenges and opportunities in sustainability. This literature review delves into the complex relationship between e-commerce, employment in the T&S sector, and sustainability. By examining key studies and diverse perspectives, this review explores how digital advancements reshape job roles, skills requirements, and geographical employment patterns while highlighting the push toward sustainable practices in the industry. The goal is to provide comprehensive literature related to e-commerce and its aftereffects on employment in T&S and the pursuit of sustainability, shaping the future of jobs in the T&S sector.

One of the most outstanding effects of e-commerce is the growing demand for faster delivery options. According to Oyama

et al. (2024), consumers increasingly expect swift delivery. This phenomenon necessitates a more agile logistics approach from retailers, increasing job opportunities in the logistics sector. In the study of Rutter et al., (2017) strategies such as strategically locating smaller distribution centers closer to customers, reflect a change from the traditional model where large warehouses are situated in outlying areas, often with limited public transportation access for workers.

Additionally, e-commerce has intensified the need for efficient inventory and transportation management. Companies must quickly respond to online orders, driving demand for flexible and fast transportation services. Consequently, businesses are adopting automated transport solutions, such as autonomous vehicles and drones, to enhance delivery efficiency, further highlighting the shift toward smaller distribution centers. Araújo et al. (2020) mention the first drones started in 2013 in Amazon facilities. In 2014, DHL drones focused on remote areas with limited entrance for delivery. Furthermore, Fried and Goodchild (2023) analyze the factors influencing last-mile facility locations, considering facility and regional characteristics. Their analysis of operational Amazon logistics facilities across the United States reveals a tendency for them to be closer to population centers instead of traditional upstream distribution centers. This shift toward urban-centric logistics facilities is driven by consumer demand for faster delivery times, seen in sectors like food delivery, where the need for last-mile logistics has risen. This rise in e-commerce and online shopping needs speed, capacity, and flexibility and the biggest companies follow last-mile delivery in this direction (Araújo et al. 2020). The change has required significant adaptations in supply chains, ensuring product quality while optimizing costs and delivery times, thereby creating more qualified jobs in the transportation sector. According to Economic Times, delivery staff is increasing due to the last mile delivery (Nasreen and Purohit 2019).

Additionally, Rutter et al. (2017) emphasize the rise of independent contractors using personal vehicles for deliveries,

like the model of ride-sharing services. While this approach caters to the demand for speed, it also exacerbates the burden on existing transportation infrastructure. The arrival of delivery vehicles contributes to road congestion, posing challenges for urban planners (Rutter et al., 2017). In the services sector, companies such as meal delivery platforms heavily rely on the transportation sector's ability to provide fast and reliable solutions to meet modern consumer expectations. This shift has led to closer collaboration between the services and transportation fields, further strengthening the interdependence between these industries.

Apart from the actual impact on logistics and transportation, the digital transformation of e-commerce also highlights the critical role of training and skills in handling the changing employment plans. With the rise of Information and Communication Technology (ICT), e-commerce requires a labor force equipped with digital skills. E-commerce adoption can be possible with knowledgeable staff in small and medium enterprises (SMEs). Knowledgeable staff can aid SMEs in being competitive in the commerce environment (Sharma, 2005).

However, the impact of ICT and e-commerce on employment is not clear. According to Kiani and (Ahmed 2013), e-commerce enables SMEs, so that there can be an increase in employment, especially in developing countries. On the other hand, Robinson, et al. (2020) investigate some crucial questions about geographical disparities and social inequalities within the digital field. They focused on the need for solutions that target the specific challenges faced by rural areas, underserved communities, and individuals lacking access to the necessary infrastructure and resources. Moreover, the effects of e-commerce extend beyond employment and into sustainability concerns. E-commerce has significantly altered transportation motives, directly impacting employment in transportation. Shao et al., (2016) point out, that rise of e-commerce and e-work has reduced the need for physical travel, leading to lower traffic congestion and reduced

carbon emissions. However, the increased demand for delivery services, fueled by e-commerce, has led to a surge in last-mile delivery traffic, which presents both environmental challenges. Because the goods are not consolidated in the last mile delivery, the cities face problems with the traffic of trucks and delivery vehicles. This situation also creates unnecessary CO2 emissions and environmental issues (Pufahl, et. al.2020). While the shift towards e-commerce has reduced some types of transportation jobs, it has simultaneously created new roles, particularly in urban delivery and logistics management. These changes also have consequences related to environmental concerns. For example, the rise in delivery vehicles on the roads contributes significantly to carbon emissions, air pollution, and traffic congestion (Brown & Guiffrida 2014). Haryanti & Subriadi (2022) show that private vehicles can reduce emissions because the goods are delivered to the customer's home. However, different orders delivered from various e-commerce can cause inefficient delivery. Additionally, packaging waste such as plastic generated from online purchases poses a significant challenge to waste management systems. Addressing these issues requires a united effort to implement sustainable practices within the T&S industry to lessen the environmental impact of e-commerce. Therefore, examining the increase in e-commerce and its consequences is essential. There are sustainable logistics that balance the economic benefits and the development of e-commerce with environmental issues. For example, optimizing delivery routes, employing electric and hybrid vehicles, and utilizing eco-friendly packaging can significantly reduce the carbon footprint of T&S operations (Fernández Gil et al. 2022). Additionally, new production processes optimize package volume and shape, additive manufacturing, and 3D printing. This can aid sustainable production with reduced CO2 emissions (Escursell et al. 2021).

Furthermore, warehouse management systems applications that prioritize energy efficiency and waste reduction can lead to more sustainable storage solutions (Christopher, 2016).

Innovations such as automated warehouses, advanced data analytics, and blockchain technology offer new opportunities to enhance efficiency and transparency in logistics operations (Custodio, & Machado, 2020). Also, the increasing sales volume of e-commerce has transformed warehouses customized to the special needs of online retailers serving customers in business to the consumer (Boysen et al.2019). By integrating these practices, the T&S industry can contribute to the broader goals of sustainable development while supporting the growth of e-commerce. These technologies can help consolidate supply chains, reduce waste, and improve resource utilization, leading to a more sustainable and resilient T&S industry. It is crucial to explore how these technological advancements can obtain the desired result to achieve sustainability goals and positively impact the economy and the environment (OECD, 2022).

Energy consumption associated with digital infrastructure can complicate the environmental benefits of e-commerce. Yontar (2023) discusses the contradictory aspects of digital transformation, where technologies like AI, IoT, and blockchain, while improving efficiency, also contribute to significant energy usage. This dynamic is crucial in the transportation sector, where sustainable e-commerce practices could accept more energy-efficient delivery systems, potentially altering employment patterns as new technologies require different skill sets.

Furthermore, the shift to sustainable e-commerce is not just about environmental impact; it also reshapes employment in the transportation sector. The demand for last-mile delivery services has increased employment opportunities in urban logistics (Nasreen & Purohit 2019). However, the push for sustainability, adoption of electric vehicles (EVs), and automation may change the nature of these jobs. For instance, as companies adopt EVs to reduce their carbon footprint, there is a growing need for workers skilled in maintaining and operating these new technologies (Cetindamar et al.2021). Moreover, sustainable practices in supply chain management are transforming the sector. Santos

et al. (2018) highlight how Industry 4.0; such as IoT and big data revolutionize supply chains by enhancing transparency and efficiency. In the context of e-commerce, these technologies enable more efficient delivery routes and reduce environmental impact, which could lead to a shift in employment from traditional logistics roles to more technologically focused positions. The growing emphasis on sustainability in e-commerce could also drive demand for jobs related to green logistics, and the development and maintenance of sustainable transport networks.

Additionally, integrating sustainability into business models is seen as essential for the future of e-commerce and its impact on employment in the transportation sector. Chinoracký and Čorejova (2019) conclude that less-skilled labor jobs can decline, and a large degree of job types will depend on the skill level of jobs. Moreover, the push towards sustainable e-commerce can lead to reassessing employment in the transportation sector. As companies seek to reduce their carbon footprints, there may be a growing demand for jobs related to green logistics and sustainable supply chain management (Tănasie et al. 2022). As a result, this could result in new roles focusing on the sustainability of e-commerce operations, from developing eco-friendly packaging solutions to optimizing delivery routes to minimize environmental impact.

Implementing Industry 4.0 technologies in e-commerce presents two conflicting outcomes for employment in transportation. (Lee et al., 2018). While these technologies can enhance efficiency and sustainability, they also threaten to displace traditional jobs. Job loss is possible with online stores (Biagi & Falk, 2017) However, e-commerce has new opportunities for employees with digital literacy. Javaid et.al. (2022) discuss how adopting IoT, AI, and big data analytics transforms supply chains, making them more efficient and environmentally friendly. However, these advancements require workers to possess new skills, such as data analysis and technology management, which could lead to job displacement

for those unable to adapt. Similarly, Sunny et al. (2020) explores the potential of blockchain technology to enhance transparency and traceability in supply chains, contributing to more sustainable practices. As a result, blockchain reduces the environmental impact of supply chains, its high energy consumption and the need for widespread industry adoption present challenges. For workers in transportation, adopting blockchain could mean a shift towards more tech-centric roles, potentially leading to the need for retraining and upskilling.

Singh (2012) and Bănescu et al. (2022) highlight that these digital skills are more than data analysis, basic technical proficiency, digital marketing, and cybersecurity. Government support is important for Small and Medium Enterprises (SMEs). Another reason for the importance of government support is that SMEs struggle to adapt to the online infrastructure. SMEs also do not emphasize skill development programs and training.

In sum, the development of e-commerce and the management of companies have significantly changed people's shopping habits and lives. Transportation and storage, affected by digital developments, have gained importance in e-commerce and brought questions about environmental sustainability. Fast delivery is essential in e-commerce. While consumers expect swift deliveries than usual, the proximity of distribution centers to customer centers makes it easier for employees to reach business centers.

Rapid response to orders related to e-commerce and inventory management needs in the manufacturing sector has increased the need for fast transportation services. Swift delivery is pivotal in transportation solutions such as autonomous vehicles and drones for efficiency.

E-commerce also attracts attention in terms of environmental sustainability. Although e-commerce and e-working reduce travel, traffic congestion, and carbon emissions, the demand for e-commerce causes environmental pollution by increasing

carbon emissions delivery vehicles in the long run. In this regard, electric cars can provide environmentally friendly distribution by optimizing routes. Sustainability in e-commerce and developing transportation networks with new technologies may increase the interest in green logistics.

Recycled packaging materials can also reduce carbon footprints. Warehouse management systems that give importance to energy efficiency and waste reduction in storage can also be a solution. Automated warehouses, advanced data analytics, and blockchain technology are essential in logistics operation efficiency. Technological developments should be monitored to measure the effect on the economy and the environment.

In employment, the environmental benefits of e-commerce increase efficiency in terms of the distribution of technologies such as artificial intelligence, IoT, and blockchain, new technologies require employees with different skills. While employees are expected to manage data analysis and technology, those who fail to adapt may lose their jobs. Digital transformation policies are needed to reduce these risks.

In transportation, blockchain could shift towards technology-centric roles and require training and skills. Applying Industry 4.0 technologies in e-commerce can replace traditional jobs while increasing employment efficiency and sustainability in the transportation sector.

The digital transformation of e-commerce also emphasizes the role of skills and education in employment. Technical competence, knowledge and skills related to data analysis, digital marketing, and cyber security are also skills that employees must acquire. Government support is also pivotal for small and medium-sized enterprises. In this regard, firms can invest in training programs to obtain skills. The literature emphasizes the potential of e-commerce to strengthen SMEs and create employment. At this point, policies that include fair access to the opportunities brought by the digital revolution are necessary.

3. TRENDS IN E-COMMERCE AND EMPLOYMENT IN TRANSPORTATION AND STORAGE

In this section, tables, figures, and descriptive statistics to explore the trends in e-commerce sales and employment trends in thirteen selected European countries (European Union, Bulgaria, Croatia, Estonia, Hungary, Ireland, Italy, Romania, Slovakia, the Netherlands, and Lithuania) from 2013 to 2022 are utilized. The value of e-commerce sales is Nace2[11]. This is the percentage of total e-commerce sales by sector (Nace2). Three areas are chosen: manufacturing, accommodation, and food service activities, and information and communication. In addition, the share of Transportation and Storage (T&S) in employment and the ratio of T&S employment in the labor force are used to examine whether there is an impact on employment. Eurostat website shows. It is found that the e-commerce sales by different sectors, total number of employees, and number of employees in the transportation and storage sector on the World Bank website. e-commerce sales by different sectors, the total number of employees, and the number of jobs in the transportation and storage sector.

The descriptive statistics for e-commerce sales by different sectors are shown in Table 1. Table 1 represents the value of e-commerce sales in terms of percentage turnover. The first column in Table 1 shows the European Union (27 countries from 2020). Others represent the selected thirteen countries. The last four columns show the descriptive statistics for these selected countries, such as minimum, maximum, mean, and standard deviation. This research is on manufacturing, accommodation and food, and information and communication sectors. The first block represents e-commerce percentages in manufacturing, the second one presents e-commerce percentages in accommodation

[11] Enterprises' total turnover from e-commerce sales/enterprises' total turnover by Nace2.For example, enterprises' total turnover from e-commerce sales/enterprises' total turnover means the percentage of e-commerce sales in total sales in manufacturing. Note that enterprises with 10 or more employees.

and food while the third one belongs to e-commerce percentages in the information and communication sector.

With the help of Table 1, the Figures below are created. Figure 1 belongs to the manufacturing sector and Figure 2 is for accommodation and food. Figure 3 refers to information and communication. The last figure shows the employment shares of transportation and storage. The black line with a triangle marker represents the European Union's e-commerce percentage. This is valid for all the figures. In manufacturing, in the beginning, Ireland has values of 26.7 percent and 69.9 percent (Figure 1). It peaked in 2020 at 61.3 percent and in 2015 at 74.6 percent. Even if it decreases in some of the years, Ireland has the highest percentage for the whole period. The rise in e-commerce in manufacturing is also related to a greater emphasis on sustainability, with companies increasingly adopting greener production methods and more eco-friendly delivery options. The case of manufacturing having a peak in 2020 is possibly due to the COVID-19 pandemic. This surge in e-commerce also prompted the industry to rethink packaging practices, leading to innovations in sustainable packaging materials and waste reduction. E-commerce percentages' mean values are calculated by taking the e-commerce percentages of the selected countries. In manufacturing, mean values change between 16.7 % and 21%. The minimum mean (16.7%) value belongs to the beginning of the investigated period (2013) while the highest belongs to 2020. This increase in the mean percentage in 2020 can also be associated with the pandemic-induced shift to online shopping, which encouraged more companies to invest in sustainable and efficient supply chains. Minimum values belong to Cyprus (0.2% to 2.5%) for the whole period while maximum values belong to either Ireland or Czechia.

Table 1. E-commerce Sales by Sectors (2013-2022)

Value of e-commerce sales by NACE Rev.2 activity																			
Manufacturing																			
TIME	European Union	Bulgaria	Czechia	Estonia	Ireland	Croatia	Italy	Cyprus	Lithuania	Hungary	Netherlands	Romania	Slovakia	Norway	Min	Max	Mean	sd
2013	17.3	2.6	34.3	23.	26.7	10.2	8.	1.9	5.7	28.5	16.2	8.9	27.8	22.7	1.9	34.3	16.7	10.6
2014	17.3	5.5	34.3	23.3	29.	11.9	7.5	0.2	8.1	34.9	16.	10.2	26.3	16.7	0.2	34.9	17.2	10.9
2015	21.7	9.	38.1	24.3	36.4	19.7	8.6	0.2	9.1	30.9	20.1	13.1	31.9	16.8	0.2	38.1	19.9	11.4
2016	21.2	7.8	32.7	20.8	31.2	11.5	9.4	0.4	9.1	25.	22.2	13.	26.2	25.6	0.4	32.7	18.1	9.7
2017	24.6	7.6	40.8	24.	35.1	11.9	11.	0.3	11.5	30.4	19.	14.9	31.9	20.5	0.3	40.8	19.9	11.5
2018	21.4	8.	34.8	20.9	39.	11.3	11.2	0.4	12.6	37.9	18.1	14.9	31.9	22.8	0.4	39.	20.3	11.8
2019	22.7	6.1	37.9	19.8	40.5	13.8	12.2	0.5	12.7	35.8	14.8	11.3	29.9	21.2	0.5	40.5	19.7	12.1
2020	26.3	9.8	33.7	19.	61.3	16.0	12.6	0.8	12.5	34.8	16.4	17.8	31.3	16.8	0.8	61.3	21.8	14.8
2021	25.	8.2	33.7	20.3	49.4	20.6	11.9	0.5	18.1	32.3	18.1	10.5	27.2	16.9	0.5	49.4	20.6	12.2
2022	21.4	7.1	33.3	19.	35.9	20.9	13.4	2.5	15.3	31.4	20.2	9.2	33.6	21.1	2.5	35.9	20.2	10.4
Accommodation and food service activities																			
TIME	European Union	Bulgaria	Czechia	Estonia	Ireland	Croatia	Italy	Cyprus	Lithuania	Hungary	Netherlands	Romania	Slovakia	Norway	Min	Max	Mean	sd
2013	9.8	3.6	14.7	8.1	14.8	15.5	7.8	10.8	12.	9.8	14.2	2.3	9.6	11.4	2.3	15.5	10.4	4.0
2014	12.1	3.4	18.0	9.	14.4	29.9	7.7	12.	14.1	12.	14.6	4.1	4.9	15.4	3.4	29.9	12.3	6.8
2015	12.9	1.3	15.2	8.8	18.2	18.7	8.9	10.1	12.8	12.5	14.2	3.7	5.3	19.7	1.3	19.7	11.5	5.6
2016	13.9	5.1	15.9	13.8	19.7	20.9	10.1	14.6	13.1	12.4	12.7	2.5	8.1	18.1	2.5	20.9	12.8	5.2
2017	14.	4.3	16.3	19.2	19.5	24.4	12.	17.8	14.6	13.7	13.5	4.7	7.9	21.7	4.3	24.4	14.6	6.0
2018	13.8	3.6	16.8	15.9	19.7	19.7	11.4	17.9	14.8	13.5	14.8	3.	9.2	22.7	3.	22.7	14.1	5.7
2019	14.9	5.9	20.4	18.0	23.3	23.7	12.2	12.1	15.5	15.8	14.4	5.2	8.6	23.5	5.2	23.7	15.3	6.1
2020	17.2	9.6	23.	14.7	26.2	30.1	16.	15.2	19.7	19.2	18.6	7.8	10.6	21.3	7.8	30.1	17.8	6.2
2021	16.9	10.9	17.5	18.4	28.2	31.1	12.9	22.6	19.5	22.3	23.4	9.3	12.1	20.2	9.3	31.1	19.1	6.3
2022	11.7	10.7	15.7	20.5	25.4	29.4	15.2	28.7	16.5	21.7	28.6	10.1	9.1	19.8	9.1	29.4	19.3	6.9
Information and communication																			
TIME	European Union	Bulgaria	Czechia	Estonia	Ireland	Croatia	Italy	Cyprus	Lithuania	Hungary	Netherlands	Romania	Slovakia	Norway	Min	Max	Mean	sd
2013	14.7	2.5	30.5	5.2	69.9	28.2	2.3	1.5	4.2	6.2	6.5	4.1	9.3	17.9	1.5	69.9	14.5	18.5
2014	15.3	0.8	29.0	9.2	69.8	8.6	4.2	3.8	4.2	4.9	6.7	3.3	12.3	24.2	0.8	69.8	13.9	18.0
2015	14.7	1.8	23.0	14.3	74.6	2.9	3.1	4.5	5.6	5.1	5.8	7.7	10.6	20.3	1.8	74.6	13.8	18.7
2016	15.7	3.5	22.0	12.3	60.9	55.4	8.5	4.3	9.3	5.5	10.8	6.6	13.6	28.4	3.5	60.9	18.5	18.2
2017	18.2	4.3	27.1	10.5	32.3	17.7	10.7	6.8	16.1	5.6	18.9	10.7	16.6	25.1	4.3	32.3	15.6	8.3
2018	15.5	14.1	26.2	14.6	32.1	6.4	9.6	7.9	11.2	5.2	18.3	10.1	14.9	31.1	5.2	32.1	15.5	8.7
2019	17.3	2.3	26.4	17.0	30.6	5.5	4.7	7.3	10.9	3.5	16.9	7.7	13.7	25.1	2.3	30.6	13.2	9.0
2020	17.4	6.0	22.5	20.2	42.0	11.0	11.5	17.6	19.4	4.3	17.8	10.0	16.9	20.9	4.3	42.0	16.9	9.1
2021	18.7	4.7	24.6	26.0	39.4	12.9	15.1	4.5	23.7	6.5	13.5	9.9	15.2	20.3	4.5	39.4	16.6	9.6
2022	20.7	7.2	21.6	37.1	63.2	11.9	10.8	6.4	34.2	7.5	16.6	16.9	16.1	19.3	6.4	63.2	20.7	15.3

Source: https://ec.europa.eu/eurostat

Notes: Enterprises' total turnover from e-commerce sales, 10 people employed or more, Percentage of turnover

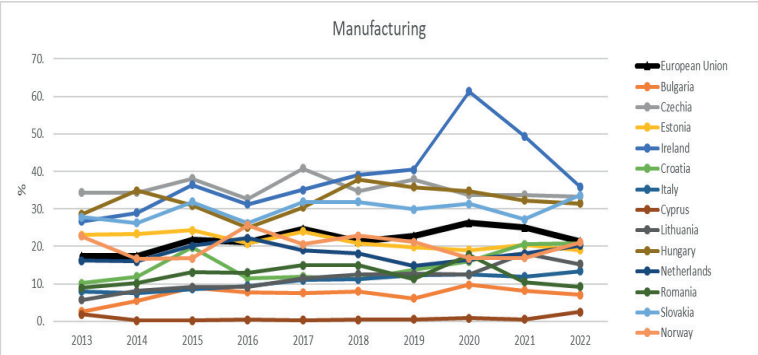

Figure 1. E-commerce Sales by Manufacturing (2013-2022)

Source: https://ec.europa.eu/eurostat

Notes: Enterprises' total turnover from e-commerce sales, 10 people employed or more, Percentage of turnover

Figure 2 shows the percentage of e-commerce in the accommodation and food sectors. Croatia has the highest percentages in the accommodation and food sector (Figure 2). The percentages of e-commerce in accommodation and food in Bulgaria, Italy, Romania, and Slovakia are lower than the percentage total of the European Union. Note that there is a general upward trend in e-commerce sales of accommodation and food with a significant boost in 2020 (Figure 2). This is due to the COVID-19 pandemic which forces individuals to do online shopping. This shift also accelerated the adoption of more sustainable business practices in the accommodation and food sector, such as eco-friendly packaging, reducing food waste, and implementing greener logistics solutions. While all the countries in the research have an upward trend, Cyprus decreased from 17.9 percent to 12.1 percent in accommodation and food during the pandemic. This may be related to the decrease in the tourism sector and incoming students. In Cyprus, tourism statistics, results show tourists decreased from 3800 thousand to 600 thousand from 2019 to 2020[12]. The decline in tourism also had a

[12] Look at the web page CYSTAT Portal: https://www.pio.gov.cy/en/press-releases-article.html?id=42594#flat

positive side, as it may have led to a temporary reduction in the environmental impact of travel and transportation, contributing to sustainability goals. Depending on the restrictions in the COVID-19 pandemic, the steepness of the trend may differ. For example, if the restrictions are rigid, individuals can shop on the Internet during the Pandemic.

Some countries have had steep trends during the COVID-19 pandemic and following the COVID period. These steep trends continue such as Netherlands, Ireland, Bulgaria, etc. For three years, these increasing trends have continued in some countries (Netherlands, Cyprus, etc.) However, other countries' e-commerce percentages in this sector decrease after 2021. This decrease is probably due to the individuals' returning to previous shopping habits. This shift back to traditional shopping habits may also reflect a growing awareness of the environmental impact of e-commerce, leading consumers to reconsider their purchasing choices, particularly regarding fast delivery options and overconsumption. For the accommodation and food sectors, e-commerce percentages' mean values have changed from 10.4 % to 19.3 %. The minimum mean (10.4 %) value belongs to the beginning of the investigated period (2013) while the highest belongs to 2022. As e-commerce in this sector grows, there is an increasing push for sustainable practices, such as eco-friendly accommodations, sustainable food sourcing, and reducing the environmental footprint of delivery services. Minimum values belong to values belong to either Bulgaria or Romania for the whole period while maximum values belong to either Croatia or Norway.

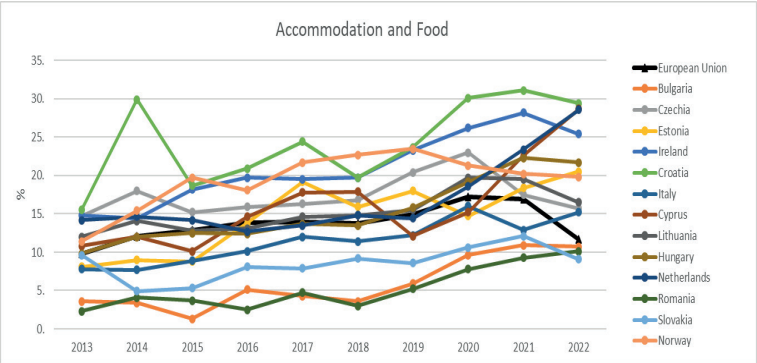

Figure 2. E-commerce Sales by Accommodation and Food (2013-2022)

Source: https://ec.europa.eu/eurostat

Notes: Enterprises' total turnover from e-commerce sales, 10 people employed or more, Percentage of turnover

In Figure 3, e-commerce sales percentages in information and communication are presented. the three countries (Ireland, Bulgaria, Czechia) are higher than the European Union values for all the years. The European Union's e-commerce sales percentages are between 15% to 21 percent. Others' percentages are lower than the value of 15 percent. For the information and communication sector, e-commerce percentages' mean values change between 13.2 % to 20.7 %. The minimum mean (10.4 %) value belongs to 2015 while the highest belongs to 2022. Minimum values belong to either Bulgaria or Cyprus for the whole period while maximum values belong to Ireland. These trends suggest that countries with higher e-commerce adoption, such as Ireland, may be better positioned to integrate sustainability practices within their digital economies, potentially driving more eco-friendly consumption patterns. As e-commerce continues to grow, it becomes crucial for nations to focus on sustainable practices in the information and communication sector, aiming for long-term environmental and economic balance.

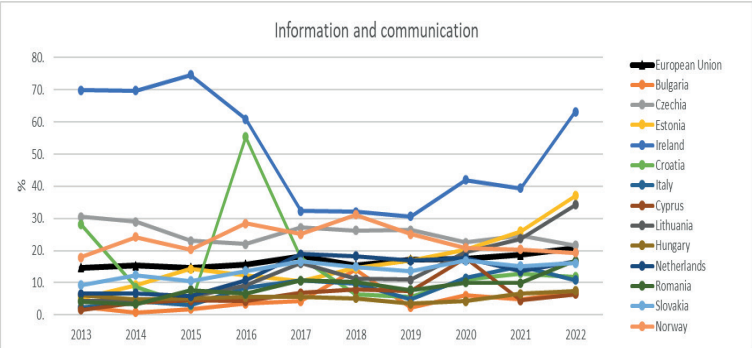

Figure 3: E-Commerce Sales by Information and Communication (2013-2022)

Source: https://ec.europa.eu/eurostat

Notes: Enterprises' total turnover from e-commerce sales, 10 people employed or more, Percentage of turnover

Table 2 is constituted for depicting employment in Transportation and Storage. In this table, the first block represents the number of employees in transportation and storage. The second block shows the total number of employees. The last block belongs to the share of transportation and storage in employment. As in Table 1, the first column represents the European Union (27 countries from 2020). Others represent the selected thirteen countries. The last four columns show the descriptive statistics for these selected countries, such as minimum, maximum, mean, and standard deviation.

Table 2. Share of Transportation and Storage in Employment

Employment by NACE Rev. 2 (Transportation and Storage)																		
TIME	European Union - 27 countries	Bulgaria	Czechia	Estonia	Ireland	Croatia	Italy	Cyprus	Lithuania	Hungary	Netherlands	Romania	Slovakia	Norway	Min	Max	Mean	sd
2013	9423	169	292	46	81	98	1022	15	93	259	354	428	148	132	15	1022	241	254.7
2014	9568	181	299	49	83	114	1026	14	100	258	342	431	152	133	14	1026	245	254.1
2015	9594	173	294	45	85	103	1021	14	98	266	351	474	161	137	14	1021	248	256.2
2016	9899	187	310	49	88	98	1073	15	95	275	359	471	163	135	15	1073	255	268.1
2017	10131	210	321	50	89	112	1097	17	100	292	375	489	161	122	17	1097	264	274.8
2018	10319	208	329	47	94	105	1104	19	97	287	394	509	174	122	19	1104	268	278.3
2019	10444	191	358	46	101	99	1113	17	101	299	362	510	172	126	17	1113	269	280.5
2020	9976	187	292	43	96	97	1096	16	99	273	358	515	159	122	16	1096	258	276.8
2021	10345	186	313	45	96	99	1121	15	101	280	422	542	149	118	15	1121	268	287.2
2022	10389	192	308	47	103	102	1148	15	100	285	433	553	158	131	15	1148	275	293.1
Total Employment																		
TIME	European Union - 27 countries	Bulgaria	Czechia	Estonia	Ireland	Croatia	Italy	Cyprus	Lithuania	Hungary	Netherlands	Romania	Slovakia	Norway	Min	Max	Mean	sd
2013	181802	2889	4833	597	1885	1494	21755	357	1264	3860	8104	8179	2318	2519	357	21755	4620	5510
2014	183812	2929	4862	600	1933	1542	21810	355	1288	4070	8032	8254	2349	2523	355	21810	4657	5514
2015	185635	2971	4891	606	1995	1559	21973	350	1301	4176	8123	8235	2405	2540	350	21973	4702	5548
2016	188458	2956	5025	607	2066	1567	22241	354	1318	4309	8227	8166	2472	2541	354	22241	4758	5608
2017	191094	3072	5056	618	2125	1603	22444	370	1306	4373	8371	8363	2502	2548	370	22444	4827	5664
2018	192980	3067	5144	622	2180	1630	22356	390	1324	4411	8547	8382	2533	2582	390	22356	4859	5645
2019	194762	2947	5151	626	2239	1561	22465	404	1324	4436	8689	8408	2544	2615	404	22465	4878	5681
2020	191695	2828	5090	612	2204	1541	21943	405	1298	4376	8677	8272	2491	2604	405	21943	4795	5559
2021	193032	2781	5068	616	2328	1559	21849	417	1310	4535	8972	7668	2522	2660	417	21849	4791	5518
2022	197462	2840	5019	637	2486	1579	22413	435	1354	4586	9236	7728	2560	2732	435	22413	4893	5654
Share of T&S in Employment																		
TIME	European Union - 27 countries	Bulgaria	Czechia	Estonia	Ireland	Croatia	Italy	Cyprus	Lithuania	Hungary	Netherlands	Romania	Slovakia	Norway	Min	Max	Mean	sd
2013	0.052	0.059	0.06	0.077	0.043	0.066	0.047	0.042	0.074	0.067	0.044	0.052	0.064	0.052	0.042	0.077	0.057	0.011
2014	0.052	0.062	0.061	0.082	0.043	0.074	0.047	0.039	0.077	0.063	0.043	0.052	0.065	0.053	0.039	0.082	0.059	0.013
2015	0.052	0.058	0.06	0.073	0.043	0.066	0.046	0.041	0.076	0.064	0.043	0.058	0.067	0.054	0.041	0.076	0.058	0.011
2016	0.053	0.063	0.062	0.081	0.043	0.062	0.048	0.043	0.072	0.064	0.044	0.058	0.066	0.053	0.043	0.081	0.058	0.011
2017	0.053	0.068	0.063	0.081	0.042	0.07	0.049	0.045	0.076	0.067	0.045	0.058	0.064	0.048	0.042	0.081	0.06	0.013
2018	0.053	0.068	0.064	0.075	0.043	0.065	0.049	0.048	0.073	0.065	0.046	0.061	0.069	0.047	0.043	0.075	0.059	0.011
2019	0.054	0.065	0.069	0.074	0.045	0.063	0.05	0.042	0.076	0.067	0.042	0.061	0.068	0.048	0.042	0.076	0.059	0.012
2020	0.052	0.066	0.057	0.07	0.044	0.063	0.05	0.039	0.077	0.062	0.041	0.062	0.064	0.047	0.039	0.077	0.057	0.011
2021	0.054	0.067	0.062	0.072	0.041	0.064	0.051	0.037	0.077	0.062	0.047	0.071	0.059	0.044	0.037	0.077	0.058	0.012
2022	0.053	0.067	0.061	0.073	0.041	0.064	0.051	0.035	0.074	0.062	0.047	0.072	0.062	0.048	0.035	0.074	0.058	0.012

Source: https://ec.europa.eu/eurostat

The figure below is created by using Table 2. In Figure 4, the black line with a triangle marker shows the percentage of transportation and storage in employment for the European Union. The selected countries may be grouped as having Values higher than the European Union and values lower than the European Union. The highest percentage belongs to Estonia and Lithuania comes in second place. This is probably due to being the geographical midpoint of Northern Europe. In addition

to that, Estonia is in the middle of the routes from China not only to Northwestern Russia but also to Northern Europe. For the share's transportation and storage employment, mean values are around 5% during the investigated period. Since the standard deviation and the mean range are very small. The maximum values are around 8% while the minimum values are around 4%. The minimum values belong to either Cyprus or Ireland. As the transportation and storage sectors grow, sustainability becomes increasingly important, particularly in countries like Estonia and Lithuania, where transportation routes play a crucial role. The expansion of these sectors should prioritize eco-friendly logistics, carbon emissions reduction, and sustainable supply chain management to mitigate environmental impacts

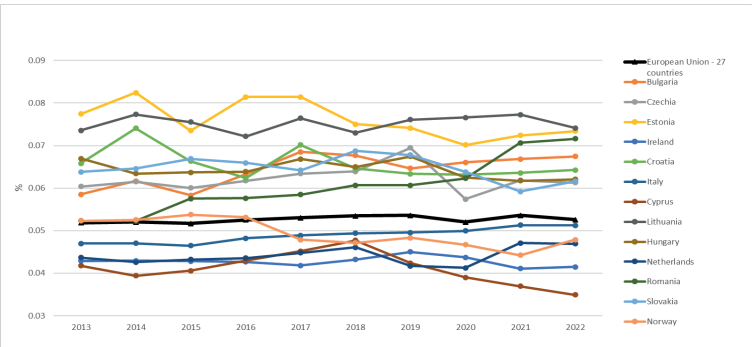

Figure 4. Share of Transportation and Storage in Employment (2013-2022)

Source: https://ec.europa.eu/eurostat

4. CONCLUSION AND DISCUSSION

This paper investigates the trends in e-commerce sales by sector and the share of transportation and storage in employment between 2013 and 2022. Figures and tables are used for this purpose. Manufacturing, accommodation and food services, and information and communication are selected. The reason for choosing these sectors is that e-commerce is more likely to be utilized.

Our findings can be summarized as follows: The first finding is that Ireland and Czechia have the highest e-commerce sales percentages in manufacturing. In the case of the accommodation and food, Croatia takes the first place. As COVID-19 affects every economic indicator, it has impacts on e-commerce sales. Especially, the trend of e-commerce sales percentages in accommodation and food has been very steep during COVID-19. However, (Cyprus) should be considered because the e-commerce sales percentage in Cyprus has decreased. The second important finding is that the e-commerce sales percentages have a decreasing trend in most researched countries after COVID-19. This phenomenon is probably due to the individuals' returning to their previous shopping habits. From this point of view, it can be said that e-commerce sales probably impact on the labor market, particularly in terms of employment and workers' skills. For this purpose, we examine the trends of transportation and storage shares in employment. It is found that the shares of transportation and storage are not higher than 10 percent. Even if the values are small, there are slightly increasing trends for most countries. The highest shares belong to Estonia and Lithuania. These increases should be focused on in detail. In addition, to increases in shares of transportation and storage employment, it is important to understand which part of the workers are affected by this increase and what kind of skills are needed. To foster a sustainable transition in the labor market, governments should implement policies that incentivize green skills development in logistics, such as training workers in energy-efficient transportation practices and sustainable supply chain management. Moreover, e-commerce has also impacted environmental sustainability issues. To understand deeply about these impacts, one should consider that e-commerce's effects can be in two opposite directions: it can reduce travel and traffic congestion, thus decreasing carbon emissions, or it can increase delivery services and environmental pollution. Governments should promote policies that encourage e-commerce companies to adopt environmentally friendly delivery options, such as electric

vehicles or consolidation hubs, to reduce their environmental footprint. Furthermore, tax incentives for e-commerce businesses investing in green technologies and carbon offset programs could be effective in minimizing their environmental impact. Incorporating sustainability into the design of e-commerce infrastructure is crucial to minimize its negative environmental footprint and enhance its positive potential for reducing emissions in transportation

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SOCIAL SUSTAINABILITY AND GENERATIONS IN ORGANIZATIONS: GLOBAL AND LOCAL ASPECTS DEFINE THEM

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ABSTRACT

The idea that individuals shaped by similar experiences and tendencies in the same period in history may have common responses in social and organizational life, has created interest for social science researchers. Due to the differences in generations, the replacement of one generation by another brings about transition and a process of change that society and organizations need to understand and follow in order to ensure social sustainability. In this study, the characteristics of generations with different development stages and different needs are inspected from both global and local perspectives. In the light of the generational cohort theory and the concept of global generations, the stages through which generations acquire their characteristics and their expectations from business life which constitute a large part of social life are examined. Based on the theories and empirical studies on generations, generational perspectives on concepts such as equity, social justice and collaboration, which are necessary elements of social sustainability are discussed. This chapter provides insight into the national and international classifications of generations, related theories, and reflections on intergenerational differences in working life in the scope of social sustainability.

Keywords: Generational differences, Global generation, Generations in organizations, Social sustainability

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1. INTRODUCTION

Various studies have been conducted in the literature on organizational behavior regarding the issues faced by employees within organizations, solutions for these issues, and the benefits gained by organizations capable of managing these challenges. For organizations to achieve high productivity from their workforce, which is one of their most critical input resources, managers and human resources professionals must develop approaches that optimize working conditions for employees. Achieving these optimal conditions requires understanding of what employees value, the types of difficulties that affect them the most, and what they expect from their managers. This knowledge will positively impact the resolution of individual-level issues.

Within the framework of a human-centered approach, the closer the attention given to employees at an individual level, the more effectively problems can be resolved. Addressing individual-level issues in large-scale organizations is particularly challenging. However, considering individuals as groups with similar expectations and sensitivities is seen as a method that can facilitate this challenging task. In this context, whether individuals shaped by similar experiences and tendencies during the same periods exhibit common reactions in their working life has attracted the interest of organizational behavior researchers. Due to the differences generations exhibit in the workplace, the transition from one generation to another brings a change process that every organization, regardless of how established it is, must follow. It is inevitable that the trends and sensitivities reflecting the zeitgeist of society and the business life which forms a significant part of society, will impact organizations. Therefore, understanding generations became a crucial problem. The generational cohort theory is the term that groups individuals according to the generations they belong. In this book chapter, you will gain insight into differences and the national and international classifications of generations, related theories and the reflections of intergenerational differences in social life.

2. SOCIAL SUSTAINABILITY AND GENERATIONS IN ORGANIZATIONS

The term 'sustainability' is in danger of carrying so many implications and nuances that for it to be properly understood it must be defined whenever it is used (McKenzie, 2004). The scope of social sustainability includes concepts such as equity, social justice and well-being (Ajmal et al., 2018). These important concepts are also aspects of the field of organizational behavior in terms of understanding the factors that affect individuals and organizational outcomes. Social sustainability is achieved when formal and informal processes, systems, structures, and relationships actively support the capacity of current and future generations to build healthy and livable communities (McKenzie, 2004). Littig and Griessler (2005) take social sustainability by focusing on the capacity of society and related institutional arrangements in terms of satisfying and fulfilling human needs, social justice, human dignity and participation.

Studies indicate different generations have different expectations and perceptions about justice in their organizations (Ferres et al., 2003, Leelamanothum et al., 2018, Topçu & Kırkbeşoğlu, 2021). Managing generational change effectively in society and organizations that represent a large part of social life would have important benefits for maintaining social sustainability as well as sustaining organizational effectiveness during this transformation. Shifting cultural and social norms throughout the twentieth century have influenced people in various ways, leading to a wide range of attitudes and perceptions about work and life (Bennet et al., 2012). Since generations have different expectations from society and organizations, to preserve individual and social well-being, understanding and inspecting generations and their needs will be helpful for protecting social sustainability.

3. DEFINITION OF THE CONCEPT OF GENERATION

The concept of generation is defined as a philosophical term by the Turkish Language Association (TDK) as "the community of people who were born in approximately the same years, who shared the conditions of the same age, therefore similar troubles and destinies, and who were obliged to do similar duties" and in the terminology of social sciences, it is defined as "a group of individuals forming age groups of approximately twenty-five to thirty years, hub, generation, infancy, generation" (TDK, 2020). Nash (1978), who aimed to shed light on the origin of the concept of generation with his research on the epics written in ancient times, revealed that the concept of generation had been used since ancient times to express those born at the same time as the word "*genos,*" meaning "*emergence*". In the social sciences literature, the concept of generation was first discussed in the article "*Das Problem Der Generationen*" written by Mannheim (1927) and examined within a sociological framework. The article was published in English in 1952.

The concept of generation is frequently used in everyday language to make sense of the differences between age groups within society and to position individuals in a part of historical time (Pilcher, 1994, p.481). For social sciences, the concept of generation is one of the indispensable guides for understanding the structures of social and intellectual movements (Mannheim, 1970, p.378). It is not possible to handle historical processes, events and sociological changes independently of different generations, their historical experiences and the characteristics these experiences bring to them. Individuals who belong to the same generation and share the same year of birth have a common position in the historical dimension of social processes (Mannheim, 1970, p. 382). A generation can be defined as a society-wide group of peers who collectively share a common personality, born over a period roughly the same length as the transition from youth to adulthood (about 20 years) (Howe & Strauss, 2000, p. 40). According to Mannheim, who introduced

the concept of generation into the literature, generations are sociological groups other than concrete groups such as families, tribes, etc. where individuals have concrete information about each other. Generation members are undoubtedly connected in various ways, this bond cannot be considered the same as a bond seen in a concrete group in which people exchange information with face-to-face interactions (Mannheim, 1970, p.381). Therefore, individuals within a generation can express a sociological group together, even if they are not in direct interaction with each other.

4. GENERATIONAL COHORT THEORY

The concept of cohort is defined as the total of individuals who experience the same events in the same period (Ryder, 1965, p.845). The differences observed between generations of individuals who were simultaneously exposed to the conditions of certain periods in history and showed similar characteristics allowed them to be examined in the form of cohorts. Interest in the theory of generations was flourished in the 1920s with the studies of Ortega y Gasset (1923) and Mannheim (1927) (Bolin & Skogerbø, 2013, p.7). However, the work of Strauss and Howe took the generational cohort theory further in 1991. Strauss and Howe (1991) presented a three-part test to determine the boundaries separating generations; common age location which represents experiencing the same historical events and social trends in the same phase of life, common beliefs and behaviors which are formed by the common experiences and the perceived generation membership which represents awareness of sharing experiences and inclinations with other members of generations. Accordingly, to evaluate the personality of a generational cohort group, we first look at the group's position against the historical events and trends in the background of the era that includes its life cycle. Secondly, objective measures of common beliefs and behaviors are used to determine which groups share common personality traits. Thirdly, we look at how society perceives and is aware of membership in a common generation and whether

it sees itself as a member of a generation different from others (Strauss & Howe, 1991, p.64).

Each generation differed from those before it (Levenson, 2010, p. 257). The generational cohort theory posits that groups of people born, grow up, develop, age and experience the same events within the same period will exhibit similar values, attitudes, and beliefs, furthermore, the values, attitudes, and beliefs of one generation can differ from those of other generations because they experience different events and age during different periods in history (Parry & Urwin, 2011, p.80; Carpenter et al., 2012, p.413). Shared experiences at key developmental points contribute to unique characteristics, such as values, attitudes, and personality, that define one generation and distinguish it from another (Kowske et al., 2010, p.266). Concepts that form and represent generations should not be evaluated only as birth date or age partnerships. Generations, a sociological phenomenon, are based on the biological rhythm of death and birth, but being based on a factor does not mean simply being deducible from it or implied in it (Mannheim, 1970, p.168). In fact, the factors that are effective in forming generations are historical and sociological factors rather than biological ones. Generations refer to the empirical nature of a group of people born in an identifiable period but defined more by their shared experiences (Cutler, 2015, p. 34). According to Zemke and others (1999), a generation is defined not only by birth coincidence but also by shared tastes, attitudes, and experiences, therefore a generational cohort group is a product of its own time and tastes. What makes the cohort group essentially unique is that all its members are exposed to the same national events, moods and trends from birth, always at similar ages (Howe & Strauss, 2000, p. 48). While the term "*age*" which points to an undeniable personal characteristic can have a range of different meanings depending on the perspective applied (biological, psychological) the term "*generation*" corresponds to a holistic meaning that can be defined by various phenomena such as age, experiences,

memories, lifestyle, media usage, and more (Bolin & Skogerbø, 2013, p.4).

In their book "*The Fourth Turning*" Strauss and Howe (1997) explain, based on historical periods spanning the past five centuries, that society exists within a cycle consisting of four phases completed throughout a long human lifespan, roughly 80-100 years. It is suggested that each generation born within these periods represents different archetypes. According to their theory: Generations entered childhood in the "*High*" period, a post-crisis era where institutions strengthen with a new civic order while individualism weakens such as the era of post-WWII, are archetyped as "*Prophets*". Those were children during the "*Awakening*" period, characterized by a spiritual revolution and a new values regime affecting the civic order such as the era of global-scale university revolts in 60' are archetyped as "*Nomads*". Generations were children in the "*Unraveling*" period, where individualism strengthens and institutions weakens such as the era of globalization after 80', leading the old civic order to begin transitioning to a new one, are archetyped as "*Heroes*". Lastly, were children during the "*Crisis*" period, a defining secular revolution where the old civic order is replaced by a new one such as the era of the great depression and WWII, are archetyped as "*Artists*" (Strauss & Howe, 1997, pp. 3-19). If current generations are to be defined according to these archetypes, it is said that the Baby Boomers would be the "*Prophets*" Generation X would be the "*Nomads*" Generation Y (Millennials) would be the "*Heroes*" and past Silent Generation with the future Generation Z would be the "*Artists*" (McCrindle, 2014, pp. 5-7).

4.1. Classification of Generations

Generations to emerge, it is necessary for individuals who exist at the same point in time, culture, and development to have shared experiences of certain historical events as a group, which means that individuals of similar chronological age must have lived in the same historical period, been influenced by similar

values and social norms, and shared a common event in history (Nakai, 2015, p.331). In their 1989 study, Schuman and Scott asked 1,410 people about the most important events and changes in the past 50 years. They found that most individuals who cited World War II or the Vietnam War as the most significant events were those who were in their adolescence or young adulthood during these events. Accordingly, the Baby Boomer generation, born after World War II, and earlier generations were affected by different events. Consequently, it is shown that people of similar ages are more significantly impacted by the same events, embedding these experiences more deeply in their memories and thus differentiating them from other age groups.

Historical breaks are effective in the formation of different generations, but this may not occur due to the same events in every culture. For example, in their study comparing the collective memories of two countries, Scott and Zac (1993) found that while World War II was a significant common event shaping the future years of youth in both the US and the UK, the Berlin Wall held a lesser place in the memories of Americans, and the Vietnam War was less prominent in the memories of the British. In another example, the fact that World War II did not significantly affect Brazil has resulted in World War II not being considered a defining event in Brazilian society as it is in most developed countries around the world (Schewe & Meredith, 2004, p.59). On the other hand, it seems that generation classifications in the literature are generally based on American society. These generations are typically defined in American-based birth rates and important events such as World War II and Economic Depression (Deal, 2010, p.195). On the other hand, it is possible to say that economic and political events such as crises, wars, and mass socio-cultural trends that affect the personalities of generations leave similar traces on the world in general, starting from the Western world with the influence of globalization. According to İçli (2001) global mass culture is dominated by modern tools of cultural production (such as visual

and graphic arts, advertising, television and television) and this type of global culture is Western-centered and its language is English (İçli, 2001, p.166). It can also be assumed that the impact of mass events such as World Wars and global economic crises, which have shaped generations, along with trends that can spread to wider geographical areas through mass communication technologies, can also be observed in generations in our country.

Although there may be some differences in born year thresholds used, academic publications on the generations indicate that there are 7 generations (see Table 1).

Table 1. Thresholds of Generations

Generations	Birth Dates	Age (in 2024)
Greatest Generation	1924 and before	100 and older
Silent Generation	1925 – 1942	82 – 99
Baby Boomers	1943 – 1960	64 – 81
Generation X	1961 – 1982	42 – 63
Generation Y	1983 – 1995	29 – 41
Generation Z	1996 – 2009	28 - 15
Generation Alpha	2010 and after	14 and younger

Source: Strauss & Howe (1991), Yüksekbilgili (2015), McCrindle & Fell (2021).

4.1.1. Greatest Generation

Named after Tom Brokaw's (1998) book "*The Greatest Generation*" the lives of individuals in this generation have been influenced by the Great Depression and World War II. Due to their participation in World War II and their enduring strong image, they are also referred to as the "*Greatest Generation*" or "*Good Warriors*" (Carlson, 2008, p.20). They are also called "*Good Warriors*" because they fought in World War II and their solid image has survived to this day (Carlson, 2008, p.20). Members of this generation, when they were children, witnessed more than 15 million people losing their jobs in the greatest economic crisis the world had ever seen, and when they entered young adulthood, they shelved their youth plans and marched to war (O'Donnell,

2005, p.197). The conservative, unselfish, and less materialistic individuals of the Great Generation, who witnessed radical social and technological changes such as new schools, miracle drugs, and rockets throughout the rest of their lives, were concerned with health, aging, financial and personal security problems (Williams & Page, 2011, p.38). As individuals who lived through the war years and the Great Depression, members of this generation, whose basic approaches to the business life are "*working hard*", "*working to live*" and "*work comes before pleasure*" tend to work hard (Berkup, 2014, p.219).

4.1.2. Silent Generation

The members of the Silent Generation, also known as Traditionalists, Depression Generation, and Lucky Few, were born during the war and economic depression period, they are the only generation with a smaller population than both the generations before (the Greatest Generation) and after itself (the Baby Boomers) (Strauss & Howe, 1991, p.284). Members of this generation, who witnessed America's emergence as a superpower, are very patriotic and care about social peace and family togetherness (Williams & Page, 2011, p.39). Strauss and Howe (1991) defined the life cycle of members of this generation as a line from a poor childhood to a wealthy old age and stated that this rise was smoother and faster than that of any other generation.

With the rapid development of the economy in the post-war period, young people of this generation had the chance to have a much better standard of living than previous generations. Between 1950 and 1960, with developments such as youth unemployment falling to historically low levels, employers entering into competition with young people, and wage levels rising, the Silent Generation experienced a time of global wealth after a generation that experienced a time of global war (Carlson, 2008, p.24). The economy of Silent Generation households between the ages of 20 and 40 showed the steepest increase in

per capita income and household wealth of the century (Strauss & Howe, 1991, p.284). Carlson (2008) coined the term "*Lucky Few*" for this generation, which enjoyed improved living standards in the post-war era. This rapid improvement in living conditions was also reflected in birth rates and as deaths decreased during peacetime the population began to increase rapidly. In the US, members of the generation are remembered with the characteristics of the generation that got married the earliest and had babies the earliest. 94% of women born between 1931 and 1935 became mothers and having an average birth rate of 3.3 makes them the only generation that university-educated women to surpass the lower-educated ones in fertility (Strauss & Howe, 1991, p.284). However, the role of the female population in the workforce, which gained importance in production and technical fields during World War II, decreased after the war when the Silent Generation was in the workforce. With the change in the economic role of women, female members of this generation took on a lower role than men in the workforce at a younger age, but their increased participation in the workforce as their children began to grow has also increased their employment rate in their 40s and 50s to almost two-thirds which is the ratio that previous generations could not reach (Carlson, 2008, p.24).

The Silent Generation's work environment was dominated by the mentality that requires showing high respect to authority. In the 1950s work environment, there was a definite distance between boss and employees, with a low degree of socialization, formal relationships and rigid hierarchy (Zemke et al., 1999, p. 50). Members of this generation are characterized as extremely devoted, loyal employees who prefer to stay away from risk and are strongly committed to collaboration (Tolbize, 2008, p.2). According to Carlson (2008), more than one-third of the men of the Silent Generation, whom he defines as the Lucky Few, developed rapidly and became professionals or managers thanks to the new corporate organizations where they found work right after graduation. Shaw (2013) attribute the loyalty of this

generation to the easy career path, security and more money that organizations provide them with and stated that it was natural for the Silent Generation.

4.1.3. Baby Boomer Generation

The term "*Baby Boom*" which denotes a significant increase in fertility and population, was given as the name of this generation. In the period after World War II, as discussed in the previous section, the Silent Generation was introduced to good economic conditions, married early and became a fertile generation. Almost immediately nine months after the end of World War II, more babies were born every minute, and due to advances in modern medicine, more babies were able to survive birth and beyond than in previous years (Zemke et al. 1999, p.64). Baby Boom occurred in most Western countries after World War II and constituted the most densely populated generation in American history (Glass, 2007, p.99). Due to their high population and the time period they live in, this generation has had a great impact on global society. Generation members witnessed and contributed to the political and social turmoil of their time, such as the Vietnam War, the Cold War, civil rights riots, the Kennedy and Martin Luther King assassinations, the Watergate Scandal, the sexual revolution, and the Woodstock Festivals (Tolbize, 2008, p.2; Carpenter et al., 2012, p.414). Events they experienced while growing up, such as Rock n' Roll, the space race, and the women's freedom movement, shaped the personality of this generation; enabled them to be optimistic, idealistic and directive (Glass, 2007, p.99).

The Baby Boomers have been a generation that advocates individualization. The value they placed on individuality, their self-centricity and their habit of being skeptical caused them to be called the *"Me Generation"* as well (Schewe et al., 2000, p.107). The first members of the Baby Boomer generation, who always preserved their optimism, self-discovery and self-reflection, thought that they were a special generation that could own the world, provided that they worked hard and remained true to

themselves (Shaw & Covey, 2013, p.68). However, the economic environment faced by members of this generation, especially those born in the second half, was not as comfortable as the expanding economy and very low unemployment environment experienced by Silent Generation parents. Unlike their parents, they did not have the chance to afford their lives immediately after leaving university, so they did not leave the family home until they had saved enough to provide the living standards they were accustomed to while growing up (Gravett & Throckmorton, 2007, p.53). According to Strauss and Howe (1991), although the economic situation for the first half of members of this generation was better than their fathers who were included in the Greatest Generation, the earnings of the second half of young individuals born later, in their 30s fell 10% behind what their Silent Generation fathers earned at the same age. However, despite these financial problems, they believed in the "*American Dream*", they saw their careers as better than their parents, their freedoms wider and their lives more meaningful even though they knew that they might not be the richest generation in America (Howe & Strauss, 1992, p.71).

In working life, the first members of the Baby Boomer Generation tend to work hard, are generally loyal to their employers, are willing to work with others and accept the chain of command in terms of leadership style (Yu & Miller, 2005, p.36). Members of this generation, who operate under the slogan "*work hard and rise to the top*" believe that commitment to work and success is measured by the number of hours worked. They also believe that working for a single company not only brings success but is also an honest endeavor (Berkup, 2014, p.220). Benson and Brown's (2011) study, in which they found that the Baby Boomer Generation had higher job satisfaction and a lower tendency to quit than the next generation, Generation X, also supports this idea. Baby Boomers work selflessly in the workforce to achieve goals at the expense of their families and personal lives (Drago, 2006, p.7).

The second wave of this generation, born in the latter half, experienced an economic system shaken by factors such as the 1973 Oil Crisis and the 1973-74 Stock Market Crash. As a result, they believe that good work habits and a positive attitude are not always rewarded and are often insufficient to save a job (Zemke et al., 1999, p.74; Schewe et al., 2000, p.108). The second-half members view the first-half members as more idealistic, more workaholic, and more willing to prioritize career over family and it was found that those born in the 1940s (the first half) earned more money and owned more homes compared to those born between 1950 and 1960 (the second half) (Zemke et al., 1999, p.71).

4.1.4. Generation X

The generation born after the Baby Boomers, mostly children of the Silent Generation, is referred to as Generation X in the literature, first mentioned by Douglas Coupland in his book "*Generation X*" (Coupland, 1991). Interest in this generation has been relatively low, following the highly dynamic period of the Baby Boomers. In America, Generation X, with its 46 million members, finds itself squeezed between the 80 million-strong Baby Boomers and the 78 million-strong Generation Y (Stephey, 2008). Due to the doubling of divorce rates in America in the late 1960s and early 1970s, members of Generation X grew up with new family dynamics, including stepparents, stepsiblings, and half-siblings (Marston, 2010, p.56).

Members of Generation X, who grew up in a more complex family structure than any previous generation, had unique familial experiences. By 1980, only 56% of them had parents who were married only once, while one-fifth had a half-sibling (Strauss & Howe, 1991, p. 325). Due to the workaholism and divorces of their parents, Generation X experienced a neglected childhood, leading them to become more independent and self-confident. They developed a habit of forming small, close-knit friend groups, akin to those depicted in the TV show "*Friends*".

They placed a high value on balancing work and social life and remained perpetually skeptical of their parents, the media, political figures, and corporations (Zemke et al., 1999, pp. 98-101). Unlike the Baby Boomers, who were at the heart of many social and cultural movements such as Rock 'n' Roll, political protests, and freedom movements, Generation X did not enjoy the same economic luxuries. Consequently, their survival issues led them to focus more on themselves rather than engaging in broader movements, developing a nearly myopic concern for surviving both economically and psychologically (Zemke et al., 1999, p. 94).

Members of Generation X, unlike their parents, who believed hard work was key to their professional lives, Generation X values personal satisfaction and seeks ways to develop their skills, showing loyalty to their professions rather than their employers (Yu & Miller, 2005, p.36). They were the first generation reluctant to become workaholics or sacrifice their social lives, reversing the employer loyalty and workplace commitment of earlier generations. Witnessing the crises faced by their hardworking parents, Generation X distanced themselves from overwork, prioritizing control over their own time (Marston, 2010, p.60). They also hold different views from their parents regarding long-term employment expectations. They do not expect lifelong employment (O'Bannon, 2001, p.100). Having learned that the future is uncertain, and job security is nonexistent, they adopt a work agreement mindset, committing to deliver quality work only when their demands are met (Kupperschmidt, 2000, p.70). Rejecting the idea of sacrificing social lives and family for work, they focus on life outside of work, valuing free time, family, lifestyle, and other interests as much as their jobs, making job satisfaction more important than promotions (Yu & Miller, 2005, p.37). Research in Türkiye revealed that Generation X members value good relationships at work alongside material rewards in terms of motivation, and seek strong communication skills, courage, reliability and honesty in their leaders (Yalçın & İlic,

2017). Similarly, Yıldız (2021) indicates that understanding, harmony, friendliness, tolerance, and respect, along with economic factors, are primary motivators for Generation X employees.

However, Generation X contributes significantly to the workplace with their diverse skills. They are technically proficient and excel in diversity, change, multitasking, and competition (Kupperschmidt, 2000, pp.69-70). Their characteristic of being the most diverse generation compared to past ones allows them to adapt easily to ethnic differences in the workplace (O'Bannon, 2001, p.101). The second half of Generation X benefited from a tightening labor market, especially as previous generations' roles in the workforce declined and their own generation's smaller numbers came into play. With the labor market tightening significantly by 1997 and the explosion of information technology becoming integral to every company, those with computer technology skills secured impressive starting salaries (Zemke et al., 1999, p.105). According to the Corporate Leadership Council (2001) study, the characteristic features of Generation X value independence and autonomy, are prone to open communication, look at work from an action-oriented perspective, seek the "why" in problems, prioritize skill and experience development, do not seek long-term employment, believe in work-life balance, strive for a shared struggle and vision, and are reluctant to take on leadership roles (cited in Jorgensen, 2003, p.42). To motivate Generation X employees, strategies can include allowing them to control multiple tasks and projects in their own way and order, frequently providing constructive feedback, and giving them some freedom to reflect on their non-work interests in the workplace (Zemke et al., 1999, p.122).

4.1.5. Generation Y

The Millennial Generation, also known as Nexters, the Internet Generation, and the Echo Boom due to being the children of Baby Boomers, is the first graduating class of the new millennium (Zemke et al., 1999, p.128). According to Bencsik

and others (2016), Generation Y takes its name from the first letter of the word *"youth"*. They were born with high birth rates, similar to the period in which their parents, the Baby Boomers were born. In contrast to Generation X, Millennials were raised with considerable attention from their parents, encouraged to be environmentally conscious, and aimed to make a mark on the global community (Debevec et al., 2013, p.21). As the first wave of the digital generation born into the world of technology, they possess high qualifications in digital knowledge, making it easy for them to quickly adopt the use of new tools and devices in information technology (Bencsik et al., 2016, p.92). Generation Y has greatly benefited from modern technologies, such as having access to computers at an early age and learning how to surf the internet for research by the time they reach elementary school (Glass, 2007, p.99). Developments in communication technologies have also influenced their lives significantly. They have not allowed the widespread use of technological tools in communication to reduce their interactions with people; on the contrary, they have valued maintaining healthy relationships both at work and outside of it (Rainer T.S & Rainer J., 2011, p.19).

Generation Y has some characteristics that largely overlap with the current requirements of working life. Howe and Strauss (2000) show Generation Y as cooperative team players who accept authority, follow the rules, and are optimistic about the future. The economic conditions of the period in which they grew up affected the qualities of Generation Y, as in other generations. Since Generation Y members spent their childhood in a steadily expanding economy, they have a more optimistic perspective on life, work and the future compared to Generation X members at their age (Tulgan & Martin, 2001, p.4). Because they grew up in an era of relative economic prosperity, they were much more motivated about the future than the previous generation and believed in tolerance and protecting basic values (Drago, 2006, p.12). Members of Generation Y, a generation that is socially tolerant of diversity and difference, on the other hand,

were exposed to a period in which patriotism increased after the 9/11 terrorist attacks and during the Iraq War (Raines, 2002, p.3). Some researchers have even asked questions about whether this event was effective enough to create a new "*9/11 Generation*" that is nationalist, religious and prioritizes security, but this conclusion was not reached in research (Debevec et al., 2013, p.23). Generation Y is according to Gravett and Throckmorton (2007); extremely environmentally conscious, concerned about the future of nature both locally and globally, highly expressive, open-minded, and accepting of differences in race, gender, ethnicity, and sexual orientation, and as socially conscious individuals, they prioritize dedicating themselves to meaningful causes and volunteering for a purpose.

As mentioned before, some of the tendencies of Generation Y, who were raised with the care of their families, were formed under the influence of their families. With the guidance of their parents, who attach importance to education and workplaces that demand educated human resources, Generation Y has understood that the source of success is education. 70% of young people believed in the necessity of education for their career goals, 90% of high school seniors strived to attend university and 40% of first-year university students set a master's degree goal; thus, they have shown themselves to be the most education-oriented generation compared to previous generations (Tulgan & Martin, 2001, p.7). Generation Y attended college approximately two times more than the last members of the Baby Boom and the first members of Generation X (Levenson, 2010, p. 259). In the USA, 25-29-year-olds had the highest university participation rate ever seen in this age range in history and they have also postponed their marriage age. While the marriage rate of young people between the ages of 18-25 was 44% in the 70s, this rate was 15% in the same age range in Generation Y (Rainer TS & Rainer J., 2011, p.3).

Generation Y exhibits more traditional behavior instead of rebelliousness (Kowske et al., 2010, p.266). As a result of

these aspects, they are shown as a generation that tends to get along well with previous generations, and this bond of respect is important in the workplace (Rainer TS & Rainer J., 2011, p.128). Kowske et al. (2010) conducted a study on 115,044 employees using data from before the economic recession, demonstrating that Generation Y exhibits higher job satisfaction compared to other generations. They have been shown as a determined, collaborative, optimistic generation with their belief in collective action in the workforce, optimism about the future, trust in central authority, desire to get things done, proneness to technology, and multitasking abilities (Zemke et al., 1999, p.144). Generation Y members tend to enjoy collective action in the workplace, while they prefer working in academic project teams during their student years and one of the key characteristics of this generation is their need for achievement (Debard, 2004, p.37). Being inclined towards collaborative work, they do not hesitate to take on challenging tasks to satisfy their drive for success. They actively seek creative challenges and view their peers as valuable sources of information (Spiro, 2006, p.17).

According to the Corporate Leadership Council (2001) study, the characteristics of Generation Y capture information and media, possess a strong work ethic, entrepreneurial spirit, and sense of responsibility, are compatible with change, work to build a more open and tolerant society, blend collaboration, networking, and interdependence to achieve goals, are self-confident and optimistic about the future, value talent development and mentoring, and are well-educated (as cited in Jorgensen, 2003, p.43). Tulgan and Martin (2001), in their assessment based on the stable economy of the previous 30 years before their research publication in 2001, stated that members of Generation Y, who grew up during this period, had an optimistic outlook on life, work, and the future. However, this optimistic outlook proved insufficient to ensure that things always went well. Like some previous generations affected by major global crises, Generation Y found itself in the midst of a global economic crisis in 2008. For the younger members

of Generation Y, who were around 17-23 years old at the time, the 2008 Global Economic Crisis could be seen as a catastrophic event that shaped their values in the following years (Debevec et al., 2013, p.20). According to a study by the Pew Research Center (2014), the effects of the crisis were significant, and Generation Y became the first generation in the modern era to have higher levels of student loan debt, poverty, unemployment, lower levels of wealth, and personal income compared to the same stage of life for the two preceding generations.

Generation Y in working life constantly seeks feedback from their superiors and expects to provide information from older generations in the workplace (Brown et al., 2009, p.1). To manage and motivate Generation Y in the workplace, approaches such as sharing expectations and long-term goals, learning about employees' personal goals and using them for strategies to improve job performance, expanding teams and appointing strong leaders in places with a large number of Generation Y members, developing the training department in a way that suits this generation's desire to enhance their skills, and implementing mentorship programs should be demonstrated (Zemke et al., 1999, pp.146-147). Keleş (2011) indicates that Generation Y members demand flexibility, and while supervision reduces their motivation, feedback and guidance from superiors have a positive effect on their motivation, and receiving help for career planning has a motivational effect. It was interpreted that this research in Türkiye is compatible with the literature on generational differences. Coaching is one of the most successful methods for retaining Generation Y employees because it provides employees with the opportunity to develop in an environment designed to ensure their success (Spiro, 2006, p. 18). In their study in terms of leadership, VanMeter and others (2013) found that Generation Y employees exhibit characteristics suitable for servant leadership; they found that organizations can expect additional practical benefits from Generation Y employees, including better teamwork ability and higher levels of ethical compliance.

4.1.6. Generation Z

The generation that comes after Generation Y and is the last generation who has taken place in the working life is defined as Generation Z and can also be referred to as Generation i, Gen Tech, Digital Natives, Gen Wii (Singh & Dangmei, 2016, p.2). Generation Z roughly represents individuals born between the mid-90s and the early 2010s. Dimock (2019) explains the key political, economic, and social factors that distinguish Generation Z from Generation Y as follows; members of Generation Y were at an age to remember and comprehend the historical role of the 9/11 attacks and had reached an age to enter the workforce during the global crisis period and Generation Z was born into the era of wireless internet and social media. While Generation Y experienced the transition period of the technological revolution, Generation Z is fully immersed in the age of technology (Tulgan, 2013, p.6). Wireless internet technology and social media have become key technologies that enable them to stay connected to the digital world independently of location, freely and constantly.

Since members of Generation Z were born in the world of technology and feel comfortable in this world, it is primarily important for them to stay in this environment where they are not afraid of constant changes and can have a lot of information to a certain extent thanks to the internet world (Bencsik et al., 2016, p.93). This generation is often described as individualistic, self-directed, demanding, and materialistic and it is perceived as lacking the enthusiasm of previous generations, being more impatient, and having attention deficit disorder due to its high dependence on technology (Singh & Dangmei, 2016, p.3). The impatience associated with Generation Z is also evident in their short attention span. They exhibit an attention span of 8 seconds, 12 seconds less than Generation Y (Shatto & Erwin, 2016, p.253). Generation Z is the most technology-saturated, globally connected, and formally educated generation our world has ever seen (McCrindle, 2014, p.14). The internet and social media bring the world outside closer for this generation. They have

more knowledge about other parts of the world than Generation Y do, but because their connection to the world is online, they are likely to be less geographically adventurous, allowing them to focus on the local (Tulgan, 2013, p.7). This situation may also increase the demands of Generation Z, often characterized as a demanding generation, for the opportunities they witness in other parts of the world through the internet to be provided in their local surroundings.

For today's students, education is not just a phenomenon dependent on a life stage at the beginning of life or before starting a career, but a lifelong reality (McCrindle, 2014, p.16). According to the Pew Research Center (2018) research, members of Generation Z have a higher rate than previous generations of having college-educated parents; at the same age, they give more importance to receiving a college education than previous generations, and they avoid working life in a younger age and participate in the workforce more slowly. Generation Z is expected to create the largest generational change in history in the workforce, along with the retirements of the highly populated Baby Boomer Generation members (Tulgan, 2013, p.2). According to a study conducted in 2015 on 49,000 Generation Z members from 47 countries, curiosity, potential gain and the ability to help people are seen as the strongest sources of motivation in this generation. It is understood that the members of the generation are afraid of joining the workforce without receiving higher education, and while it is revealed that their most important career goals are to ensure work-life balance and job security, it is seen that only 56% of the participants think that they can live their lives at better standards than their parents (Dill, 2015, pp.3-5). The increase in world population and resource-sharing problems cause the new generation to start life in a more competitive environment. A study by the human resources consultancy company Robert Half reveals that 80% of Generation Z expects to have to work harder than previous generations to have a successful career path (Iorgulescu, 2016, p.49).

When individuals engage in intense working relationships in the workplace, Generation Z is not resistant to authority. However, effectively managing Generation Z requires significant improvement in transferable skills such as work habits, interpersonal communication, and critical thinking (Tulgan, 2013, p.6). When managed well, it is thought that members of Generation Z can use this ability even more and more productively than Generation Y (Iorgulescu, 2016, p.48). Tulgan (2013) suggests that to effectively manage Generation Z in the workplace, it is important to work in small groups with strong leaders and well-defined roles, build a strict and well-observed chain of command, possess instructive leadership skills, and adopt a management approach similar to customer service.

4.1.7. Generation Alpha

The newest generation is labeled and started to be known as Generation Alpha whose members were born between 2009 and the middle of 2020' (McCrindle & Fell, 2021). The most influential event that this generation experienced was the COVID-19 pandemic. The effect of globalization shows itself in a harmful way this time and created a rapidly spreading virus worldwide with its effect on the global economy and social life. While the rest of them realized the importance of information technologies to stay in touch with the world, Generation Alpha met with the world via virtual networks and even they were provided with school education through this technology. Generation Alpha has been described using terms like "*generation glass*", "*screenagers,*" "*digital natives,*" and the "*wired generation*" due to their strong association with technology and ongoing technological advancements (Tootell et al., 2014 as cited in Ziatdinov & Cilliers, 2022). Similar to Generation Z, Generation Alpha is heavily influenced by social media platforms, shaping their perspectives and behaviors. From birth, both generations have been immersed in a world where the internet and smart devices are ever-present, using popular apps for entertainment, communication, learning and even work (Drugas, 2022).

However, attributions of characteristics such as seeming less concerned with privacy and rules, showing little regard for boundaries, and living in the moment are criticized as being a childhood state rather than generational characteristics (Nagy & Kölcsey, 2017). It looks like we have some years ahead to get to know this generation more clearly, of course, especially in the context of workplace and economics. However, there are expected characteristics from this generation. Generation Alpha's strengths and core competencies are likely to include a combination of digital skills, creativity, curiosity, and adaptability which are traits to be expected to define their approach to problem-solving, learning, and innovation in an increasingly digital and fast-paced world (Ziatdinov & Cilliers, 2022).

5. GENERATION CLASSIFICATION IN TÜRKIYE AND THE CONCEPT OF GLOBAL GENERATION

This section will discuss how generational definitions are addressed in the literature specific to Türkiye, the global or transnational theories suggesting that generations in different nations are shaped by similar global events, and the research conducted on whether generations in Türkiye differ from the definitions in the foreign literature in the field of organizational behavior.

5.1. Generation Classification in Turkish Society

In the management and organizational behavior literature, domestic and foreign sources on defining generations in the workplace are close to each other in terms of generation definitions. When we look at the history and sociology literature, on the axis of the concept of generation which is also used to describe political identities in Türkiye, it is seen that the communities that can be defined as generations are represented by people who have experienced common events under the influence of regimes, changes in power, political crises. It is seen that these generations, in which political breaks played a major role in their separation, are defined and examined under 5 headings in the literature.

5.1.1. Pre-Republican Generation

Known as the founding generation of the Republic of Türkiye, this generation, which also represents the "*Young Turks*" movement with a new generational definition formed during the Ottoman period, is characterized by being raised with new thoughts and ideas in the 19th century with the Westernization movement and the spread of Western education in the Ottoman Empire. Starting in the late 18th century with Sultan Selim III sending students abroad and continuing in the 19th century with the establishment of modern educational institutions such as *Tıbbiye*, *Harbiye*, and *Mülkiye*, the fate of the Ottoman Empire in World War I depended on the patriotic feelings and extraordinary efforts of this new military-bureaucratic class educated in contemporary schools both abroad and domestically (Örmeci, 2010, p.97).

It is observed that during the period of this generation that carried out the Young Turk movement, individual freedoms were pushed aside as the focus was on saving the state, a systematic philosophy could not be created, and practical solutions and prescriptions were sought to stop the collapse of the empire in this period (Lüküslü, 2009, p.23). In addition, the ideals of freedom, equality, brotherhood and nationalism ideology that spread after the French Revolution in 1789 are seen in the generation of this period (Örmeci, 2010, p.97). These movements, which spread from France to Europe and then to the Ottoman Empire, show that even under the communication technology conditions of the 18th and 19th centuries, different societies could acquire similar identities by being influenced by the same events.

5.1.2. First Generation of the Republic

It is possible to say that in this period, when individuals born at the beginning of the 20th century were included in the Republican Youth, the young people who received education were raised in line with the policies of the founding party. In the society of the period, individuals who have received a certain education are

devoted to the country wholeheartedly and think that they can play an important role in the development as willing to sacrifice themselves for the country (Lüküslü, 2009, p.42). Sharing the same timeline with the Greatest Generation, it is possible to see the characteristics of the First Generation of the Republic in the definitions of the Great Generation in international literature, with their experiences and the sense of sacrifice.

The role undertaken by the educated youth of this period under the leadership of Mustafa Kemal Atatürk gave them a sacrificial identity characterized by a commitment to existence, education, and work with the aim of advancing their society from a communal perspective. This patriotic mindset reflects the influence of nationalism, as part of the modernity spreading from Europe to the world (Eriksen, 2010, p.122), on the Republic of Türkiye. As the first generation of a newly established nation-state, this generation formed the key building blocks of the nation-building process.

A significant portion of this generation, who witnessed the proclamation of the Republic, experienced the effects of the Great Depression and World War II alongside other societies around the world. The first reflections of the Great Depression in Türkiye manifested itself in the form of an atmosphere of panic, such as the rapid decrease in the value of the Turkish currency against the British currency and unemployment increased with companies going bankrupt (Ezer, 2005, p.159). Similarly, during World War II, the state's allocation of human and economic resources for precautionary war efforts, even without entering the war, created an economic crisis that impacted this generation. During World War, all nations, whether they entered the war or not, had to put their national resources at the disposal of the war and mobilize their human, machine and raw material resources for the war (Arslan, 2016, p.2). Türkiye did not take place in World War II and maintained its position as a neutral country with a series of non-aggression pacts and agreements (Ortaylı, 2012, p.89). However, Türkiye experienced the difficulties of

the war and the war economy and the recruitment of nearly a million people of working age due to the declared mobilization negatively affected production and consumption, causing a significant part of the country's resources to be spent on defense (Şener, 2004, p.74). Following the war, the increasing influence of U.S. policies, the Marshall Plan, and efforts to adapt to the liberal system significantly affected Türkiye's political and economic order, exemplified by the first devaluation in the history of the Republic in 1946 (Tuna, 2007, pp.87-89).

5.1.3. 1968 Generation

This concept, which represents young people in Türkiye in the 1960s, also reflects the youth period of the generation known as the Baby Boomer Generation. The generation called the 68 Generation in Türkiye is a generation that had just stepped into adolescence when the 1960 Coup took place (Gözet, 2011, p.59).

From a global perspective, in the period when capitalism developed and started to cause painful social changes, the rebelliousness of the youth of the era, who gained an idealist and guiding identity with the freedom movements in the US society (Glass, 2007, p.99), was reflected in the student protests that took place in France in May 68 and for a long time. It has been seen to spread all over the world, including Africa and China, with its long-term effects. In this period, youth movements that started in universities and continued in the squares followed each other all over the world. The authority began to be questioned by young people, the rebellion movement also manifested itself as a youth movement in Türkiye. Although the youth movement in Türkiye is a part of the global youth movement, it is seen that young people in Türkiye were actively involved in the political and social arena during and before the 1960 coup (Lüküslü, 2009, p.50). Türkiye went through a period in which, in addition to the winds of change in the world, it experienced major political changes within itself for the first time, and the socioeconomic structure was reshaped as the population began to shift from

villages to cities after a new party came to power in 1950. It can be said that this generation, representing the youth of the 1960s, experienced similar events in a period when global change, youth movements and rebellion were intense.

The youth protests that began against the ruling power of the period continued in an anti-imperialist direction after the coup, influenced by the anti-war and freedom movements spreading around the world (Bulut, 2011, pp.136-137). The youth movement in the United States, which initially began as opposition to the government's Vietnam War policies and later evolved into a movement against racism towards African Americans, manifested itself in Europe as free thought and opposition to NATO in universities and similarly in Türkiye, it started with demands for university freedom and continued as an anti-imperialist movement (Gözet, 2011, p.70). From a societal perspective, it can be said that the global youth of the 1968 period drew inspiration from each other for their rebellion against authority and power.

5.1.4. 1978 Generation

The 68 Generation's characteristics, such as the pursuit of freedom in universities, an anti-imperialist stance, and the aspiration of young people to participate in political movements through various student organizations, have been passed down to and further emphasized by the 78 Generation. During this period, factors such as the struggle to survive in the city as a result of migration from villages to cities, slum life, class divisions and income distribution problems caused the masses to shift towards leftist politics. Society and the youth of that time wanted to take an active role in addressing the socioeconomic issues caused by industrialization, modernization, and urbanization. This led to a search for increased participation of large social groups in the political sphere.

The power of politicization has also increased the power of polarization between opposing views. The vitality that emerged in the public sphere due to the increasing politicization of society

through organizational activities such as unions, associations, etc., faded away with the violence provoked by different views in the late 70s and the 1980 coup. (Bağdatlı Vural, 2011, p.129). After the September 12 Coup, youth movements in the public sphere ceased, and the '78 Generation, which had a strong presence in social and political arenas, was harshly suppressed. Some literature refers to this generation as the "*lost generation*" due to the impact of the coup. Economically, this generation experienced the effects of the Oil Crisis on world economies and therefore on their societies, in the same way as the rest of the world. In this period, in addition to the effects of the Cyprus Peace Operation on the economy, the Oil Crisis introduced Türkiye to stagflation (Öztürk & Saygın, 2017, p.6).

5.1.5. Generation After 1983

The developments that form the basis of this generation are the social order that changed with the 1982 Constitution and the great changes in society caused by the new government's policy of economically opening up to the world in 1983. They, along with the rest of the world, were economically affected by the Gulf Crisis, one of the important events of this period. In this era when Türkiye is being integrated with capitalism and the global economic system, the increasing importance of materiality is likely to be effective in the higher values such as success, power and hedonism rather than the values of universalism and benevolence and the dissemination of religious education in this period is likely to be effective in the rise of the youth's values of harmony, security and tradition (Özgür, 2013, p.51). Contrary to the involvement of young people in the turbulent political environment in the past, with the new constitution of 1982, they were largely kept away from politicization.

In Türkiye, whose economy has opened up to the outside world, the society has rapidly affected consumerism, and in this period of increasing urbanization cities have turned into places where globalization and western-origin consumption culture

are felt intensely by people with the spread of international brands (Lüküslü, 2009, p.50). On the one hand, the apolitical generation of this period, where a social class difference was formed between the educated people of the cities and the uneducated people who migrated later; this generation discussed as a generation that rapidly resembled the US society with the influence of consumerism, the spoken language was eroded under the influence of English, experienced a kind of sexual revolution with the introduction of chat programs into their lives, and was subjected to criticism with epithets such as *"tiki"* and *" yuppie "*. It can be said that the effect of Westernization on society has increased with the technological developments that have taken place since the post-83 period, resulting in the formation of generations in which individuals are more connected to the global society than before.

5.2. Concept of Global Generation

The time intervals separating generations in studies may differ by a few years even in studies conducted for the same society. It is observed that the intervals utilized in international literature are also acknowledged in the generation studies within the national literature. Although the factors that distinguish generations formed by individuals experiencing similar events generally consist of socio-economic and technological developments that have had global effects, such as World War II, the Global Economic Crisis, globalization, and subsequent trends rapidly disseminated to the world through mass media, it is also possible for cultural differences to influence generational timelines. However, in a study on Chinese culture, which can be considered the farthest from the Western World, Egri and Ralston (2004) compared the four generations of Chinese culture with the Silent Generation, the Baby Boomers and Generation X, in terms of personal values. In the historical comparison between generations from closely related periods, it is observed that Chinese generations share similarities with Generation

X in two out of four personal values, while all four values are similar between Chinese generations and the Silent Generation. On the other hand, the least similarity is observed between the Baby Boomers and the Chinese generations from the same years (Egri & Ralston, 2004, p.217). In this study, it can be seen that individuals with similar characteristics can grow on a generational basis, even in cultures far from each other.

The concept of "*Global Generations*" was introduced by Edmunds and Turner (2005), who focused on the global effects of traumatic events that generation members have experienced jointly since the 1960s. Accordingly, global traumatic events have the potential to unite individuals living in the same period as part of a global generation. Edmunds and Turner (2005) argued that although generations and generational change have traditionally been understood in national terms, there are reasons to assume that traumatic events experienced globally may enable the development of global generations. According to this view, as protest targets such as communism, terrorism, environmental issues, and multinational corporations globalize, reactions triggered by the collective action of technology and rapid communication also globalize (Edmunds & Turner, 2005, p.564). Similarly, Urry (2000) argues that sociologists should abandon the nation-oriented concept of society and focus on inter-community flows and networks (Ahlkvist & Urry, 2000). Especially due to globalization, where technological developments increase their impact, people in different parts of the world are shaped by the same events, trends and developments (McCrindle, 2014, p.2). While cultures influence each other, the economic success of societies, the development of information-communication technologies, the internet and social networks accelerate this process (Ergashev & Farxodjonova, 2020, p.477). With the reconsideration of globalization and the concept of society, the development of the phenomenon defined as post-national citizenship has occurred (Urry, 2000, p.166). The generation that lived through the 1960s can be described as the first global generation, as they shared

a common experience of traumatic political events, consumer culture, global music, and communication systems. Since the 1960s, technological advancements in global communication have created a new communication environment within the electronic realm, where a shared English language is used. This further facilitates the development of a common consciousness towards global issues on a global scale (Edmunds & Turner, 2005, pp.566-568). Özer and others (2013) aimed to evaluate within the framework of cultural differences the characteristics generally attributed to generations in Türkiye to test whether the generational characteristics accepted in the international literature are valid in Türkiye. In studies where the job values of employees in Türkiye were measured using a sample that had the capacity to represent 81 provinces, results were reached that some of the characteristics attributed to generations in the international literature are also valid in Türkiye. For instance, it has been noted that the hardworking efforts of the Baby Boomer Generation members in Türkiye surpass those of other generations, aligning with international literature. In the research, the members of Generation X in Türkiye being the generation showing the lowest level of loyalty corresponds to characteristics found in the international literature for Generation X, such as low loyalty and not seeking long-term employment (Kupperschmidt, 2000; O'Bannon, 2001; Jorgensen, 2003). Similar results have also been obtained regarding Generation Y in Türkiye parallel to the international literature. For example, the findings of the research align with the studies of Gravett and Throckmorton (2007), who define Generation Y as flashy, as the members of Generation Y in Türkiye exhibit more flashy behaviors than the two preceding generations. As researchers stated the prominent findings of the research about Generation Y are largely in line with the stereotypes about this generation and the research results in the international literature (Özer et al., 2013, p.139). In another local study among the studies on generations in Türkiye, Yüksekbilgili (2015) determined the age interval for Generation Y in Türkiye by measuring the assumed characteristics attributed

to Generation Y in the literature to see which age group in our society these characteristics apply to. According to the research, the interval for Generation Y in Türkiye was determined to be 1983-1995, and the reason for this was presented as the late arrival of technological changes in Türkiye.

6. CONCLUSION AND DISCUSSION

Especially in large-scale organizations, identifying and resolving employee issues at an individual level can be a challenging task. Therefore, evaluating employees based on common characteristics to identify their common problems and expectations can be useful for solving or preventing problems. The concept of age being a factor influencing employee attitudes opens the way for the study of generations in terms of the need for examination. While differences between generations can be aligned with changes related to aging, experience, life stage, and career stage; changes in the workplace and the introduction of each generation to the workforce at different times give rise to differences in work values between generations (Cennamo & Gardner, 2008). Those differences may create generational conflicts which are a threat to social sustainability. Urick et al. (2017) categorized this conflict as behavior-based, value-based based and identity-based conflicts. Behavioral conflicts stem from different communication habits of generations and the preference level of feedback. Incompatible communication styles erode collaborative actions and knowledge transmission. Different feedback preferences lead to motivation for Generation Y, but frustrating Boomers. Value-based conflict is affected by motivation source differences of generations, e.g. extrinsic for Boomers, intrinsic for Generation X & Y. Value-based conflicts cause a generation to see the other as status quo protector or troublemaker. Identity-based conflict, especially in organizations or societies with weaker cultural values, is caused by prejudice and outgroup derogation of members of different generations to other generations, regardless of whether there is a possibility of finding

common ground. Understanding differences and expectations is the key factor to solving conflicts that occur in the workplace and in society as well. Focusing on generational differences can be considered an effective approach for analyzing the employees, given that individuals belonging to these generations may have similar expectations. Managing cultural differences can be challenging for global organizations; however, understanding generations that have common characteristics globally because of the reasons discussed, may help to create strategies for human resource professionals.

Economic and social changes in society lead to new generations having different standards, needs, and circumstances that must be considered to maintain social sustainability. Every generation seems to demand more from their workplaces to be able to spend time on social life than prior generations. Remote and hybrid working styles that the global pandemic forced tried to be embraced by new generations even though CEOs of some of the leading companies like Amazon, Tesla etc. disagree with their young workers on this kind of flexibility (Morris & Stacey, 2024). Furthermore, while they are prone to embrace diversity, younger generations seek positive feedback to develop their competencies and assist in drawing career paths to reduce uncertainty in the dynamic business world. New generations bring diverse skills to the workplace and are driven by different motivations; in a way, they are conscious of learning, work, and social dynamics and seek guidance from their supervisors to understand the path they should follow, and they look to them as role models and mentors who can assist (Bilge et al., 2021). Therefore "*old school*" mental model that leads people to overspecialize in dead-end jobs is not suitable for the recent workforce. It is seen that the most progressive organizations in the field of social sustainability have developed a structure that transcends traditional hierarchies, allowing for more collaborative and strategic efforts (Mesquita & Missimer, 2021). Companies should provide conditions that workers have

a chance to use and develop their skills, and opportunities to reach information, resources, support that will contribute to their growth for goals in their career path that will be determined with mentors in in the organization. As different generations usually have manager-subordinates' relationships, creating an alignment between work values and understandings of different generations is gaining importance. Creating mentors from older generation members with experience and fostering the relationship between different generations with mentorship programs and workplace groups may help satisfy both generations' growth needs.

The economic circumstances of countries create a harder environment to survive for new generations, especially in developing countries. High inflation, debts, student loans to be paid, reduced raises due to high competition to get a job, housing and living costs are the problems that the younger generation faces in the developing countries. Their higher investments in education make them join the labor market to get paid later than their parents while they expect more as a return of their education investments. Therefore, generations are taking place in different parts of the equity sensitivity spectrum. Research found that Generation Y members show higher entitlement levels than prior generations Generation X and Baby Boomers, means they expect to be rewarded more than other comparison objects (Allen et al., 2015). While emerging generations starting to outnumber the previous generations in the labor force, highly educated, often overqualified new generations have struggled to enter and meet their demands in the labor market with significantly limited opportunities for career advancement and salary increases. Social sustainability focuses on promoting intergenerational justice, trying to ensure that future generations live in a world with adequate resources, opportunities, and social systems to meet their needs and demands. It sheds light on social issues and how they are managed, concerning labor conditions, well-being, quality of life, equality, diversity and connectedness both within the community and beyond (Rai et al, 2021). Choices made

today regarding economic strategies, environmental protection and social infrastructure will directly impact the well-being of future populations. Intergenerational justice will help to balance the needs of both current and future generations and ensure that no group is disadvantaged.

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BEHAVIORAL-BASED THEORIES FOR SUSTAINABLE CONSUMPTION: A REVIEW OF PROSPECT THEORY, NUDGE THEORY AND GREEN NUDGING

Kağan BEŞOĞUL[14]

ABSTRACT

With the expansion of the concept of sustainability to environmental, economic, and social dimensions, it has been understood that sustainability not only requires ecological balance but also social and economic development, and that global action plans need to be created for this purpose. This situation has led to sustainability becoming a key term in almost every platform today. In this study, a current literature review was conducted on the behavioral based theories that can be addressed alongside the sustainable consumption model necessary for environmental development, including prospect theory, nudging theory, and green nudging theory. The research concluded that in order for sustainable consumption to become widespread, a change in societal consumption values on a global scale is needed. The theoretical foundation is supportive, but more theoretical frameworks are required, and environmental development has the potential to trigger economic and social sustainability. For future studies, it is suggested to explore different theoretical approaches that can be associated with sustainability and examine which marketing strategies can support these theoretical approaches in concrete contexts.

Keywords: Sustainability, Sustainable Consumption, Prospect Theory, Nudge Theory, Green Nudging

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1. INTRODUCTION

Towards the end of the 20th century, the damage caused by humankind to the planet's natural resources reached alarming levels. In this regard, the Brundtland Report, prepared in 1987, played a significant role in increasing sustainability efforts (Kuhlman, 2010). Since the emergence of the sustainability concept, which began to be discussed more seriously after the Brundtland Report, perhaps the most pressing issue for the planet has been the irreversible destruction and consumption of the Earth's resources. Since the Industrial Revolution, capitalist mass production and uncontrolled consumption have directly impacted essential life resources such as air, water, and soil, particularly through carbon emissions (Kasa, 2009). Many sustainability studies conducted both before and after the Brundtland Report have expanded the concept to encompass social, economic, and environmental dimensions. Over time, this concept has evolved into a development model and has been addressed from various perspectives, including business ethics, human rights, corruption, climate change, and even the intersection of these issues with corporate governance structures, as businesses are fundamental pillars for the economy (Elkington, 2006). Furthermore, in light of views and studies suggesting that the environmental dimension forms the foundation of sustainability and is more important than other dimensions, sustainability efforts have increasingly focused on the environmental protection aspect (Kuhlman, 2010).

Ecological balance, a fundamental requirement for the continuation of life, is being disrupted by various factors such as the greenhouse effect, carbon emissions, environmentally harmful agricultural practices, the reckless consumption of fossil fuel resources, rapid pollution, and the depletion of clean water sources (Lal, 2004). In addition to this deteriorating environmental structure, global environmental disasters like

Chernobyl have often brought sustainability to the forefront, particularly in its environmental dimension (Ergen, 2016). While defining each component of sustainability individually contributes to a general definition of the concept, it is difficult to make a single definition of sustainability due to continuously changing global conditions and regulations (Goodland, 1995). Moreover, various definitions of sustainability from different sources help to understand the essence of the concept in a multidimensional way. Understanding sustainability as a concept is important, but equally important is examining local, regional, and global efforts in this area, creating a global integrated structure for sustainable lifestyles, understanding action plans such as the 3R or 7R rules for environmental sustainability, and studying theoretical approaches that will form the foundation for all of these efforts.

This study focuses on the development, current state, and future of the concept of sustainability, an area that is still not clearly defined in many aspects in literature. In this study, the theoretical foundations necessary for the future acceptance of sustainability have been examined. These theoretical foundations are addressed behaviorally, in relation to marketing and sustainability studies in literature. Behavioral-based theories present significant opportunities in creating promotional strategies and marketing activities centered around consumer needs (Rothschild, 1981). Additionally, theoretical modeling is used as a tool in marketing research and is closely related to behavioral marketing (Moorthy, 1993). At this point, there is also a high potential for application in the context of sustainable consumption. Therefore, the literature review in this study seeks to answer the main research question of the study: Do Prospect Theory, Nudge Theory, and Green Nudging have an impact on sustainable consumption?

In this study, the primary reason for selecting behavioral-based theories such as Prospect Theory, Nudge Theory, and Green

Nudging is their connection to marketing and sustainability fields in literature. When focusing on Prospect Theory, studies in this area have provided a scientific explanation for decision-making under uncertainty and risk-taking behaviors, particularly regarding investments, market dynamics, and consumer approaches. Research on Prospect Theory has highlighted the need for more studies in the marketing field, and relevant studies and suggestions have been updated periodically (Cochran, 2001; Gonzalez-Ramirez, 2018; Kluczek, 2021; List, 2004; Liu, 1998; Liu J. X., 2017; Ljungqvist, 2005; Pasquariello, 2014). In this context, Prospect Theory has been examined in the context of marketing and sustainability in this study with the aim of contributing to the field.

Studies suggest that Nudge Theory plays a crucial role in stimulating sustainable behaviors by triggering perceptions of climate change and environmental responsibility, and that marketing strategies can enhance long-term brand success by considering these factors. Research on Nudge Theory and its effects across different fields further encourages more academic attention to Nudge Theory (Anagnostopoulou, 2020; Boenke L. P., 2022; Bornemann, 2019; Lehner, 2016; Olya H. et al., 2024). Similarly, practices that create a green nudge effect, such as environmental prioritization and green logos, have been shown to increase preference for products in this area, indicating that nudge techniques can be effective in sustainable marketing (Lee, E. J. et al., 2020). Although Green Nudging has been less explored in literature compared to the other two theories discussed in this study, research in this area encourages further exploration of this approach (Bonini, 2018; Carlsson, 2021; Schubert, 2017).

Based on the studies mentioned in this section and throughout the text, while sustainability, marketing, and theories have been discussed in various contexts today, they have not been sufficiently addressed together from the perspective of

sustainable development for the planet. The theoretical section of this study was selected from behavioral-based theories to guide individual behaviors, which are crucial for sustainability. The three chosen theories have positive potential benefits in terms of guiding individuals toward consumption habits that will ensure a sustainable planet and contribute to the establishment of sustainability on a global scale. A comprehensive academic exploration of these theories will significantly contribute to both the marketing discipline and sustainability studies. The main limitation of the research is that the theoretical approaches focus only on a limited number of theories available in literature. Future studies should broaden the scope of theoretical approaches and reconsider the issue of sustainability in the context of the conditions of the time in which the research is conducted.

2. LITERATURE REVIEW

2.1. The Concept of Sustainability

Looking at the definitions of the concept according to the studies conducted in the name of sustainability, the United Nations Commission on Environment and Development defined sustainability as a development model that meets the needs of the present without jeopardizing the capacity of future generations to meet their own needs (Wilkinson, 2001).

Another widely accepted definition of sustainability, similar to the UN definition, is provided in the Brundtland Report (Kostecka, 2019). According to this definition, sustainability is the actions of individuals living today, taking into account the needs of future generations, meeting their needs within this framework and all practices that guarantee the needs of future generations. This definition provides a very broad framework. In this context, there is a content that can be summarized under many headings such as understanding the environmental impact of all activities in

developed and developing economies, securing basic human needs such as air, water, food for the present and future, and protecting non-renewable environmental resources (Hajian, 2021). This content basically refers to preserving the existing natural structure or repairing the degraded ecosystem rather than building something new (Sakınç, 2006). Because one of the cornerstones of sustainability is to maintain balance. In this respect, another definition of sustainability accepts the preservation of ecological balance as the ultimate goal (Wilkinson, 2001). Engaging in the act of consumption and exchanging this consciousness with the consciousness of overconsumption is the basis of the ideological structure of sustainability (Wilkinson, 2001). This ideology is essentially a fundamental consciousness for the protection of the right to life. Sustainable lifestyle is a consciousness that guarantees the right to life of all living things that are currently living and will continue to live in the future (Soylu, 2018). In this respect, sustainable lifestyle requires regular and certain rules to be applied both locally and globally (Kayıkçı, 2019).

In terms of adopting sustainability as a lifestyle, the consumption actions of individuals stand out. In this respect, the United Nations Rio Conference on Environment and Development (UNCED) in 1992 focused on changing consumption habits completely. In addition, attention was drawn to the unsustainable production and consumption structure of the industrialization-based consumer society that has developed since the 20th century and the reformist definition of sustainable welfare that is compatible with the ecological capacity of the earth (McLaren, 2007).

An additional expansion to the definitions in the literature and global initiatives on sustainability was made by the Norwegian Ministry of Environment and reflected in the Organization for Economic Cooperation and Development (OECD) report. The report emphasized the need to regulate the

consumption dimension in the transition to a sustainable order, and for this purpose, it was mentioned that the use of products to meet basic individual needs should be encouraged, and the destruction of natural resources, the use of pollutants and the release of toxic emissions in production should be prevented. The importance of protecting the right to life of the earth and future generations by ensuring sustainable consumption was emphasized and it was stated that this was the essence of the concept (OECD, 2002).

2.2. The Concept of Sustainable Development

The fact that local and global institutions have begun to understand that the concept of sustainability is an inevitable phenomenon in order to leave a livable world for future generations has enabled them to go beyond defining the concept. In this respect, the European Commission's Circular Economy Package in 2015 and the United Nations Sustainable Development Goals of the same date have been important roadmaps for sustainability (Sachs, 2019). In particular, the United Nations' global sustainable development goals constitute the infrastructure for the actions necessary to achieve sustainability rather than defining sustainability.

The UN's action to establish sustainable development goals consists of 17 goals and 169 targets. In the package, the goals are grouped under 17 headings and 169 sub-targets are set for the place that these 17 goals aim to reach (Hák, 2016). The 169 targets are actually the concretization of the actions to be taken in order to realize the 17 main goals (Biermann, 2017). The 17 SDGs proposed by the United Nations for an efficient and sustainable global order are presented below (Table 1) (Costanza, 2016).

Table 1. Sustainable Development Goals

SDG 1	:	End all forms of poverty globally.
SDG 2	:	End hunger, achieve food security, improve nutrition and promote sustainable agriculture globally.
SDG 3	:	Ensure a healthy standard of living and promote well-being for all at all ages.
SDG 4	:	Ensure inclusive, equitable, quality education and lifelong learning opportunities for all.
SDG 5	:	Achieve gender equality and empower all women and girls.
SDG 6	:	Ensure sustainable management of the availability of water and natural resources and ensure sanitation for all.
SDG 7	:	Ensure access to affordable, reliable, sustainable and modern energy for all.
SDG 8	:	Promote sustainable, inclusive economic growth and ensure full productive employment and decent work for all.
SDG 9	:	Build resilient, inclusive and sustainable infrastructure and promote industrialization and innovation.
SDG 10	:	Reduce local and global inequality across countries in the world.
SDG 11	:	Make all human settlements, especially cities, safe, resilient and durable.
SDG 12	:	Ensure sustainable consumption and production patterns.
SDG 13	:	Take urgent action to combat global climate change and its impacts.
SDG 14	:	Protect and sustainably use the oceans, seas and marine resources for sustainable development.
SDG 15	:	Protect and restore terrestrial ecosystems, promote their sustainable use, sustainably manage forests, combat desertification and reverse land degradation and halt biodiversity loss.
SDG 16	:	Promote peaceful, inclusive societies for sustainable development, ensure access to justice for all, and build effective, accountable and inclusive institutions at all levels.
SDG 17	:	Strengthen the means of implementing the SDGs and revitalize the global economy by building partnerships for sustainable development.

Source: (UN, 2015)

The 12th of the UN's 17 SDGs relates to the goal of achieving sustainable consumption. The objectives presented by the UN to ensure sustainable consumption are, in summary, to reduce all types of waste, to prevent food loss in all production, logistics and consumption processes, to reduce global waste in terms of food, post-harvest losses, losses in supply chains, to

prevent negative impacts on human health and the environment by ensuring environmentally sound management of chemicals and all other wastes, and to reduce waste generation through prevention, reduction and recycling (UN, 2015).

2.3. Sustainable Consumption Action for Sustainable Development

The relationship between consumption and sustainability has been addressed from different perspectives in literature, and those who have examined the issue quantitatively have tried to determine the maximum sustainable consumption point that an individual can reach in consumption (Schaefer, 2005). In the literature, analyses such as life cycle assessments have revealed data to guide policy makers on sustainable consumption (Hertwich, 2005). For example, ecological footprint calculation methods have been used to calculate the amount of land required for an individual to maintain his/her current consumption during his/her lifetime, and it has been revealed that on average a US citizen needs 9.7 hectares of land, a British citizen 5.35 hectares and a Mozambican 0.47 hectares. Thus, it has been faced with the fact that if the world population were to be equal in the current consumption pattern, it would need several Earth planets (Schaefer, 2005). In this respect, the suggestions for avoiding consumption, reducing consumption numerically, consuming products that respect ecological order and consuming the products with the least negative impact on the environment are presented to ensure sustainable consumption (Hansen, 1997). In addition, it is emphasized in literature that in the realization of the cognitive transformation process required for sustainable consumption, not only will the struggle against the capitalist economic structure not be sufficient, but also the established cultural patterns that deeply affect consumption must change (Dolan, 2002). In order to achieve this cognitive reform, it is important to adopt the values of universalism and total protection of the planet, which respect the right to life of all present and future living beings, in

all cultural structures from childhood. For this reason, it is stated as a necessity for sustainability that businesses, policy makers and non-governmental organizations working in the field attach importance to these common values and create action plans to adopt them (Karalar, 2010).

The foundation of sustainable consumption awareness is based on the 3R principle. The actions that form the 3R principle are listed as reducing, reusing, and recycling (Bushnell, 2011). It is stated that in order to provide positive environmental value, these three prerequisites must be met (Mishra, 2014). To live a life based on sustainability, the actions of reducing, reusing, and recycling are considered the most effective strategy in the current system for conserving natural resources, protecting the environment, and achieving global economic savings (Kabirifar, 2020). Although sustainability awareness is beginning to spread, it has not yet reached the desired level. This is because the consumption habits of individuals in consumer societies produce products that generate high levels of waste, making waste management more difficult. Evolving societal consumption habits by promoting the 3R rule is seen as an important step for a sustainable planet (Yu, 2021).

The first action within the 3R rule is the reducing action. Reducing refers to minimizing waste production and energy consumption to the lowest possible level. Reusing aims to extend the lifespan of a product, using it as many times as possible. Recycling, on the other hand, involves a product going through the reuse process, reaching the end of its lifespan, becoming waste, and then being reprocessed as material to create a new product. The full implementation of these three actions will establish the basic level of the sustainable consumption process (Ergen, 2016). To achieve advanced sustainable consumption, studies in literature have added four new principles to the 3R principle. The 7R principle includes the following: reducing, reusing, recycling, regulation, recovering, rethinking, and renovation. In addition to the actions of reducing, reusing, and recycling, the

regulation principle refers to the legal regulations to be created for sustainability, the recovering principle involves the advanced recovery of products that can still be used for certain purposes before the recycling phase, rethinking encourages reconsidering sustainable consumption for its protection and development, as well as ensuring the long lifespan of products, and the renovation action refers to repairing objects to perform their basic functions and, beyond that, reusing them for different, beneficial purposes (El Haggar, 2010). For the actions within these rules to become established for sustainable consumption, integration with marketing strategies is recommended (Benton, 2015). In this context, theories in literature are also important when designing action plans. The methods and approaches proposed by these theories contribute to sustainability strategies.

2.4. Selected Theories in Sustainable Consumption

The studies that establish a connection between theory and concepts allow the concept to be researched to be based on more solid foundations. In this context, it is important to establish a foundation in terms of theory in academic studies (Yağcı & Çabuk, 2015). There are several key theories that help to address the issue of sustainability, which has become a phenomenon today, within a scientific framework. The theories connected to sustainability within the scope of this study include Prospect theory, nudge theory, green nudge theory, as well as the theory of planned behavior and the cause-and-effect chain theory. As a result of the research, the theories linked to sustainability are presented under specific headings.

2.4.1. Prospect Theory Approach to Sustainable Consumption

The economic perspective, which assumes that individuals will always engage in actions that benefit themselves, argues that rational individuals will seek to gain macro-level benefits in all their choices. On the other hand, psychological literature that

works on the existing production and consumption habits familiar to individuals in the modern era has criticized the assumption of rational behavior (Kamber, 2018).

Behavioral economics, shaped by this criticism of the rational behavior assumption in psychological literature, argues that individual decisions are not only shaped by the desire to achieve personal macro benefits, but also that environmental factors play a significant role in the decision-making process. The prospect theory, developed by scholars who have built a bridge between the disciplines of economics and psychology, examines the tendency of individuals to consider future consequences in their decision-making process and how they evaluate the benefits they will derive (Kahneman & Tversky, 1979).

The degree of importance that individuals place on the issue at hand also stands out in their decision-making processes. For example, during a low-cost purchase, the decision-making process is quick and based on surface-level reasons, while deciding on a high-cost investment is a much longer process in which different factors come into play. This is similar to behavioral economics. Investment decisions in financial markets or retirement investments can similarly be evaluated through psychological factors (Mullainathan & Thaler, 2000).

In economics and psychology studies, probability distribution and decision-making models under risk have been developed to predict the potential outcomes of inputs that affect decision-making. In these model results, individuals' tendency to avoid losses has been predicted through activity measurements in relevant areas of the brain, and the conclusion has emerged that decision-making is not governed by a universal rationality but rather may vary according to the individual's personality (Tom, 2007). At this point, when an individual makes decisions in the context of sustainability, it is considered a behavior for future benefits, while the unpredictable aspects of human behavior, as mentioned in the studies, are seen as a significant

obstacle to acting in the direction of sustainability. The aspect of Prospect theory that predicts rational behavior alone is not sufficient to encourage sustainable behavior. Communicating that sustainability is rational does not guarantee that individuals will act accordingly. Prospect theory can be considered as a precursor to the Nudge Theory, which is also discussed in this study. This is because Nudge Theory prioritizes the individual's free will. For instance, Nudge Theory offers a set of low-cost, widely applicable methods to encourage healthier lifestyle choices. These methods aim to steer behaviors without the need for restrictive or coercive tools. There are thoughts that working on using these methods for societal persuasion by policymakers would be effective in promoting the societal understanding of sustainability (Arno, 2016).

When summarizing the relationship between Prospect theory and sustainable consumption, Prospect theory suggests that individuals analyze the outcomes of their decisions by considering the expected utility of all possible outcomes and the probabilities of these outcomes. According to the theory, individuals tend to strike a balance between utility (or satisfaction) and probability when making decisions (Kahneman & Tversky, 1979). This theory is often used to explain people's risk-taking behaviors and risk-aversion tendencies in the decision-making process. However, studies advancing through behavioral economics have also been reflected in the field of marketing. This reflection has also been evaluated in terms of sustainability. Prospect theory can be integrated into this area primarily to ensure financial sustainability. This is because environmental and social factors, under the influence of globalization, rapidly affect economic systems and financial structures. The disasters created by environmental crises worldwide are shaking not only social structures or humanity's future but also the current economic structure. Globalization has made global systems more interconnected. For example, the 2008 global financial crisis led to increased efforts to establish sustainable financial structures

in line with the rational decision-making assumption of Prospect theory, aiming to ensure long-term stability in the markets. Thus, as a regional step, the EU has emphasized integrating sustainability factors based on environmental, social, and governance criteria into the financial policies between its member states (Beerbaum & Puaschunder, 2019). As the benefits of sustainability become more widely understood, the likelihood of behaviors based on Prospect theory emerging increases, but the multifaceted nature of sustainability and the variable nature of human psychology cannot guarantee this. At this stage, the concept of consent and, therefore, Nudge Theory comes to the forefront.

2.4.2. The Nudge Theory Approach to Sustainable Consumption

Another theoretical approach related to the factors influencing the decision-making process is Nudge Theory. This theory intersects disciplines such as Prospect theory, behavioral economics, and psychology. The theory is built on the idea of guiding behavior with the help of environmental cues, without imposing any prohibitions or straining economic conditions, by predicting individuals' potential behavioral practices (Thaler & Sunstein, 2008). The theory aims to reach a conclusion by using basic psychological nudges without spending excessive financial resources (Cai, 2020). In this sense, it has become one of the key theories often referenced in many studies in the literature (Ökten, 2023).

Nudge Theory suggests that a "choice architecture" can be established that can, so to speak, manipulate individuals in their decisions. The person responsible for organizing the sequence of events and guiding individuals toward a decision is called the choice architect. For example, the person who decides whether to place healthier foods or the more expensive options provided by a supplier on the front shelves in a school cafeteria is the choice architect. The process of organizing this is the choice architecture (Thaler & Sunstein, 2008). This approach can

guide many strategies that aim to encourage positive outcomes such as choosing sustainable options, economic savings, and a healthy lifestyle (Cai, 2020). The theory presents a libertarian approach with harmless manipulation aimed at steering people's preferences (Arno, 2016).

Nudging, as a choice architecture, encompasses encouraging individuals to make self- and socially beneficial choices (Özdemiray, 2024). However, it is important for nudgers to use this mental choice architecture with good intentions, aiming to increase welfare, and for studies to progress in parallel with this ethical concern. Due to the strong mental effects of nudging, cooperation among disciplines such as technology, economics, and social sciences is necessary for it to be used as a powerful tool in enhancing welfare (Cai, 2020). While neoclassical theories such as Prospect theory and behavioral economics focus on understanding why individuals make irrational decisions and preventing illogical behaviors, Nudge Theory focuses on guiding thoughts to foster rational behavior rather than understanding the cause of irrational behavior (Pedwell, 2017). Nudge Theory guides decisions without banning or criticizing any option, using choice architecture. In this regard, it falls under the concept of "libertarian paternalism." Libertarian paternalism does not prohibit choices or impose coercive interventions. Libertarian paternalist initiatives, just like nudging, guide individuals to make choices with their free will, not through commands, but through manipulation. For example, even if individuals are inclined toward harmful habits, wasteful consumption without considering the environment, or make immediate hedonic choices in terms of economic and environmental sustainability, libertarian paternalism does not ask them to do the opposite. This is because, in this understanding, individuals are free, and there can be no intervention. In nudging, too, an individual's freedom of choice is not violated, and no pressure is exerted on individuals who are not influenced by nudges. The aim is simply to guide individuals through choice architecture toward choices that benefit both the

individual and society. However, ultimately, the individual is free to make their preferred choice (Thaler & Sunstein, 2008). Due to its free nature, nudging is free of negative elements and holds an important place in the implementation of sustainability policies for the benefit of society. A study on climate change and sustainable behavioral intentions has shown that Nudge Theory is significantly effective in encouraging sustainable behavior changes. The same study concluded that awareness, beliefs, and concerns about climate change are important nudges guiding sustainable behaviors, but that awareness and belief alone are not enough; concern nudges are more effective in manipulating behaviors (Olya H. et al., 2024).

In the mentioned context, nudging actions can be applied in both public and private sector policies (Thaler & Sunstein, 2008). For example, in 2009, the establishment of the "Behavioral Insights Team" in the UK to create behavioral policies in the public sector, the establishment of the "White House Social and Behavioral Insights Team" in the US in 2012, and the establishment of the "E-Export, Digital Marketing, Behavioral Public Policies, and New Generation Technologies Directorate" under the Ministry of Trade in Türkiye in 2015 are some of the formations. Additionally, in the context of sustainability, public sector-based nudging units and academic-based nudge studies are conducting research to solve environmental problems threatening the future of the planet. These studies are called "environmental nudging." Since 2017, in the context of sustainability, studies related to solving environmental problems have been referred to as "green nudging" (Aktaş, 2023).

2.4.3. The Green Nudging Approach to Sustainable Consumption

The concept of green nudging is a promising tool to increase environmentally friendly consumer demands in the context of environmental sustainability (Wensing, 2020). Green nudging is a more effective tool for promoting sustainable consumption

compared to many other theoretical approaches because it evaluates individuals from the perspective of them being consumers. Rather than guiding them on political, economic, financial, or health matters, it focuses on encouraging them to adopt production and consumption practices that respect ecological order. Based on this, green nudging works on triggers to encourage preferences for renewable energy sources, energy conservation, investment in recycling, and other environmental values that will provide ecological benefits. As a result, in the context of leaving a livable planet for future generations, green nudging has been proposed as a set of promising tools for a sustainable environment (Schubert, 2017). For example, a study conducted in Thailand on young consumers aged 18-29 found that environmental awareness, environmental knowledge, and environmental attitudes had significant positive effects on the intention to purchase green products. Additionally, this study concluded that environmental attitudes had a significant impact on consumers' purchase intentions, with young consumers exhibiting a more positive attitude toward green products and a greater intention to purchase them (Maichum, 2017). In this context, the impact of strategies based on theory stands out.

2.4.3.1. The Relationship Between Green Nudging as a Sustainability Tool and Consent Engineering

Green nudging, in addition to providing a theoretical foundation for steps towards sustainable consumption, also includes elements that can be directly applied in the field. When considered as a tool, green nudges contain inputs similar to the building blocks of basic nudging theory. Therefore, it progresses in parallel with the libertarian paternalism approach and applies choice architecture for environmental sustainability, just like nudging theory. When used to promote sustainability necessary for the transfer of the Earth's resources to future generations, this choice architecture can be considered a positive manipulative approach in terms of social benefit. However, the transformation

of this manipulation into consent engineering has been seen as dangerous, just like the concerns raised about the significant mental effects of nudging theory. This is because, under the influence of the current global economic and political context, nudges may sometimes deviate from their libertarian paternalistic structure and shift to serve peripheral interests like political or financial concerns, which is debated with regard to sustainable environments (Carlsson, 2021). There are also ethical criticisms of nudging (Vandenbroele J, 2020). In this debate, the feared element is hegemony, which expresses the pressure one side exerts over another, and has manifested itself throughout history in political, social, and individual relationships. Hegemonic approaches sometimes appear through pressure and sometimes through consent engineering (Lippmann, 1922).

Referring to consent engineering offers clues to understanding the concerns raised in nudging and its subset, green nudging. The publication "Public Opinion" examined how the media shapes social thought and perception. In the Public Opinion approach, individuals, having been exposed to numerous events, now require simple, key shortcuts or symbols to understand the complex world they perceive. When the media provides these shortcuts to them, they tend to use them immediately. However, the media presents these shortcuts and symbols under the control of a certain authority, in the desired form. Therefore, the role of the media in this process is significant. In this view, the public's perceptions are not based on reality but on images created by the media, which are controlled by a dominant power. The formation and embedding of these images in the public mind are discussed within the context of consent engineering and are diametrically opposed to libertarian paternalism. This is because there are uncertain probabilities that could lead to restrictions or misuse without the individual's awareness (Lippmann, 1922). In libertarian paternalism, however, there is no top-down coercive intervention; instead, the focus is on individual and social benefits, with persuasion efforts shown by demonstrating

potential outcomes if the alternative path is taken (Thaler & Sunstein, 2008). In this case, there is no coercion for individuals who are not persuaded, but in consent engineering, there is a risk of coercive guidance based on the interests of the dominant power rather than societal benefits. This consent is not in the libertarian sense (Lippmann, 1922).

For instance, a study investigating the effects of nudging messages on sustainable consumption behavior found that these messages play a critical role in either encouraging or preventing sustainable behavior. The study also highlighted that for nudging to effectively guide sustainable behavior, the right sources of the messages are essential (Boenke, 2022). It is important that there is no coercion for sustainability. Habits formed through coercion will disappear once the coercive element is removed. In contrast, for sustainability, sustainable habits must be formed with consent, which will be ingrained in life.

2.4.3.2. Elements of the Green Nudging Set: Intrinsic Nudges and Ethical Nudges

The use of behavioral interventions aimed at reducing negative externalities on the environment during the consumption process is discussed in the literature, particularly regarding the potential misuse of consent engineering. Research on this topic categorizes behaviors based on how and with which interventions they are influenced. In explaining these classifications, green nudging, when considered as a tool for creating environmental policies, can be viewed as a superset that contains several subsets. Each element within this subset can be considered a distinct tool. In this context, the categories of "intrinsic nudging" and "ethical nudging" have emerged as subsets within the green nudging set.

Intrinsic nudging involves influencing the environment in such a way that individuals, without being aware of it, are nudged toward a consumption action. This is done by altering the environment and the available choices (for example, the options presented to them). From some perspectives, this can be seen as

a form of intervention because if all product options presented to a consumer during shopping are environmentally friendly, their choices are already restricted. In this case, the nudge operates by intervening in the essence of the choice. On the other hand, ethical nudging is based on triggering a psychological response to influence an individual's behavior and encourage a change. For instance, when both environmentally friendly and non-environmentally friendly products are presented to a consumer during shopping, ethical nudging involves psychologically warning the consumer of the potential negative outcomes if they choose the non-environmentally friendly option. However, in this case, there is no intervention in the essence of the choice, so the consumer can still choose the non-environmentally friendly product if they wish (Carlsson, 2021).

Any intervention that is fully individualized and respects the legal framework of preferences is encouraged in the context of libertarian sustainability. Ethical nudging, as it does not interfere with the essence of the choice, can be fully integrated into the libertarian paternalist structure (Thaler & Sunstein, 2008). In summary, within sustainability policies, the use of green nudging by policymakers, while aligning their economic models with this process, is presented in the literature as an important option for persuading consumers toward sustainable consumption (Carlsson, 2021).

New solutions and approaches, aligned with interdisciplinary fields such as behavioral economics, marketing, communication, psychology, and sociology, are being developed to persuade the public in their role as consumers, aiming to tackle environmental problems caused by global climate change. This approach helps contribute to sustainable consumption. For instance, a study conducted on highly educated Chinese consumers, who were concerned about the environmental problems arising from China's rapid economic development, found that the perceived environmental responsibilities and the effectiveness of environmental protection played an important role in promoting

their intention and attitude toward purchasing environmentally friendly products (Mark, 2015).

2.4.4. Alternative Theories in Sustainable Consumption

There are several other theories in the literature that can be understood from the perspective of sustainable consumption. These theories discuss the factors that could form the basis for steps toward sustainability and also play a guiding role in interpreting potential outcomes. One of the most commonly encountered related theories in this regard is the Theory of Reasoned Action. This theory has served as the foundation for studies that predict consumers' intention to purchase green products (Paul, 2016), research on the regulation of corporate actions for environmental sustainability (Jeremiah, 2019), and studies examining how information technologies, through the classification of green information technologies, raise environmental awareness (Mishra, 2014), among many others.

The Theory of Reasoned Action, developed by Fishbein (1975), analyzes the relationship between intention and behavior. The theory focuses on how personal attitudes and social norms influence an individual's intention, and how that intention affects behavior, aiming to predict individual behaviors (Fishbein, 1975). This theory is one of those used in studies evaluating data on sustainable consumption.

Another theory that supports the formation of sustainable consumption is the Cause-Effect Chain Theory (Gutman, 1982). The Cause-Effect Chain Theory has provided a theoretical foundation for studies that examine the achievement of abstract goals in consumer behavior in the context of cause-effect chains (Pieters, 1995), the impact of customer goals and service features on satisfaction (Orsingher, 2011), studies that link products with personality (Walker, 1991), and research aimed at understanding the effects on consumers' recycling decisions (Bagozzi, 1994).

The Theory of Reasoned Action assumes that consumer decisions are a cognitive process. According to the theory, an

individual's consumption motivation results from a cognitive process in which they evaluate product characteristics, the values they desire to attain, and the outcomes they will achieve by purchasing the product. The "cause" part of the theory refers to the object (physical product) or activity (such as running, reading, or a service) offered. The "effect" part refers to the happiness, security, or success that the consumer will obtain by consuming the product or service. The consumer passes this cause-effect chain through a cognitive process and is directed toward purchasing behavior (Gutman, 1982). It is crucial to insert small cues into the consumer's mind that will encourage sustainable consumption throughout this cause-effect chain up to the point of purchase.

3. CONCLUSION AND DISCUSSION

Do the behavioral based theories of Prospect theory, Nudge Theory, and Green Nudge Theory have an impact on sustainable consumption? According to the literature review conducted as a result of the research, it was concluded that these three key theoretical approaches, along with other related theories, do not have direct, individual effects on sustainable consumption behavior. This is because sustainability is a concept where economic, cultural, social, and psychological factors come into play. For example, it cannot be said that a sustainable consumption strategy based solely on Prospect theory or Nudge Theory, which does not intervene with an individual's free actions, would have a direct impact on behavior. Additionally, although research indicates that nudges have potential effects in promoting environmentally friendly purchases, these studies could not universally prove the influence of changing behavior through choice architecture. This is because, as in Prospect theory, factors such as individual differences make it difficult to predict whether the impact of nudges will be long-term. The fact that most research in this area is still limited to Western societies further strengthens the reason for rejecting this hypothesis

(Vandenbroele J, 2020). On the other hand, it has been concluded that all the theoretical approaches investigated may have an impact on promoting sustainable consumption. This is because research shows that theoretical approaches could play an important role in encouraging sustainable consumption habits (Boenke, 2022), particularly with Green Nudge Theory, which holds significant potential as a tool for implanting necessary informational cues in minds to encourage environmentally friendly products and behaviors (Maichum, 2017). It is also clear that more support and strategies are needed for the theoretical approaches to be effective in practice.

Furthermore, it is believed that the theoretical approaches discussed may be effective in creating environmentally friendly policies and marketing strategies. Research findings suggest that these theoretical approaches can contribute to the development of environmentally friendly policies and strategies, which in turn show promise in promoting sustainable consumption behavior (Mark, 2015). These findings could serve as an important guide for policymakers (Aktaş, 2023). According to current literature, environmental collapse, which has been escalating since the second half of the 20th century, has reached a stage that the planet can no longer bear. While the Brundtland Report (1987) brought the issue of sustainability into more serious discussion, the scope of studies in the field has expanded beyond the environmental axis. The concept has grown to include social and economic dimensions in terms of providing a foundation for environmental sustainability. Thus, for overall sustainable development, environmental, economic, and social elements have become the three pillars of sustainability. Initially aimed at maintaining ecological balance, the concept of sustainability has evolved to assert that social and economic development is also necessary to maintain this ecological balance. Elements such as the greenhouse effect, carbon emissions, and pollution of water resources threaten the planet's ecological balance, while global disasters such as Chernobyl have reinforced the importance of the

environmental dimension for sustainable development. To ensure environmental sustainability, the protection and non-pollution of natural resources are key factors. Therefore, consumption habits are critical for sustainability. For a sustainable planet to emerge, individuals' lifestyles must be integrated into sustainability on a global scale, regardless of culture or region, and especially the significant reduction of consumption in developed Western societies is necessary.

The most fundamental obstacle to this change is the rigidly established economic, cultural, and societal patterns worldwide, and the lack of sufficient steps being taken for change. For the creation of a sustainable planet, stages of transformation in consumption habits have been established. These are the 3R and 7R principles of sustainable consumption, which are aimed at ensuring environmental and economic sustainability. By fully applying these principles, all necessary conditions for sustainable consumption in today's circumstances will be met. However, due to the significant barriers individuals face, even partial implementation of these principles is important. For this, necessary actions must be urgently implemented in both the political authority and individual contexts, supported by appropriate policies and marketing strategies. The effectiveness of sustainability strategies increases through political, theoretical approaches, and integrated marketing strategies. Given that the planet is signaling an alarm for depletion, policymakers and those working in the policy field must take immediate action. Theoretical approaches will serve as the foundation for these actions.

Sustainability and consumption behavior, along with foundational approaches like Prospect theory, Nudge Theory, and Green Nudge Theory, are strategies aimed at encouraging individuals to make environmentally conscious decisions. Prospect theory assumes that individuals will engage in a rational decision-making process by considering the potential outcomes of their choices, yet within the context of sustainability, due to the

involvement of environmental, social, and psychological factors, the theory alone is insufficient to promote rational behaviors. In this regard, the foundation created by Prospect theory needs to be supported by Nudge Theory for sustainability. Nudge Theory aims to guide individuals' choices through environmental cues based on a libertarian paternalism approach, respecting their free will. Thus, it serves as an important catalyst for making sustainable decisions through choice architecture. Another catalyst in this regard is Green Nudge. Because Green Nudge focuses on the environment, it provides the most effective theoretical foundation for sustainability. Green Nudge is a powerful tool used to promote environmentally friendly products and behavior habits, encouraging the adoption of these consumption behaviors. Its strength lies in the dynamics of consent engineering, which, while aiming for positive purposes, inevitably contains powerful mental interventions that affect behavior. Similar to the effect of consent engineering, the focus of Green Nudge on environmental issues also holds undeniable potential. Other theories, such as reasoned action and cause-and-effect chain theories, are also considered as strategies with high potential to help individuals develop sustainable consumption habits by providing a positive theoretical foundation for sustainability. Future studies are recommended to explore different theories that can play a role in promoting sustainable consumption. Moreover, it is suggested that future research should delve deeper into how the role of theoretical approaches for sustainability can be used to create strategies, and how these approaches can complement each other. This is because strategies built on a theoretical foundation are effective tools for encouraging individuals to adopt environmentally friendly behaviors. Sustainability is a structure that supports environmental transformation through economic and social transformations. Supporting a single area often leads to a chain effect on other areas. This result has been attempted to be conveyed in a memorable way below."

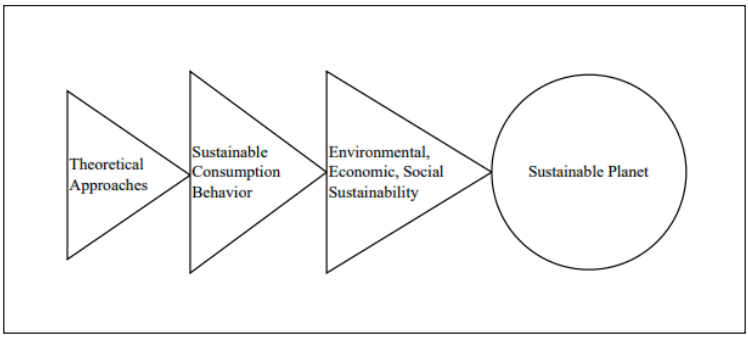

Figure 1. Research Findings Overview
Source: by Author

"In short, individuals' consumption habits and societal values need to undergo fundamental changes. To achieve social acceptance of sustainability, theoretical foundations must be strengthened. On a global scale, it will not be possible to build a sustainable future, particularly in environmental, economic, and social terms, without making deep-rooted societal changes.

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Dr. Kağan Beşoğul holds a bachelor's degree in Media and Communication, a master's degree in Political Science and International Relations, and a Ph.D. in Business. Specializing in Marketing, Dr. Beşoğul has conducted research in areas such as sustainability, consumer behavior, and corporate social responsibility. His work in these fields has led to presentations and publications at international conferences. Additionally, he has contributed to book chapters and journal articles. Currently working as an independent researcher, Dr. Beşoğul aims to develop innovative approaches in Business and its subfields while staying up to date with the latest developments in the academic world.

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SUSTAINABILITY RESILIENCE IN A TURBULENT WORLD

Sustainability reflects the importance of organizations maintaining their market presence and ensuring their practices do not undermine the fulfillment of future generations' needs. Accordingly, organizations need to become more resilient and flexible to adapt to dynamic changes in their internal and external environments.

This book aims to provide insights and perspectives from researchers from different disciplines in business administration, administrative, and social sciences regarding sustainability and sustainability resilience. It is prepared as a celebration of the achievement of a crucial milestone of the Republic of Türkiye, its 100th anniversary.

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