Chapter 5
Parcel Lockers as an Environmentally-Friendly Delivery Method in E-Commerce:
The Case of Turkey

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ABSTRACT

This chapter delves into the escalating last-mile delivery challenges spurred by the burgeoning e-commerce industry and explores innovative solutions like cargo vending machines (CVMs). Focusing on Turkey's e-commerce environment, it begins by outlining the mounting pressure on logistics, resources, and the environment due to increased deliveries. CVMs emerge as an efficient means to streamline delivery processes and offer customer convenience. Their environmental benefits are highlighted, positioning these machines as eco-friendly by reducing carbon emissions. The chapter emphasizes their pivotal role in fostering sustainability in e-commerce and advocates for a greener approach to logistics. Moreover, it details the integration of CVMs into Turkey's e-commerce framework, outlining current practices, potential growth areas, and future expectations. Ultimately, it underscores the positive environmental impact of CVMs in Turkey's e-commerce landscape, advocating continuous innovation and strategic implementation to alleviate last-mile delivery hurdles and promote sustainability.

DOI: 10.4018/979-8-3693-3811-7.ch005

INTRODUCTION

Increasing digitalization in Turkey in recent years has changed consumers' traditional shopping approaches and led them to online platforms. Today, most consumers prefer to shop online instead of going to places where products are displayed. The delivery of online purchases brings the shipping process, which is the last stage of the supply chain, to the forefront. The shipping process is conceptually related to last-mile transportation. Last-mile transportation is the process of receiving products purchased by customers at home or any collection point (Gevaers et al., 2009).

As companies deliver products to their customers through various distribution channels, they face challenges related to last-mile transportation. While the increase in online shopping options provides businesses with revenue benefits, last-mile transportation poses direct and indirect environmental problems such as frequent deliveries, traffic congestion, increased shipping costs, and customers not being present at the given addresses during product delivery (Ranieri et al., 2018). In addition, the delivery of products purchased by customers in last-mile transportation and online shopping also affects companies' carbon footprint. The carbon footprint is determined by measuring the greenhouse gas emissions resulting from human consumption activities in terms of carbon dioxide (Kaypak, 2013). The size of the carbon footprint of each individual and business can be different from each other. Accordingly, the carbon footprint indirectly affected by online shopping increases the size of the carbon footprint of businesses during the delivery of products to customers, i.e., last-mile transportation (WWF, 2012).

In the report published by the Turkish Statistical Institute for 2023, the use of energy resources increased by 9.8% in 2021 compared to the previous year and by 188.4% since 1990 (TUIK, 2023). These statistics show that the upward trend of carbon emissions from energy use in Turkey continues and that last-mile transportation, the last link in the supply chain, impacts the environment.

Table 1. Greenhouse gas emissions by sector, 1990-2021

	1990	2000	2010	2015	2016	2017	2018	2019	2020	2021	1990-2021 Change (%)	2020-2021 Change (%)
Total emissions	**219.5**	**298.9**	**398.8**	**475.0**	**501.1**	**528.6**	**523.1**	**508.7**	**524,0**	**564,4**	**157.1**	**7.7**
Total Energy	139.5	216.0	287.9	342.0	361.7	382.4	373.4	365.6	366,6	402,5	188.4	9.8
Industrial processes and product use	22.9	26.2	49.1	59.7	63.8	66.6	67.7	59.0	68,0	75,1	228.7	10.6
Agriculture	46.1	42.3	44.4	56.1	58.9	63.3	65.3	68.0	73,2	72,1	56.5	-1.5
Solid Waste	11.1	14.3	17.4	17.1	16.7	16.3	16.6	16.1	16,3	14,7	32.6	-9.9

Source: TUİK, 2023.