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A Study on Recent Trends of Environmentally Sustainable Urban Supply Chain and Transport Solutions on E-Commerce

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Abstract: *The expansion of e-commerce has led to an increase in urban freight transportation, which has resulted in negative externalities such as noise, pollution, congestion, habitat loss, and emissions. It is evident that efforts are being made to make urban last-mile (LM) deliveries more environmentally friendly; However, there is a lack of a synthesis of the most recent research trends and solutions in the relevant literature. This paper identifies trends and research gaps in the field of green LM deliveries on the urban e-commerce market by conducting a literature review using the SRL methodology. In addition, the e-commerce market's current research topics and solutions that improve its environmental sustainability are presented. The results provide a precise and comprehensive summary of the research on green LM e-commerce deliveries in cities, highlight areas of research that require additional investigation, and highlight current and emerging research interests worldwide. In the current research, ICT and smart solutions, customer behavior, and performance evaluation appear to be understudied. Practically, it is a source of information and guidelines about the current developments in the solution for last-mile e-commerce deliveries in urban areas, which may assist local governments, freight operators, and other stakeholders in last-mile logistics in increasing their sustainability.*

Keywords: environmental conservation; e-commerce; environment; last-mile shipping; metropolitan delivery; a green final mile; systematic review of the literature

I. INTRODUCTION

According to the United Nations, more than 55% of the human population currently lives in cities, and this proportion is expected to rise to 68% by 2050. In Europe, where 745.5% of the population lives in urban areas [1], this ratio is even higher. It is clear that urbanization and trade are connected [2]. There is an increasing demand for housing, services, and goods as a result of the rising number of city dwellers, many of whom are well-paid. The growth of retail trade, initially in traditional brick-and-mortar stores but more recently also in online stores, has been driven by the demand for goods. Products can be purchased from anywhere in the digital world, and after being shipped around the world, they are delivered to the final customer, typically in cities. The National Science Foundation lifted its ban on commercial use of the internet in 1992, which gave rise to the massive development of e-commerce in 1993 The final phase of this journey—last-mile delivery—seems to be the most problematic one in terms of cost, efficiency, and pollution Internet usage has increased globally since then. In 2020, it will be 63.2% worldwide and 87.2% in Europe.
The infrastructure is getting better, like the speed of connections and access to broadband internet. E-commerce has also grown in popularity as smartphone functionality has improved. Simplifying checkout and payments as well as optimizing delivery are, however, particularly relevant to the shift in shopping habits and the rise in e-commerce revenues . E-commerce sales increased by nearly 300% from 2014 to 2019. Online sales now make up 21% of all retail purchases in the United States, up from 5.1% in 2007 [8]. By 2030, there will be a 78% increase in demand for last-mile delivery, which will result in a 36% increase in the number of delivery vehicles in 100 cities worldwide . In addition, the COVID-19 pandemic contributed to the rapid growth of e-commerce . As with any human activity, online commerce has an impact on the environment, especially in urban areas, where the majority of people live. Logisticservices, likewise those associated with last-mile conveyances of web based shopping, are a significantcontributor to expanded emanations; A third increase is anticipated. Additionally, it is anticipated that last-

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mile delivery-related congestion will increase by 21% by 2030 [9]. Hyperbolic discounting—the preference for smaller, longer-lasting rewards over larger, longer-lasting ones—seems to be a cognitive ability that may have disastrous consequences, even though it helped humans survive in the past.

The environment is severely harmed by the temptation of convenience, one-click shopping, and a high rate of returns. It would appear that people rarely give enough thought to the long-term effects of their actions, especially when it comes to the effects on the environment. However, some studies suggest that online shopping may be better for the environment than traditional shopping especially for non-food purchases, home delivery reduces CO2 emissions]. However, it cannot be denied that the increase in last-mile deliveries brought on by an increase in the e-commerce market has a negative impact on the environment. Despite the growing interest in last-mile logistics research , efforts to reduce the environmental impact of e-commerce last-mile deliveries have not been the focus of applied research. As a result, the e-commerce market requires green solutions for last-mile deliveries.

According to the findings of the relevant literature analysis, there is fragmentation in the presentation of current trends and solutions regarding environmentally sustainable last-mile deliveries on the city-based e-commerce market. As a result, perceptions of the most significant areas of research and environmentally friendly solutions for urban LM e-commerce deliveries are hampered. The aspects related to environmental protections are not given enough attention in the existing contributions, which instead focus on the conceptual framework or the engineering management perspective . The majority of these articles do not address environmental protection but rather cost reduction . The only review that looks at the environmental effects of e-commerce covers the literature up until 2014. However, since then, numerous studies on environmentally friendly last-mile deliveries have been carried out, opening up new opportunities for environmentally friendly deliveries. Additionally, there has been no examination of the environmental impacts of e-commerce LM deliveries that are strictly restricted to urban areas. As a result, the purpose of this article is to assess the state of the literature on green last-mile deliveries on the e-commerce market in urban areas, as well as to identify trends and research gaps, employing the SRL method.

II. BACKGROUND FROM THE LITERATURE

Researchers, members of society, and politicians have shown a lot of interest in the topic of sustainable development. The UN Brundtland Commission, which defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their ownneed" , is responsible for developing the key concept. “to address growing concern about the accelerat-ing deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development” was the purpose of the commission's creation. The need to integrate the three fundamental components of sustainable development (SD) is emphasized in all definitions of the concept: The three pillars of sustainable development are social equity, economic expansion, and environmental protection . Environmental issues have been one of the central roots in the definition of sustainable development and are frequently referred to as environmental sustainability. This is in response to alarming reports on the state of the natural environment worldwide . The term focuses on the preservation of scarce natural resources and environmental integrity. This tenet guarantees that human activities do not harm the land, air, or water resources of the planet. It acknowledges that human activities can have significant negative effects on the environment, such as the loss of ozone, emissions of greenhouse gases, the production of waste, a decrease in biodiversity, and pollution . The issues associated with combating environmental externalities and developing environmentally friendly practices have received significantly more attention in the search for opportunities to make cities more sustainably , many of which refer to logistical operations; green logistics including e-commerce market last-mile deliveries

City logistics includes deliveries over the last mile . Road freight transport is the most common mode of transportation in urban areas, and it has the most severe environmental externalities associated with delivery . In cities, last-mile delivery is to blame for more traffic, congestion, noise, and air pollution . It also reveals conflicting interests of city logistics stakeholders, including private organizations (logistics operators, haulage and shipping companies), public organizations, NGOs, and the general public . While the interests of private companies are obvious, those of public authorities or the general public are less so. Even though studiES indicate that customers strongly prefer home delivery, it appears that e-commerce customers have only recently begun to recognize the environmental impact of last-mile e-

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commerce deliveries. The fastest delivery method continues to be the most popular. However, there is a discernible pattern that indicates that some customers will select an environmentally friendly delivery method when informed
Relevant environmental and organizational variables include stakeholder pressure, environmental regulations, company size, industrial sector and geographical location, internationalization, position in the value chain, strategic attitude, managerial attitudes and motivations, manager characteristics, and human resources. Research on the factors that motivate businesses to become more environmentally sustainable frequently includes these variables. Methodology The purpose of this study is to conduct a systematic review of scientific articles on green last-mile delivery in urban e-commerce markets. It identifies research gaps in this field and describes current research trends. The VOSviewer software was used for the bibliographic analysis. The research includes English conference papers published in peer-reviewed journals from two databases: Scopus and the Web of Science provide access to a wealth of research on green last-mile delivery issues affecting the urban e-commerce market. Because there are so many available papers and publications from all over the world, a well-designed strategy is needed to conduct an in-depth and logical analysis, clustering, and mapping The method suggested by Tran-field was used to get a complete picture.

III. DISCUSSION AND DIRECTION FOR FUTURE RESEARCH

1: This strategy has been widely used in the social sciences. Even though crowdshipping is a type of collaborative solution, the author believes that it is significant enough to become a separate trend in future research on developing greenLM e-commerce deliveries. Crowdshipping within the scope of e-commerce last-mile deliveries The first papers examining LMdeliveries on the e-commerce market were only published in 2017, but they are widely cited, despite being relatively recent. In scientific papers, the concept of crowdsourcing is discussed with regard to passengers on public transportation , private car owners , bike owners and neighbors but it is also implemented by business professionals,
2. Customer behaviorAs was mentioned earlier, the behavior of customers who shop online and in brick-and-mortar stores has been the subject of scientific interest for a few years . However, it is interesting to note that recent developments have shifted toward modeling the behavior of customers so that they choose or pressure other stakeholders to adopt more sustainable methods of last-mile e-commerce deliveries. End-user behavior may have a significant impact on the environmentally friendly choice of distribution channel and, as a result, exert or alleviate environmental pressures. The current research examines this behavior from an economic standpoint without considering environmental concerns. Research into ways to increase customers' awareness of their shopping and delivery options appears to be a promising area for further study in light of the alarming state of the environment, joining the delivery organization with marketing and psychology,
3. ICT and smart solutions The application of ICT and smart solutions to the secure and lowest-cost delivery of online-purchased goods appears to be the next suggested research trend. Evangelista identified a research gap regarding the role of ICT tools in supporting green 3Pls action. It would appear that the application of ICT and smart solutions to urban LM deliveries is only just beginning
As a result, the topic of using ICT tools to make urban LM e-commerce deliveries more environmentally friendly is not discussed enough. The Internet of Things, big data, and sensors installed in infrastructure and vehicles enable real-time monitoring of a variety of factors, including fuel consumption, component and spare part wear and tear, product temperature, driver working time, and emissions. Therefore, through improved route planning, fleet monument, or traffic control, ICT in decision support systems, energy-saving technologies, and big data analysis may significantly improve the sustainability of LM e-commerce deliveries and reduce environmental externalities. From the perspective of increasing the environmental sustainability of LM e-commerce deliveries in urban areas, these possibilities must be investigated. As a result, the author recommends more research in this area
4. Assessment of Performance The challenges associated with the economic, social, and environmental aspects of those deliveries are growing alongside the scope of solutions and tools for delivering online-purchased goods to customers in cities. Again, the necessity of developing performance assessment measures for third-party logistic service providers was highlighted in previous reviews . In a similar vein, a small number of studies of this kind also cover environmentally friendly urban LM e-commerce deliveries

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5. Green vehicles The analysis showed that there are a lot of papers on green vehicles, like bicycles, electric vehicles, and public transportation, and that researchers seem to be interested in them more and more. Whether or not electric vehicles are actually environmentally friendly and whether or not deploying such a fleet is cost-effective is still up for debate . Other options are looked at, like utilizing bicycles for delivery services or taking public transportation to deliver goods . In conclusion, last-mile delivery optimization is the most prominent area of research, followed by green vehicles. The shift toward stakeholder management is evident, as previous contributions suggested. A lot of research has been done on stakeholder collaboration, which has resulted in a lot of publications. Alternative delivery locations are the next important area of study. The issue of access restrictions is the next area of research that the review uncovered. In addition, a similar level of interest is noted in crowd logistics, consumer behavior, and performance evaluation.

IV. CONCLUSION

In the following works, the author intends to develop the literature studies into empirical research focused on green last-mile deliveries on the e-commerce market, within the trend of customer behavior. The area of ICT and smart solutions had the fewest publications. Also, it might be interesting to study rural last-mile deliveries on the e-commerce market to learn about their particular issues and compare them to urban ones. It might make it possible to identify issues that are shared by all areas and how they are addressed. Lastly, a few restrictions should be mentioned. Even though every effort was made to make the review as thorough as possible, some papers might not have been included by accident. The structure of the keywords and the components of the search phrase might also be a limitation. Even though the selection of keywords was discussed among researchers, it's possible that the search omitted some relevant contributions due to the structure of the search phrase and the use of search operators. Moreover, the hunt was restricted to gathering papers and examination articles publishedin English in scholarly diaries. As a result, papers that might have been relevant in other languages might have been overlooked. Another significant limitation is that some of the papers in the analyzed set did not solely address e-commerce deliveries in order to include the largest possible sample of papers on the environmental impact of last-mile e-commerce deliveries in urban areas. Nevertheless, they were included in the analyzed set as long as LMe-commerce was taken into account there. Despite those limitations, the author is convinced that the article provides an accurate account of the research on the impact of green last-mile deliveries on the urban e-commerce market. As a result, the results of the analysis are regarded as conclusive.

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