

SUSTAINABLE CITY LOGISTICS OF LAST-MILE DELIVERY AND RETURNS ON THE E-COMMERCE MARKET. VARIOUS GROUPS OF STAKEHOLDERS' PERSPECTIVES – AIMS AND SCOPE OF THE PROJECT

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Abstract

The paper presents the research project implemented at Wrocław University of Economics and Business led by Eng. Maja Kiba-Janiak, Ph.D., Prof. of WUEB, financed by the National Science Centre in Poland, granted based on the decision number 2018/31/B/HS4/03711. The project answers the challenges created by the dynamically growing e-commerce market. Attractive purchase prices, low cost, short time, and convenient delivery places motivate consumers to shop online, which is a challenge for e-trade services and transport companies. Meeting the expectations of e-clients in terms of delivery of the purchased products leads to congestion, pollution, and road accidents. The project is the conceptualization of a model of sustainable city logistics in the field of last-mile delivery and the returns on the e-commerce market, including the tools stimulating stakeholders to change their preferences in terms of the last-mile delivery and goods return, making them more sustainable (environmentally, socially and economically).

Keywords

Sustainable city logistics; E-commerce; Last-mile delivery; Returns.

Introduction

The problems related to congestion, pollution of the natural environment, and the growing number of road accidents resulting from goods deliveries constitute a vital and up-to-date topic of city logistics. The development of the e-commerce market and the increasing demands of customers in this area intensified these problems. Issues related to the last-mile deliveries and returns are discussed in various scientific articles, however, usually in a narrow dimension. The existing research referring to the discussed issue is fragmentary, usually concerns a particular city, and focuses mainly on a limited group of stakeholders. Meanwhile, the minimization of the negative effects of the last-mile delivery organization applies to a

wide range of stakeholders (e-clients, e-trade services, transport companies (especially CEP), local governments, and inhabitants), which has been highlighted in many EU projects. However, there is a lack of scientific research that may indicate the tools, which can lead to a change in preferences of city logistics stakeholders in the area of last-mile delivery and returns on the e-commerce market, and the possibility of changing these preferences to more sustainable (including environmental, economic and social aspects). The above-presented topics constitute the main reasons for conducting research, including the various stakeholders' perspectives and identifying instruments that may change preferences regarding the last-mile delivery organization in provincial capital cities.

1 Project Description

A fast-growing e-commerce market and the increasing customer requirements in terms of speed and frequency of deliveries contribute to more and more interference in the last-mile of the supply chain [1], [2], and [3]. Research indicates that the last-mile deliveries are 5 to 23 times more expensive than shopping in a retail store (depending on the size of the package and service delivery). At the same time, customers are not willing to pay the higher delivery costs [4]. Providing delivery to the individual customer within a day or even a few hours is a growing challenge for the transport companies. However, more and more frequent deliveries result in environmental pollution, congestion, road accidents, increased delivery costs, and costs related to congestion formation and environmental pollution [5].

City logistics of last-mile delivery and returns in the e-commerce market is one of many areas of Urban Freight Transport (UFT). It can be defined as “*a series of activities and processes that are necessary for the delivery process from the last transit point to the final drop point of the delivery chain*” [6]. It can be viewed from three perspectives represented by various stakeholders: from the demand side (demand for goods purchased online, represented by individual customers and companies, institutions), supply (delivery of goods purchased online, represented by mostly courier, express and parcel companies – CEP and e-commerce services and online shops) and its physical environment regulated by the local government [7]. Each city logistics stakeholder in the field of last-mile delivery has its preferences and expectations. E-customers choose companies that deliver goods faster and cheaper than others. The authorities put the good of all inhabitants above the individual needs of enterprises, transport companies focus on low delivery costs, often ignoring environmental pollution or congestion problems, and e-commerce services compete to satisfy individualized customer needs. A sustainable approach to city logistics of last-mile delivery and returns, taking into account the perspective of key stakeholders (local government, e-commerce services (such as Zalando), e-customers (people who do shop online) and courier, express, parcel companies (CEP) is needed to solve these problems.

Based on the existing literature definitions of city logistics [8], [9], [10], [11], [12] and [13], and the definition of sustainable development presented in the report [37], it can be assumed that sustainable city logistics of last-mile delivery and returns on the e-commerce market concern the planning, implementing, coordinating and controlling of processes on urbanized areas related to the last-mile delivery and the returns of goods purchased online with the accompanying information, in order to reduce costs, reduce environmental degradation and increase road safety, obtained as a result of a compromise developed among the diverse preferences of stakeholders.

Many reasons lead to researching sustainable city logistics of last-mile delivery and returns on the e-commerce market. Among them, the following can be distinguished:

- **a literature gap** in terms of the conceptualization of the model of sustainable city logistics of last-mile delivery and the returns on the e-commerce market, taking into account the perspective of all groups of stakeholders as well as tools motivating them to change preferences in the last-mile delivery and returns in a sustainable manner (environmental, social and economic);
- **an empirical gap** in terms of city logistics stakeholders' preferences' analysis in the field of last-mile delivery and returns on the e-commerce market and the possibility of changing them to more sustainable ones (including the environmental, economic and social aspects);
- **the need to make improvements in the strategies for urban development** in the field of city logistics following the fast-growing e-commerce market, including three scenarios (the pessimistic, optimistic, and business as usual ones) for the development of sustainable city logistics of last-mile delivery on e-commerce market taking into account stakeholders' ability to change preferences in this area.

1.1 Research Objective

The project's scientific objective is to conceptualize a model of sustainable city logistics in the field of last-mile delivery and the returns on the e-commerce market, including the perspective of all stakeholders. The model will include the tools that stimulate the change of stakeholders' preferences regarding the last-mile delivery and goods return to be organized sustainably (environmentally, socially, and economically).

The cognitive objective is to analyze the preferences of various stakeholders in terms of the last-mile deliveries and returns and identify factors that may motivate them to make sustainable choices in this area.

While the methodical objective is to develop a tool with the usage of the conjoint analysis to identify the preferences of various groups of stakeholders and the possibility of their change in the last-mile delivery and returns in order to organize them in a sustainable manner.

1.2 Methods of Research

In the first stage of the research secondary data analysis was used to assess and compare e-commerce markets in Poland, the EU and Brazil. CAWI – standardized Computer-Assisted Web Interview was conducted in the third stage of the research. The applied research tool is a questionnaire consisting of closed-ended questions. The research tool includes the methodology used in the conjoint analysis. The research was conducted on a sample of 1100 clients that make purchases online. The selection of the sample was on a quota basis. The general population was e-customers in all province and capital cities in Poland. The research sample was selected in a quota sampling manner: the amounts for individual cities, age (4 categories) and gender of respondents. The structure of the respondents was determined based on the data of Statistics Poland (Główny Urząd Statystyczny). The research sample was extracted from the database purchased by the specialized research company selected to carry out the research. The standardized and partially structured interviews are used in the fourth stage of the research. The standardized focused interviews are conducted among the most recognizable e-commerce services by the e-costumers, such as RTVEuroAGD, Rossmann, Empik, Tesco, and DOZ – Dbam o Zdrowie. For the interviews with representatives of courier services the following were selected: DPD, DHL, UPS, GLS, Poczta Polska and Inpost, so the companies who concentrate around 80% of the entire CEP (courier, express and parcel) market [14]. Accordingly, electronic surveys (standardized and structured interviews) are conducted with representatives of 18 capitals of 16 provinces (stage 5). Research tools

include the methodology used in the conjoint analysis. An expert panel is the qualitative research and will be conducted in Wrocław after the relevant research among the city logistics stakeholders in last-mile delivery on the e-commerce market. The expert panel will be attended by outstanding experts/researchers from abroad and Poland who have experience and knowledge in the city logistics of the last-mile delivery on the e-commerce market.

2 Significance of the Project

In terms of the last-mile and returns in the e-commerce market, sustainable city logistics is playing an increasingly important role. According to the C3 Solutions report, e-commerce has become one of the biggest problems in the supply chain in the 21st century [15]. In just five years, from 2012 to 2017, the number of people making purchases over the Internet worldwide has increased by more than 200% [16]. Poland was among the ten countries where the growth rate of purchases made in online stores was the highest in the last quarter of 2017 [16]. E-commerce European research shows that Polish Internet customers (e-customers) change delivery times more frequently than e-customers from other European countries. In 2016, almost 70% of Polish e-customers indicated the need to change the delivery date [17]. At the same time, among the factors motivating e-customers to make more frequent purchases via the Internet are low delivery costs (62%). Courier companies are trying to adapt their services to the growing requirements of consumers through customizing them. The goods are delivered more frequently and in a faster way. As a result, in the cities there are observed growing problems regarding congestion, environmental pollution and the increasing number of road accidents. Freight transport in city is responsible for 25% of CO₂ emissions in the city [18], and it is believed to be the one which pollutes the air more than the long-distance transport due to the short distances and stops required by the traffic organization and distribution in the city [7]. What is more, increased traffic causes fatal road accidents, which in some cities exceed 100 people per million inhabitants [19]. In addition, according to the calculations of the European Commission, the costs of congestion in European cities are almost 100 billion euros or about 1% of EU GDP per year [20].

In recent years, the European Union is increasingly focused on developing sustainable urban freight transport by introducing legislation and formal directives. As a result of these activities, many strategic documents contain long-term goals of freight transport and environmental protection [21]. In the Green Deal, specific targets for ecological transport in the city were developed [22]. The ultimate goal is to organize CO₂ emission-free freight transportation in cities by 2030 [22]. In response to the guidelines of the European Commission, several projects have been created (ENCLOSE, C-LIEGE, NOVELOG, CIVITAS, STRAIGHTSOL etc.), which have developed guidance and policies to develop transportation plans, including the sustainable urban freight transport. Among these guidelines, it can be highlighted the three main ones [23]: Sustainable Urban Transport Plans (SUTP), Sustainable Urban Mobility Plans (SUMP), and Sustainable Urban Logistics Plans (SULP). The sustainable approach to urban freight transport is also noted in other many EU projects, such as BESTUFS (I, II), City Log, City Move, C-LIEGE, eDRUL, FLEAT, GRASS, START-A, SUGAR, TRAILBLAZER [24], SULPiTER. These projects focus on various aspects of urban freight transport, particularly on reducing the environmental pollution in the city, improving the coordination and cooperation between stakeholders, and improving the formulation of plans for sustainable urban freight transport. In only one of the above presented EU projects, the study concerned logistics in the e-commerce market (eDRUL).

An increase in initiatives related to sustainable mobility has also been observed in Poland. However, these activities concern primarily public transport. However, many Polish local

authorities consider freight transport an area relating exclusively to private enterprises [25]. This problem is also noticeable in foreign scientific publications that present the issues of sustainable city logistics in the area of freight transport [7], [10], [26], and [27]. In the literature, an interest in city logistics in terms of last-mile delivery and returns on the e-commerce market has also increased over several years; however, many publications typically refer to the individual problems such as analysis of the e-commerce impact on the last-mile delivery [28], [29], and [30], the study on e-customer opinion on alternative solutions for the shipments purchased via the Internet concerning the home deliveries [2], [5], [31], and [32], research among logistics companies dealing with the goods deliveries on the e-commerce market [1], the search for the last-mile problem-solving ways through optimization models [33], the use of intelligent information systems [34], or an attempt to calculate external costs of city logistics in the field of last-mile delivery on the e-commerce market [30].

2.1 Innovative Values of the Project

The innovative nature of the project stems from several reasons. First of all, both in the EU projects and the subject literature, there are no studies related to a comprehensive approach, including the perspective of all groups of stakeholders to the problem of sustainable city logistics of last-mile delivery and returns on the e-commerce market. In scientific publications, there is a deficit of studies demonstrating a comprehensive approach to sustainable city logistics of last-mile delivery and returns that include the perspective of all stakeholders and the identification of tools that stimulate the change of stakeholders' preferences in this area in terms of sustainable manner (environmental, social and economic). The city logistics of last-mile delivery and returns is an essential subsystem of the city's logistics system, which has not yet been thoroughly investigated.

Secondly, no research has been yet conducted in order to identify factors that motivate stakeholders (such as e-customers, couriers, express, parcel companies - CEP, e-commerce services, and local governments) to change their preferences in terms of more sustainable deliveries (including environmental, economic and social aspects) and returns of goods purchased via the Internet.

2.2 International Cooperation

Moreover, the tool developed during the research to analyses the preferences of the last-mile delivery stakeholders in the e-commerce market and identify factors that may affect their change was applied in Brazil by a group of researchers under the leadership of prof. L. K. de Oliveira. The choice of Brazil for the comparative analysis was a result of a few reasons. Firstly, the e-commerce market in Brazil is growing as rapidly as in Poland. Brazil was the leader in e-commerce spending in 2020 [35]. Next, the CPI index is relatively higher in Brazil. It means that the prices of goods purchased in significant quantities by the population of the cities increase yearly more than in Poland, even though the level of GDP per capita in Brazil is 50% lower than in Poland. At the same time, the level of CO₂ emissions (from transportation) is three times higher in Brazil than in Poland [36]. These will verify the tool in different environmental and cultural conditions in terms of its universality. A comparative analysis of the research results carried out in two different countries: Poland and Brazil can provide additional relevant conclusions.

The project will gain significant value by involving outstanding experts from abroad (prof. M. Browne, prof. R. van Duin, prof. Gernot Liedtke, dr M. Piecyk, and prof. L. K. de Oliveira), four well-recognized experts in city logistics from Poland together with the representatives of the different groups of stakeholders. The experts will participate in an expert panel during which an assumption for an original model of sustainable city logistics in the field of last-mile

delivery and returns on the e-commerce market will be developed, including the perspectives of all groups of stakeholders, as well as tools encouraging their changes in preferences in this field in a sustainable manner (environmental, social, and economic). The model will consider three scenarios diagnosed by the experts (e.g. optimistic, pessimistic and business as usual) and can support local authorities in strategic planning in sustainable city logistics. The model can be also helpful for e-commerce services and CEP companies in planning long term activities in the field of last-mile delivery.

Conclusion

The project will contribute to a better understanding of the preferences of the last-mile stakeholders in the e-commerce market and the factors enabling their change. Thus, it should be the basis for cooperation between stakeholders and help local governments formulate and implement city logistics strategies. The results of research and the proposed model of sustainable city logistics of last-mile delivery and returns, which includes the stakeholders' preferences in this field, as well as tools motivating to change these preferences, will contribute to the development of the theory of management science in the area of sustainable city logistics.

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UDRŽITELNÁ MĚSTSKÁ LOGISTIKA DORUČOVÁNÍ NA POSLEDNÍ MÍLI A VRACENÍ ZBOŽÍ NA TRHU ELEKTRONICKÉHO OBCHODOVÁNÍ. POHLEDY RŮZNÝCH SKUPIN ZÚČASTNĚNÝCH STRAN – CÍLE A ROZSAH PROJEKTU

Článek představuje výzkumný projekt realizovaný na Vysoké škole ekonomické a obchodní ve Vratislavi vedený ing. Majou Kiba-Janiak, Ph.D., profesorkou WUEB, financovaný Národním vědeckým centrem v Polsku, udělený na základě rozhodnutí číslo 2018/31/B/HS4/03711. Projekt reaguje na výzvy, které přináší dynamicky rostoucí trh elektronického obchodování. Atraktivní nákupní ceny, nízké náklady, krátká doba a výhodná místa dodání motivují spotřebitele k nákupům online, což je výzva pro služby elektronického obchodu a dopravní společnosti. Splnění očekávání e-zákazníků, pokud jde o doručení zakoupených produktů, vede k dopravním zácpám, znečištění ovzduší a dopravním nehodám. Předmětem projektu je konceptualizace modelu udržitelné městské logistiky v oblasti doručování na poslední míli a vracení zboží na trhu elektronického obchodování, včetně nástrojů stimulujících zúčastněné strany ke změně preferencí doručování na poslední míli a vracení zboží, čímž se stanou udržitelnějšími (ekologicky, sociálně a ekonomicky).

NACHHALTIGE STADT-LOGISTIK DER LETZTEN MEILE-LIEFERUNG UND RETOUREN AUF DEM E-COMMERCE-MARKT. PERSPEKTIVEN VERSCHIEDENER STAKEHOLDER – ZIELE UND UMFANG DES PROJEKTS

Der Artikel stellt ein Forschungsprojekt vor, das an der Wirtschaftsuniversität Wrocław unter der Leitung von Dr. hab. Ing. Maja Kiba-Janiak, Prof. EU, finanziert vom Nationalen Wissenschaftszentrum Polens, erteilt auf der Grundlage der Entscheidung Nr. 2018/31 / B / HS4 / 03711. Das Projekt antwortet auf die Probleme des sich dynamisch entwickelnden E-Commerce-Marktes. Attraktive Einkaufspreise, niedrige Kosten, kurze Lieferzeiten und bequeme Lieferorte motivieren Verbraucher zum Onlinekauf, was E-Commerce-Dienstleister und Transportunternehmen vor Herausforderungen stellt. Die Erfüllung der Erwartungen von Online-Kunden in Bezug auf die Lieferung gekaufter Produkte führt zu Verkehrsstaus, Umweltverschmutzung und Verkehrsunfällen. Das Projekt beinhaltet die Entwicklung eines Konzepts für ein nachhaltiges städtisches Logistikmodell für Lieferungen auf der letzten Meile und E-Commerce-Retouren, einschließlich Tools, um die Interessengruppen zu motivieren, ihre Präferenzen für Lieferungen auf der letzten Meile und Retouren zu ändern, um sie nachhaltiger (ökologisch, sozial und wirtschaftlich) zu machen.

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W artykule przedstawiono projekt badawczy realizowany na Uniwersytecie Ekonomicznym we Wrocławiu pod kierownictwem dr. hab. inż. Mai Kiby-Janiak, prof. UE, finansowany ze środków Narodowego Centrum Nauki w Polsce, przyznanych na podstawie decyzji numer 2018/31/B/HS4/03711. Projekt odpowiada na problemy, jakie stwarza dynamicznie rozwijający się rynek e-commerce. Atrakcyjne ceny zakupu, niskie koszty, krótki czas i dogodne miejsca dostawy motywują konsumentów do zakupów online, co stanowi wyzwanie dla usług e-handlu i firm transportowych. Spełnienie oczekiwań e-klientów w zakresie dostawy zakupionych produktów prowadzi do zatorów komunikacyjnych, zanieczyszczenia środowiska i wypadków drogowych. Projekt polega na opracowaniu koncepcji modelu zrównoważonej logistyki miejskiej w zakresie dostaw ostatniej mili i zwrotów na rynku e-commerce, w tym narzędzi motywujących interesariuszy do zmiany preferencji w zakresie dostaw ostatniej mili i zwrotów towarów, dzięki czemu staną się one bardziej zrównoważone (środowiskowo, społecznie i ekonomicznie).