

E-Commerce as a Game Changer for Logistics in a Sustainable Context

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Abstract

Purpose: The purpose of the study is to identify the areas of e-commerce that can lead to sustainable logistics.

Design/methodology/approach: The research methodology includes a theoretical analysis. It is based on various data collection techniques such as document review, direct observation and archival records from secondary sources such as reports, studies, statistics and internet sources.

Findings: E-commerce is not yet a game changer for sustainable logistics. However, it seems to be a matter of time, and it will grow in importance and influence. For this reason, companies that want to maintain a competitive edge need to be aware of the changes and the expectations of customers, who are increasingly paying attention to sustainable development.

Research limitations/implications: The research is mainly based on secondary sources. Empirical research is needed to confirm the hypotheses.

Originality/value: The sustainability of e-commerce is a critical issue that needs to be addressed. Despite the increasing attention paid to sustainable logistics in e-commerce research, the literature available is still in its infancy and requires further development. This paper fills this research gap.

Keywords: e-commerce, sustainable development, game changer.

JEL: L81, Q01, R41

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Handel elektroniczny jako czynnik zmieniający reguły gry dla logistyki w zrównoważonym kontekście

Streszczenie

Cel: celem badania jest identyfikacja obszarów e-commerce, które mogą prowadzić do zrównoważonej logistyki.

Metodologia: metodologia badania obejmuje analizę teoretyczną. Opiera się na różnych technikach gromadzenia danych, takich jak przegląd dokumentów, bezpośrednia obserwacja i zapisy archiwalne ze źródeł wtórnych, takich jak raporty, badania, statystyki i źródła internetowe.

Wyniki: handel elektroniczny nie jest jeszcze przełomem w zrównoważonej logistyce. Wydaje się jednak, że jest to kwestia czasu, a jego znaczenie i wpływ będą rosły. Z tego powodu firmy, które chcą utrzymać przewagę konkurencyjną, muszą być świadome zmian i oczekiwań klientów, którzy coraz częściej zwracają uwagę na zrównoważony rozwój.

Ograniczenia/implikacje badawcze: badania bazuje głównie na źródłach wtórnych. Potrzebne jest przeprowadzenie badań empirycznych w celu potwierdzenia hipotez.

Oryginalność/wartość: zrównoważony rozwój handlu elektronicznego jest kluczową kwestią, którą należy się zająć. Pomimo coraz większej uwagi poświęconej zrównoważonej logistyce w badaniach nad handlem elektronicznym, dostępna literatura jest wciąż niewystarczająca i wymaga dalszego rozwoju. Niniejszy artykuł wypełnia tę lukę badawczą.

Słowa kluczowe: e-handel, zrównoważony rozwój, zmieniacz gry.

1. Introduction

With the dynamic development of e-commerce, the scale of challenges for logistics is growing. In 2021, customers generated approximately 159 billion packages (Boukarroum, 2022). 2022 was forecast at USD 170 billion (Statista, 2023). These numbers translate into shipments being driven billions of kilometers and millions of tons of packaging material being used. Each product must be completed, packed and shipped or handed over for collection by the customer. Although online shopping is very convenient for customers, it has an impact on the environment and society. For this reason, it is claimed that the rapid and continuous growth of e-commerce cannot be discussed without talking about its sustainability (Oláh et al., 2019; Fedorko et al., 2017). Given that e-commerce is ubiquitous, it is important to ensure that its activities do not threaten the world (Dabija, 2022). It should be organized to protect the environment, avoid its destruction and ensure the continuation of humanity (Oláh et al., 2019).

Online shoppers are more and more interested in a sustainable approach. Not only do they expect social responsibility from companies, but they also want to take initiatives that are related to ecology. According to the “Green Generation” report of the Mobile Institute (2021), many e-customers are willing to wait longer for the delivery if the e-store cares for a greener delivery and to pay extra for foil-free packaging. However, there are still many customers who have the opposite attitude. The report also shows

that almost two thirds of the respondents surveyed do not know what “ecological” means, and one third believe that the global climate is not getting warmer. The problem with the development of ecological attitudes is, above all, convenience. A large part of consumers still treat the pro-ecological approach as an additional effort in which they do not see direct benefits. A similar dichotomy is shown by the results of McKinsey’s (2019) study. Some clients are able to pay up to 5% more if a green product meets the same requirements and expectations as the non-green alternative. However, there are customers who do not want to pay extra for sustainable solutions. This is indicative of the still low awareness and relatively low commitment of the public to sustainability, even though they have increasing expectations in this field.

Although sustainability in e-commerce has been attracting more attention (Abukhader & Jönson, 2003; Mangiaracina et al., 2015), the available research is still in its infancy and requires a deeper insight. E-commerce research is dominated by a large number of articles referring to the study of marketing (Allen & Fjermestad, 2001; Fedorko et al., 2017), IT (Ghobakhloo, 2011), logistics (Ramanathan et al., 2014; Rao et al., 2011). Moreover, there is also a debate in the literature on whether the rapid growth of e-commerce has a positive or negative impact on sustainable development, particularly on the environment (Carrillo et al., 2014; Godfrey, 2017). This is because online shopping eliminates the trip to the store and back – this is done more efficiently by logistics companies. However, delivery can be inefficient when the customer is not at home (Haryanti & Subriadi, 2021). On top of that, there are returns. Moreover, there are additional packaging materials in e-commerce (Mangiaracina et al., 2015). However, most research findings show that the positives of e-commerce outweigh its negatives (Oláh et al., 2019). Of interest are the results of Rai et al. (2021), which show that non-financial incentives drive more sustainable choices during e-shopping. It is therefore important to make customers aware of this and encourage them to adopt pro-environmental attitudes (Rai et al., 2021).

Undoubtedly, the dynamic development of e-commerce has brought about many changes – not only in the area of retail structure, but especially in the area of logistics and its sustainability. It has triggered additional activities and made companies and customers realize that they can influence the future of the environment and social conditions. With the new approach, companies can gain competitive advantages and attract more customers (Lumpkin et al., 2002). For these reasons, it can be treated as a game changer. Therefore, the aim of this article is to identify areas of e-commerce that are a game changer for sustainable logistics.

The research methodology of this article includes a theoretical analysis. It is based on various data collection techniques such as document review, direct observation and archival records from secondary sources such as reports, studies, statistics and internet sources. However, the most important

source of data was publications contained in the databases: Emerald, ScienceDirect, and Taylor & Francis. The search criteria in these databases were the keywords: 'sustainability' and 'logistics' and 'e-commerce'. Inclusive criteria were adopted: (1) search criteria should be included in the abstract, title or keywords of the analyzed papers; (2) publications should be classified in the area of management studies; (3) only papers in the form of scientific articles published in journals, scientific articles published in conference proceedings and chapters in scientific monographs were analyzed; (4) only papers available in full version and in English were considered. In addition, the snowball method was applied, i.e. if there were references to other scientific papers on the search keywords, these were also taken into account. The main reason for choosing this methodological approach was the need to discern the popularity of the topic under study in the research conducted so far.

2. E-Commerce Sector

The advent of the internet has not just revolutionized communication, but also altered commerce by providing customers with greater opportunities to purchase products. Customers now have access to a wider range of products at better prices. Additionally, they can now purchase products that were previously unavailable due to factors such as distance, lack of time, or a different lifestyle. This includes products from other countries that were previously difficult to obtain (Doligalski, 2009).

Online shops have been opened by both new operators (pure players) and owners of traditional counterparts (brick-and-mortar players), for whom the internet has provided an additional sales channel. This has given customers access to products round the clock, in addition to a wider selection of products than traditional shops could offer, easy product comparisons, and the ability to monitor customer behavior. Consequently, e-commerce has evolved into a new sales and marketing tool, providing a platform for businesses to offer their products and services to a larger audience (Kawa, 2017).

E-commerce has been one of the fastest growing sectors in recent years, both nationally and globally. The pandemic and the resulting restrictions at stationary shops have contributed to its dynamic development (Tran, 2021). On the one hand, e-commerce has enabled many people to access products and function relatively normally during this difficult period, but on the other hand, the internet has become a place where it is easy and quick to buy something without a lot of thought – almost like with impulse products at the checkout in a shop (Lavuri, 2021). As experts predict, the e-commerce growth achieved during the pandemic is likely to be a lasting achievement and will be the basis for its further development (Yuan et al., 2021; Elrhim & Elsayed, 2020). However, the dynamics of this development

has recently been somewhat limited by the high level of inflation, which reduces the purchasing power of consumers.

Today, 5.16 billion (64.4%) people around the world use the internet and spend 6h 37m on average daily using the internet (Datareportal, 2023). 76% of them buy online (Kemp, 2022). According to eMarketer, global e-commerce turnover increased by 12.2% in 2022, when its value reached USD 5.54 trillion. This represented around 20.3% of the total retail sales. In 2023, it is anticipated to reach USD 6.15 trillion (up by 11%), and in 2025 it is expected to amount to USD 7.39 trillion, thus accounting for 23.6% of the total trade (eMarketer, 2022). In Poland, the internet penetration stood at 88.4% percent. People spend 6h 42m on average in the internet. 97% of the population have smartphones (Datareportal, 2023). E-commerce is developing as dynamically as it is globally. Already 87% of internet users buy products online and 61% of them make their purchase online 2–5 times a week (eIzba, 2022). It is estimated that in 2022 the value of online sales amounted to about PLN 109 billion. Thus, the share of e-commerce in total trade in Poland will be about 12%. In 2023, e-commerce is expected to be worth PLN 124 billion (PwC, 2022).

As buying online involves getting the ordered product to the customer, i.e. delivery, and before that preparing it for shipping, packing and handling any returns, logistics is a very important part of e-commerce. The next section is devoted to this.

3. E-Commerce Logistics

In many companies, logistics is still treated peripherally, as an instrument to support other areas of the business and a source of costs. However, the role of logistics has changed in e-commerce. It is safe to argue that without logistics and its solutions, e-commerce would not exist at all or would function in a very limited way (Ramanathan et al., 2014).

In e-commerce, some of the logistics processes are similar to those in traditional commerce and some are different. The main difference concerns the access to and receipt of goods. In conventional trade, customers are required to physically visit the store to purchase products and then transport them to their desired location. In contrast, e-commerce replaces this process with electronic ordering and the option of having the product delivered to a location chosen by the customer or made available for collection at a brick-and-mortar store. This entails selecting the items, packing them, and arranging the shipment. Additionally, a returns process exists due to regulations concerning distance purchases. In the European Union, consumers have the right to return online purchases within 14 calendar days without providing a reason, as long as they submit a notice of withdrawal (Kawa, 2017).

In terms of the number of transactions (but not their value), e-commerce is dominated by the B2C (business to customer) segment, where goods are ordered by individual customers. Dealing with such customers is much more difficult and requires implementation of special procedures. E-customers often make one-off purchases. There is, therefore, high fragmentation of orders, which involves frequent shipments of small batches of products. E-tailers have a wide assortment of a relatively small number of items and tend to send single items (Kawa, 2017).

Logistics allows e-tailers to deal with the time and cost of fulfillment and delivery, the quality of delivery and the handling of returns. Moreover, efficient and customized logistics is a source of competitive advantages. On the one hand, the availability of goods, various forms of delivery and low shipping costs attract new customers. On the other hand, timeliness and conformity of the goods with the order help to retain existing customers, as satisfied ones repeat purchases. It helps to build trust and loyalty among customers and minimize the costs of storage and transportation.

E-commerce has also significantly affected supply chains. The advent of the internet has cut out middlemen in the supply chain and opened up new avenues for sales and distribution. The focus is now on the end consumer, who can place orders from anywhere at any time. With the beginning of online sales, customers have become an integral part of the logistics process, and in many cases have become involved with logistics services for the first time (Kawa, 2020).

A very important element of e-commerce logistics is sustainability. More and more attention is being paid to it, so more and more studies are being developed on the subject, more and more conferences, articles and initiatives are being launched around it.

4. Sustainable Development and Sustainable Logistics

Although the concepts of sustainability and sustainable development have been used in the literature for many years, there is still no clearly defined approach. It is understood and interpreted in different ways, with different scopes and actors. According to Giddings et al. (2002) and Hopwood et al. (2005), it is a contested concept. Barkemeyer et al. (2014) adds that the multiplicity of definitions does not contribute and that they are “mutually exclusive.”

The most well-adopted and most often quoted definition of sustainable development was formulated by the United Nations (known as WCED’s Brundtland report). It sounds as follows: “development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 37). This definition focuses on the needs of both present and future generations. The problem with this definition is that it is not known what the future will look like, much

less what the needs of future generations will be. In addition, it does not refer to any specific group of actors and therefore organizations often have difficulty determining their individual role in this bigger, macroeconomic picture (Carter et al., 2008; Shrivastava, 1995).

More concrete in terms of who is affected is the definition of Starik and Rands (1995, p. 909): “the ability of one or more entities, either individually or collectively, to exist and flourish (either unchanged or in evolved terms) for lengthy timeframes, in such a manner that the existence and flourishing of other collectivities of entities is permitted at related levels and in related systems.” In this case, however, it is not clear what is meant by lengthy timeframes and what are related levels and systems.

According to Britannica, it “is an approach to economic planning that attempts to foster economic growth while preserving the quality of the environment for future generations” (“Sustainable development,” n.d.) This definition focuses on economic things including the environment, it does not consider social issues. This is because initially, the consideration of sustainable development focused on reducing the negative impact of human activity on the environment. Over time, the concept has been expanded to include social cohesion, environmental protection and economic growth (Basri & Siam, 2019; Hart & Milstein, 2003). Those three dimensions have to go hand in hand (Pei et al., 2010). Integration of these three elements allow for achieving long-term economic viability (Carter et al., 2008).

There is also a similar range of different definitions and approaches to sustainability in the case of sustainable logistics. Wichaisri and Sopadang (2013) relate sustainable development to a logistics system. According to them, “a sustainable logistics system focuses on logistics operations (i.e., supplier selection, procurement, manufacturing, warehousing, and delivery) in order to reduce a company’s costs, lessen its environmental impact, and address the impact it has on society” (Wichaisri & Sopadang, 2013, p. 1019). A slightly broader reference to supply chains, and not just logistics, is made by Carter et al. (2008, p. 368) stating that it is “the strategic, transparent integration and achievement of an organization’s social, environmental, and economic goals in the systemic coordination of key interorganizational business processes for improving the long-term economic performance of the individual company and its supply chains.”

The analysis of the literature on sustainability allows the formulation of a definition of sustainable logistics in e-commerce. This definition was developed based on the definition of Seuring and Müller (2008). Namely, sustainable logistics is the management of physical products and information flows as well as cooperation among companies and consumers while taking goals from three dimensions of sustainable development, i.e. economic, environmental and social, into account which are derived from customer and stakeholder requirements.

A lot is being said about sustainability in the context of products and, more often than not, of manufacturing itself. In commerce, we deal with the finished product and thus with its marketing. In the case of e-commerce, there is a fairly strong relationship with the customer, who is increasingly paying attention to how and in what form products are delivered, in addition to how they are returned.

5. Sustainable Logistics Dimensions

Sustainable logistics in e-commerce is a concept that focuses on balancing the economic, environmental and social aspects of logistics operations. It is worth explaining the three dimensions.

Environmental sustainability focuses on the protection and preservation of natural resources, including air, water, and soil, as well as biodiversity. It relates to the e-commerce impact in the form of emission of greenhouse gasses, air pollution, noise pollution and congestion (Demir et al., 2015). It also includes reducing waste and pollution and managing energy and natural resources responsibly. Pollution is mostly generated by transport (Seebauer et al., 2016) and packaging (Freitag & Kotzab, 2020; Ignat & Chankov, 2020). Some authors add the energy that is used for e-commerce maintenance (servers, computers and other electrical devices). It turns out that a badly designed website which takes a long time to load and overloads the internet network affects the additional life of energy (Godfrey, 2017).

By making it easier for customers to access products and services, e-commerce can help to reduce the carbon footprint of retail, as customers are less likely to need to travel long distances to make a purchase.

Social sustainability refers to human needs and cultural development (Elkington & Rowlands, 1999). It includes employment (working conditions, wages, benefits, etc.) (Shishiteva, 2017) as well as gender empowerment, a decrease in poverty, fair labor practices, community engagement, and human rights. Thanks to digitization, many customer service processes are automated. Thus, e-commerce is usually less labor-intensive than selling in traditional shops. On the other hand, e-commerce continues to grow, so there is a need for new employees, but with different competences. This is changing the labor supply of the market, which is prompting retailers to look again at e-commerce. It needs human resources, especially their qualifications and skills exactly adjusted to the dynamically changing environment. Not only qualified labor, high managerial skills, but also knowledge about national and overseas markets, understanding different consuming habits, quick learning about new technologies and business models, and being innovative are the most important challenges. They require an appropriate education, training system, labor mobility, and policy facilities (Chen, 2017).

Some authors even point to more specific factors, such as the strain on public infrastructure and traffic that delivery causes (Ducarme, 2019; Ignat & Chankov, 2020; Laghaei et al., 2016), and even fraud and complaint (Haryanti & Subriadi, 2021).

E-commerce can greatly improve access to products and services, particularly for those in rural or remote areas.

In turn, **economic sustainability** concerns cost, time, quality and other major goals for business and economy (Basri & Siam, 2019). It takes into account the environmental and social dimensions while focusing on economic gains and generating profits and revenue. Cost is of great importance to customers, who consider it to be the most important deciding factor in choosing a product, delivery service, etc. It can therefore have a negative impact on other aspects of sustainability. The concept of sustainability has to be considered as trade-offs in the environment, society and economy that will result in greater benefits (Oláh et al., 2019).

To ensure the economic sustainability of e-commerce, it is important that policymakers and businesses work together to create an environment in which e-commerce can flourish. This includes ensuring that e-commerce companies pay their fair share of taxes, that there is a level playing field for all companies, and that the digital economy is regulated in a way that protects the interests of consumers, workers and the environment.

One of the main benefits of e-commerce is the ability of businesses to reach a global market and generate sales from a wider range of customers. E-commerce also enables businesses to reduce their operating costs and improve their competitiveness, which can lead to lower prices for consumers and increased consumer welfare. However, the growth of e-commerce also poses a number of challenges to economic sustainability. One such challenge is the uneven distribution of economic benefits among different groups, with some countries and regions being left behind.

6. Key Sustainable Logistics Game Changers in E-Commerce

Delivery

Due to the lack of geographical restrictions in e-commerce, goods are sometimes shipped from very far away to the customer. Regardless of that, many studies show that e-commerce is the most effective choice for delivery, even for long distances, because it allows to avoid using private transport to shopping malls and enables better consolidation and routes optimization (Escursell et al., 2021; Rai et al., 2021). However, one of the biggest challenges of e-commerce is the last stage in the process of delivering the shipment to the recipient which is known as the last mile delivery (Mangiaracina et al., 2015). It is a critical link in the entire supply chain – while logistics at earlier

stages is automated and optimally designed, the quality of service at the last stage is determined by humans (Yuen et al., 2018).

According to Frost and Sullivan (2018), global spending on logistics was projected to reach USD 10.6 trillion in 2020. The transportation sector accounts for 70% of this expenditure, with the last mile making up 40% of that amount. In addition to the very high financial costs, there are many social costs associated with urban supplies – traffic jams, noise, pollution, etc. The problem, therefore, is the limited possibility to choose the place from which the shipment will be sent while shopping online and the lack of possibility to consolidate shipments during the ordering process on the shopping platform.

Deliveries are fragmented (there are no systemic mechanisms to mitigate this) and past industry practice shows that the speed of delivery is more important than minimizing its carbon footprint. An additional challenge is the increasing demand for fast delivery (Radonjic & Tompa, 2018). Recently, there has been a growing trend of q-commerce which relies on ultra-fast deliveries – even within 15 minutes of placing an order. Such deliveries are direct from point to point and there is not much room for optimization.

With the rapid growth of e-commerce, the number of packages whose recipients are private individuals has increased. During the couriers' working hours, most of these people are usually at work, school or elsewhere. The range of delivery hours is in fact quite wide and it is difficult for customers to predict the moment of arrival of the courier, who usually does not even inform about an approximate time of the delivery. This has been a very big challenge for courier companies. A solution to this problem has been found in OOH (out-of-home) deliveries, which are now a game changer in the sustainable logistics of e-commerce. They involve the delivery to parcel lockers and PUDO (pick up drop off) points (Mangiaracina et al., 2015), which are indicated by the customer at the time of the purchase. Such packages can be picked up along the customer's commuting route, e.g. home, to work or school, at a time convenient for the customer, within a time frame of up to several days. OOH makes it possible to consolidate and deliver multiple packages to one location, which increases delivery efficiency. Resources (cars, couriers) and processes are reduced (delivering more shipments to the same location reduces the number of stops and eliminates failed deliveries due to the recipient being absent). In addition, both delivery costs and average delivery times are significantly reduced. OOH delivery, however, involves the customer in the last mile process. Customers have to do some of the work that is normally done by the courier, i.e. they have to go to the OOH point and collect their parcels themselves. In addition to convenience, the environmental benefits are also important. According to the World Economic Forum, delivery costs can be cut by 2% to 12% and at the same time road congestion can be reduced by 5% to 18% (WEF, 2018).

Out-of-home (OOH) delivery overcomes the challenges of finding the right address or not having the recipient at home. It is a straightforward delivery method where the customer selects a convenient pick-up location when making an online purchase. The proximity of the location to the customer's home or workplace is a key consideration, making the density and distribution of OOH outlets important.

By consolidating parcels, OOH delivery is less expensive than door-to-door courier services and reduces the number of undelivered parcels due to absence. It also results in fewer queries from recipients as they receive automatic updates on the status of their parcel. Moreover, OOH delivery is effective for returns, allowing recipients to return products easily and cheaply, sometimes even free of charge, depending on the retailer's policy.

The last mile problem can also be tackled with solutions related to social aspects. In logistics, there is increasing interest in applying the concept of the sharing economy. A prime example of this is crowdsourcing, which involves individuals picking up and delivering shipments in urban areas (Kiba-Janiak et al., 2021; Ignat & Chankov, 2020; Mangiaracina et al., 2015). There is also more and more attention being paid to horizontal cooperation in which e-tailers and/or logistics companies work together and thus can make better use of their resources and capabilities (Fichter, 2002). Today, mobile internet applications are most often associated with the sharing economy in transport. Its example is Uber for urban deliveries. The functionality is similar to that of transport exchanges in that they allow the selection of a carrier for a specific transport task. For individual customers, business models that involve the public and their resources to provide services are very popular.

Packaging

A big challenge related to the dynamic development of e-commerce is the growing amount of packaging waste (Escursell et al., 2021). Researchers from the MIT Real Estate Innovation Lab (2021) published interesting data. Well, the biggest "polluter" in e-commerce is not the last mile, but the packaging. 45% of all e-commerce greenhouse gas emissions are related to packaging and packaging materials. The opposite proportions are shown in the Olivier Wayman (2021) report, where packaging generates 14% of CO₂, with the greatest impact on the last mile (26%). The results of the two studies show large discrepancies which are probably due to different research methodologies. Regardless, packaging has a significant impact on sustainable logistics, in particular ecology.

Packaging serves as a means of storing and securing goods and plays a critical role in the technology used to load and transport shipments. In e-commerce, where shipments go through multiple operations, the design and functionality of the packaging is even more critical. The packaging should be easy and intuitive to open without damaging the goods and

robust enough to withstand reshipment if returned. It should also have an informative function, conveying information about the contents, protecting the goods from mishandling during transport and enabling identification of the shipment on delivery. Packaging also has a marketing function as it is often the first physical contact the customer has with the product. The act of opening the packaging evokes strong emotions in many customers, similar to the excitement of opening a gift. Therefore, the packaging should be aesthetically pleasing, act as an incentive for future purchases and as an advertisement for the online retailer (Kawa, 2017).

The packaging of goods is also part of the larger system in which products function. They are closely linked to transport, and therefore also to the last mile (Lu et al., 2020; Monnot et al., 2019). Orders placed with several e-tailers do not only require delivery to the customer each time but also individual packaging. Products are often placed in oversized packaging, which leads to less efficiency and at the same time increases the carbon footprint, because it requires additional protective materials and more transport means. Packaging loses value after use and becomes waste, although in many cases it could be reused. In addition, products are often over-packaged and consumers do not know what to do with the packaging that accumulates in their homes – where to store and dispose of it, how to segregate it properly. Different types of packaging are used, with a significant proportion of materials that cannot be recycled (Mangiaracina et al., 2015; Oláh et al., 2019), e.g. plastic fillers, foil packs, tapes that are difficult to remove from a paper carton, etc. The way in which goods are packaged varies greatly, as individual manufacturers and retailers are responsible for this. This results in a situation where the problem of packaging waste is not only a social or environmental problem but also an individual problem for consumers, as it is an impediment to their daily lives (Trivedi et al., 2018). Retailers and manufacturers often lack knowledge and environmental sensitivity – as a result, the packaging they use does not meet standards of sustainability. In addition, the cost of packaging significantly influences retailers' choice of individual solutions and ecological solutions tend to be more expensive, which means that they are used less frequently. This makes it very difficult to develop a uniform product packaging system.

Customers are paying increasing attention to reusable packaging, which is likely to be a game changer for sustainable logistics. It will allow for solving the problems associated with packaging and, above all, its negative impact on the environment. Returning goods will be made easier, delivery costs will be reduced, it will be easier to protect goods and, above all, minimize the carbon footprint.

Returns

Another very important area related to sustainable e-commerce are returns (Park & Regan, 2004), which significantly influence CO₂ emissions (Ghezzi et al., 2012; Wiese et al., 2012). Internet shopping, in contrast to traditional trade, is connected with convenience, but also with the impossibility to check goods before buying them. Customers cannot check them organoleptically, so returns at online shops are more frequent than in stationary shops. Customers in many countries (e.g. in the EU) have the right to return goods bought online without giving a reason. This is the so-called consumer return (XiaoYan et al., 2012). However, it is a more complicated process than fulfilling the order and sending the product to the customer (Bernon et al., 2016). It requires checking the quality of the product and deciding on the further fate of the production. Some are disposed of, some are repaired or reused. Returns generate additional transport to distribution warehouses, fulfillment centers or other places (Wiese et al., 2012) and ensue packing them with the aforementioned materials if the goods are not delivered in return packaging (Sallnäs & Björklund, 2020). The negative impact of returns is reduced by reusable packaging (e.g. RePack, ePack), but also by using OOH as a shipping method. Online retailers also take care of proper presentation and accurate description of their products.

Returning goods can be an unpleasant experience for customers, as it can take extra time and often involves additional costs. For some people, especially those who are new to the process, it can be a stressful situation. They may not know how to declare a return, how to prepare and pack the package, how to order a courier or where to send the package. It is important to make the returns process easier for the customer, as the decision to return a product is often due to problems with the product itself rather than the salesperson. If the return process is difficult, it can add to customer frustration. A straightforward return process can create a positive experience that encourages customers to return to the same retailer. To achieve this, it is important to have an interactive returns form and easy communication channels such as email or phone. Unfortunately, many sellers still have unfriendly return forms in the PDF format that can be cumbersome to complete (Kawa, 2019).

The delivery process in e-commerce returns logistics is a significant challenge and cost. For low-value products, some customers choose not to exercise their right of withdrawal, especially if they have to pay for the return. If shops covered all return costs, this could potentially encourage customers to order more frequently. Unfortunately, many shops view returns as an additional expense, as they not only have to cover the cost of delivering the product to the customer but also have to carry out other activities such as quality control checks, refunds, sales documentation and other processes similar to receiving goods from a supplier (Bernon

et al., 2016). However, studies (Kawa, 2019) have shown that returns can increase customer satisfaction and loyalty in e-commerce. When customers pay more attention to return policies, they tend to be more satisfied with their purchases, leading to increased loyalty and spending. This can give sellers and suppliers a competitive advantage over their rivals. The right approach to returns can be a game changer for online retailers.

Re-commerce

E-commerce also opens up opportunities to develop new activities or to apply those that are well known in traditional sales. One of these is re-commerce, which refers to the buying and selling of second-hand or pre-owned items. It is a portmanteau of “recycling” and “commerce”. This is done in line with the concept of a closed loop economy, or production and consumption, which involves sharing, borrowing, reusing, repairing, refurbishing and recycling existing materials and products for as long as possible. In this way, the life cycle of products is extended. This gives products such as electronics, clothing, toys, etc. a so-called second life. Such goods can be bought and sold on marketplaces such as Poshmark, ThredUp, and The RealReal, Vinted, OLX. Recently, second-hand goods are also traded by retail chains. Examples include H&M, Decathlon, Auchan and Carrefour (Kakowska-Mehring, 2021).

Re-commerce platforms allow individuals and businesses to sell items they no longer need to other people who are interested in buying them. These platforms are often a more sustainable alternative to traditional retail, extending the life cycle of products and reducing waste.

Second-hand goods have become increasingly popular in recent years. This has been driven by a growing awareness of the environmental impact of consumption and a desire to live more sustainably. By buying and selling second-hand goods, individuals can reduce the amount of waste sent to landfill and conserve resources that would otherwise be used to produce new items (Santos et al., 2021).

One of the challenges of re-commerce logistics is reverse logistics, or the process of handling returns and exchanges (Augustine & Fulghum, 2018). Re-commerce platforms need to have processes in place to accept returns, inspect items and issue refunds or exchanges. This process can be more complicated than in traditional retail, as items may have varying degrees of wear and tear or damage, and may not always be in their original packaging.

One of the most significant ways in which re-commerce is a game changer is its potential to reduce waste and promote sustainability. By extending the life cycle of products and reducing the need for new production, re-commerce can encourage consumers to adopt more conscious and responsible purchasing habits and help reduce the environmental impact of consumption. This can lead to a shift away from disposable and fast fashion, and towards more sustainable and durable products.

7. Conclusions

The exponential growth of online shopping in recent years has led to a growing awareness of the negative environmental impacts of e-commerce, including increased carbon emissions from transport and packaging waste. As a result, consumers are becoming more aware of the impact of their purchasing decisions and are looking for ways to make more sustainable choices. This has led to the growth of sustainable e-commerce, which is changing the way online shopping is done and perceived.

The article also showed that e-commerce can have a positive impact on sustainable logistics. This is exemplified by the lower financial outlay for the escrow of goods and thus a lower negative impact on the environment compared to traditional trade. Transport for e-commerce also compares favorably in many cases.

The rise of sustainable e-commerce is a response to growing concerns about the environmental impact of online shopping and consumers' desire to make greener purchasing decisions. By offering sustainable products and delivery options, e-commerce companies can appeal to a growing number of environmentally conscious consumers while reducing waste and improving the efficiency of their operations.

E-commerce is not yet a game changer for sustainable logistics comparable to the advent of the internet or mobile phones. However, it seems to be a matter of time, and it will grow in importance and influence. For this reason, companies that want to maintain a competitive edge need to be aware of the changes and the expectations of customers, who are increasingly paying attention to sustainable development.

In conclusion, e-commerce has the potential to contribute to sustainable development, but it is important to carefully manage and mitigate its negative impacts. This can be achieved through the development and implementation of sustainable e-commerce practices and policies, as well as through increased awareness and education about the environmental and social impacts of e-commerce.

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