
Modern Logistical Solutions in Polish E-Commerce: Economic Drivers and a Case Study Analysis

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Abstract:

Purpose: The aim of this article is to analyze modern logistic solutions employed in e-commerce in Poland, using the Zalando platform as a case study, with a particular emphasis on their impact on customer service levels and the economic conditions underpinning industry growth. The analysis focuses on how logistic solutions influence cost-effectiveness, customer satisfaction, and the competitiveness of enterprises.

Design/Methodology/Approach: The study employs secondary data analysis (desk research) and a diagnostic survey conducted via a structured questionnaire. The research involved 250 users of the Zalando platform. The analysis included an assessment of the cost-effectiveness of logistic solutions and their significance in the context of customer purchasing decisions.

Findings: Logistics represents a strategic element of competitive advantage for e-commerce firms, and its modernization translates into greater operational efficiency and cost reduction—benefiting both companies and customers. Solutions such as automation, delivery personalization, and return process optimization not only enhance the shopping experience but also minimize transaction costs. The study revealed that a lack of customer awareness regarding the logistical backend may lead to undervaluation of solutions that substantially improve a company's economic efficiency. Companies should strive to develop transparent communication regarding the economic value of the logistic solutions implemented.

Practical Implications: Optimized logistics in e-commerce has a direct impact on lowering operational costs and enhancing the profitability of the business. Improvements in customer service, automation, and the development of green logistics can serve as tools for enhancing customer experiences while also reducing costs. The implementation of such solutions fosters long-term growth in the economic value of enterprises.

Originality/Value: This article combines empirical approaches with an analysis of the economic aspects of logistics in e-commerce, providing new insights into the cost-effectiveness of modern solutions and their influence on consumer behavior.

Keywords: Logistics, customer service, economic efficiency, transaction costs, automation, return logistics, competitiveness, sustainability.

JEL codes: L81, M31, R41, D61, L11.

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1. Introduction

In recent years, electronic commerce (e-commerce) has emerged as one of the most rapidly growing sectors of the global economy. This phenomenon not only transforms the way consumers make purchases but also necessitates profound changes in the logistics processes within companies. E-commerce, as a sales modality based on digital technologies, significantly extends the availability of products and services while simultaneously generating new challenges in supply chain management.

In Poland, the development of the e-commerce market is progressing at an impressive pace. In 2024, as many as 78% of Polish internet users reported regular online shopping, which confirms the enduring entrenchment of online commerce within the structure of the national consumer market (E-Commerce ..., 2024). Concurrently, consumer expectations are rising, particularly regarding the speed, flexibility, and convenience of delivery, which compels companies to implement modern, automated, and user-centric logistical solutions.

Currently, one of the most favored delivery methods is parcel lockers, preferred by 81% of online buyers. Dominating this sector is the Paczkomat® InPost brand, chosen by 88% of users opting for this delivery method. A dynamic development of logistical infrastructure is also observed in alternative solutions, such as DPD Pickup, ORLEN Paczka, and networks of partner points, which are investing heavily in modern technologies, sustainable logistics, and integration with mobile applications (E-Commerce ..., 2024).

Contemporary logistics in e-commerce is no longer confined solely to the effective delivery of products; it also encompasses comprehensive customer service, ranging from an intuitive purchasing process to real-time tracking of shipments and quick, hassle-free return procedures. Furthermore, ecological aspects are gaining increasing significance, with companies increasingly adopting solutions that support the principles of the circular economy, such as reusable packaging and transport emissions neutrality.

In the face of intense competition—emanating both from global marketplaces like Amazon and AliExpress, as well as the rapidly evolving re-commerce sector—flexible and efficient logistics is becoming a critical component of the competitive advantage for companies operating in the Polish e-commerce market.

The objective of this study is to analyze modern logistical solutions utilized in e-commerce in Poland, with particular emphasis on their impact on customer service levels. The detailed analysis will focus on the operations of Zalando, one of the largest companies operating in the online retail sector in Europe. The research will concentrate on identifying key logistical service factors—pre-transactional, transactional, and post-transactional—that influence the choice of a specific online

store from the customer's perspective. Subsequent sections of the paper will also present potential directions for the development of logistics at Zalando that could contribute to an increase in order volume and an expansion of the customer base.

2. Literature Review

The development of e-commerce is one of the most significant phenomena in the contemporary digital economy, both on a global and local scale. The literature emphasizes that the rise in the popularity of electronic commerce is a result of increasing societal mobility, the dynamic development of technological infrastructure, and changes in consumption models (Piecarka, 2020; Kotler *et al.*, 2012). The OECD (2022) estimates that the global value of e-commerce has surpassed \$5 trillion, which accounts for more than one-fifth of total retail sales.

Despite its relatively late development compared to Western European countries, the Polish e-commerce market currently demonstrates some of the highest growth rates in the Central and Eastern European region. According to the Central Statistical Office (GUS, 2021), over 77% of internet users are making purchases online, and this number continues to rise.

The literature extensively addresses modern logistics models that facilitate effective management of operations within the digital environment. Among the most frequently described models are dropshipping, fulfillment, just-in-time (JIT), and the model based on proprietary warehousing (Kawa, 2017; Christopher, 2016). Each of these models responds to different operational needs and varies in the extent of control over the logistics process, as well as the level of initial investment required.

E-commerce logistics, according to many researchers, plays a strategic role in building competitive advantage for enterprises (Szymczak, 2013). Authors such as Fernie and Sparks (2014) and Witkowski (2010) note that effective logistics not only optimizes costs but also influences customer satisfaction and loyalty.

Customer service, which is a key component of logistics (Krajewska *et al.*, 2011), contributes to consumer retention; even minor improvements in this area can significantly impact the financial performance of a company (Coyle *et al.*, 2010).

In particular, Rutkowski (2004) and Kempny (2001) define logistics as a process that ensures the right product is delivered to the right place, at the right time, in the right quantity and quality, while simultaneously minimizing costs. According to Kempny (2001), customer service encompasses activities throughout the entire logistics chain—from order placement to after-sales service—and should be regarded as a corporate philosophy rather than merely a set of operational activities.

Modern technologies, such as ERP and CRM systems, play a crucial role in enhancing the quality of logistics management (Wieczerzycki, 2012). Mesjasz-Lech

(2014) and Baran and Sypniewska (2020) demonstrate that the integration of these systems with Big Data technologies and artificial intelligence contributes to increased operational efficiency and enables better alignment of services with customer expectations (Chmielarz, 2022).

The literature also emphasizes the importance of comprehensive customer service—not only during the transaction but also before and after it is completed. Krawczyk (2011) categorizes customer service into three components: operational actions, performance measurement, and corporate philosophy. Only a holistic approach to these elements can provide the foundation for high-quality e-commerce logistics and create a sustainable competitive advantage.

3. Research Methodology

The paper uses two primary research methods: desk research and a diagnostic survey based on a questionnaire. The theoretical section of the study is grounded in a literature review, including both Polish and international scientific publications related to e-commerce, logistics, and customer service. Additionally, statistical data from industry reports and institutional sources (GUS, 2021; E-Commerce, 2024) were utilized to present the current state and developmental trends of e-commerce in Poland.

The empirical section of the study is based on original research conducted through an online questionnaire. This tool was directed towards active users of the Zalando platform, one of the largest e-commerce platforms in Europe. The objective of the research was to identify key aspects of logistics service that affect customer satisfaction levels and their propensity for repeat purchases.

Three primary research objectives were established:

1. To identify the factors influencing the perception of Zalando as an attractive shopping platform;
2. To determine areas of customer service that, according to users, require improvement;
3. To highlight the most important elements of the purchasing process that determine customer satisfaction and loyalty towards the platform.

The research was structured around five research questions aimed at detailing the issues under investigation:

1. What are the key customer expectations regarding pre-transactional service (e.g., clarity of the offer, product availability)?
2. Which elements of transactional service (e.g., delivery time, delivery methods) are critical for buyers?

3. Which aspects of post-transactional service (e.g., returns, customer service contact) hold the most significance for users?
4. What are the subjective experiences of Zalando customers and their likelihood to recommend the platform to other users?
5. What suggestions for changes do respondents provide to enhance the purchasing process on Zalando?

The questionnaire was divided into three main sections corresponding to stages of the logistics customer service process:

1. Pre-transactional (e.g., product presentation quality, navigation intuitiveness, product availability information);
2. Transactional (e.g., delivery methods and costs, order fulfillment time, payment method options);
3. Post-transactional (e.g., ease of product return, quality of customer service, availability of post-sale information).

The study involved 150 respondents, the majority of whom were users aged 20–29 (49.6%). Additionally, 72.8% of the survey participants were women, while 27.2% were men. A substantial majority of respondents (74.4%) make purchases on the Zalando platform at least several times a year, indicating their familiarity with and experience of the subject under investigation.

The issues addressed in the study are situated within a broader context of contemporary approaches to customer relations in a value marketing model. Modern consumers are informed, understand the value of money, and rapidly share their experiences in the digital space. Therefore, companies, including those operating in the e-commerce sector, increasingly view logistics as a strategic tool for building customer loyalty and satisfaction, rather than merely as an operational function.

By analyzing the obtained results, it will be possible to identify those areas of logistical service that have the greatest impact on purchasing decisions and define possible directions for the development of logistics to enhance competitiveness and maintain customer loyalty.

4. Logistic Solutions in E-Commerce: Selected Examples

The rapid development of electronic commerce in recent years has rendered logistics one of the key areas determining the competitive advantage of firms operating within the e-commerce sector. Efficient and modern logistics not only facilitate rapid order fulfillment but also significantly influence customer shopping experiences, brand loyalty, and overall operational efficiency.

This article presents a comparative analysis of the logistics models employed by three leading online fashion retail platforms: Zalando, Modivo, and Answear.com.

Each company exemplifies a different approach to supply chain management—from highly automated proprietary logistics systems to centralized fulfillment processes with partial outsourcing. The analysis considers critical elements of logistical processes, including warehouse infrastructure, automation, inventory management, technological integration, return handling, and solutions supporting sustainable development.

The aim of this comparison is to highlight the differences and similarities in logistics approaches within the context of e-commerce and to identify best practices that can serve as benchmarks for other market participants engaged in online sales.

Zalando is one of Europe's largest fashion platforms, offering products from well-known brands and proprietary collections. Since its inception, the company has prioritized high levels of customer service, including fast delivery and flexible return policies (Chomik, 2022).

Zalando employs a logistics model based on its own warehouse infrastructure, managed directly by the company. It operates twelve order fulfillment centers across seven countries, equipped with advanced automation and robotics systems, including GreyOrange autonomous mobile robots designed to deliver products directly to staff members (Corporate Zalando...). This model allows Zalando to efficiently manage a high volume of orders across Europe and is supported by cutting-edge digital technologies and data analytics (Zalando SE, 2022).

The second platform under review, Modivo, relies on a central, state-of-the-art logistics hub located in Poland, shared with eobuwie.pl. A key feature of this model is the integration of Warehouse Management System (WMS) and Transport Management System (TMS) platforms, enabling coordinated storage and transportation operations.

Modivo exemplifies intelligent digital logistics focused on quality, efficiency, and ecological considerations. As part of the CCC Group, Modivo combines the offerings of the e-commerce platforms eobuwie.pl and Modivo, ensuring that the product assortment is continuously aligned with customer needs, providing a unified e-fashion shopping experience (Spółka eobuwie.pl S.A. ...).

An illustrative example of effective logistics model implementation is provided by Answear.com, which serves eleven Central and Eastern European countries from a single logistics center located in Kokotów near Kraków. The company adopted a hybrid delivery model combining local and international carriers, which reduces cross-border costs and accelerates delivery times.

Despite its ongoing international expansion, Answear.com has systematically reduced its logistics costs as a percentage of sales—declining from 17.7% in 2019 to 13.0% in 2022 (Wiesz w co inwestujesz ...). Compared to Zalando and Modivo,

Answeare.com's logistics model features lower automation levels and a higher proportion of outsourced courier services. It exemplifies a centralized logistics approach, effective for managing multiple markets from a single location, yet it necessitates investments in automation to remain competitive.

A comparison of the logistic solutions employed in e-commerce exemplified by these three major platforms is presented in Table 1.

Table 1. Logistic Solutions Employed by Platforms: Zalando, Modivo, and Answeare.com

Zalando	Modivo	Answeare.com
1. Logistics Infrastructure and Automation		
- Operates multiple large, automated logistics centers across Europe. - Uses advanced automation technologies, including robots, transportation systems, and automated sorting and order fulfillment.	- Utilizes automated warehouse management systems (WMS) supported by robotics and RFID technology. - The Transportation Management System (TMS) assists in transportation management and route optimization. - Packaging automation reduces errors and accelerates processes.	- Owens a logistics center located in Poland, often shared with Modivo under the CCC Group. - Warehouse management systems are less advanced than those of Zalando or Modivo, but effectively support order fulfillment.
2. Inventory Management and Demand Forecasting		
- Utilizes advanced tools for demand forecasting and inventory management. - Maintains assortment fluidity and minimizes the risk of stockouts.	- Implements artificial intelligence and data analytics for demand prediction. - Eliminates excess inventory and reduces warehousing costs.	- Employs traditional forecasting and inventory management methods. - Introduces elements of automation, albeit not on the advanced scale of Zalando or Modivo.
3. Customer Service and Returns		
- Places a strong emphasis on the ease and speed of returns, with streamlined procedures and rapid processing of refunds. - Offers delivery personalization options (home delivery, parcel lockers, different addresses).	- Enables order tracking and transparency of the delivery process. - Internet of Things (IoT) technology supports the monitoring of transport conditions (e.g., temperature). - Focused approach to customer satisfaction by eliminating logistical	- Offers a standard return procedure in compliance with market norms. - Provides high-level customer service, though it is less technologically advanced than that of Zalando or Modivo.

Provides real-time shipment tracking.	errors.	
4. Ecology and Sustainability		
Invests in green logistics, optimizing the supply chain for CO2 reduction.	- AI supports route optimization and the reduction of CO2 emissions. - Investments in sustainability and smart warehousing.	Implements ecological initiatives, though on a smaller scale than competitors.

Source: Author's calculations based on (*Wiesz w co inwestujesz ...*, Zalando SE, 2022; *Spółka eobuwie.pl S.A.*...).

Zalando continuously introduces innovations and tests cutting-edge logistical solutions to provide even better shopping experiences for its customers. The company has rapidly expanded its presence in Europe, gaining popularity due to convenient online shopping, product diversity, and delivery services.

It is one of the leading players in the European fashion e-commerce sector and consistently develops its offerings to meet the demands of all customers, regardless of their age, gender, or current needs.

The primary objective of the MODIVO platform is to have a tangible and positive impact on the surrounding reality, progressively implementing a sustainability strategy. The initiatives of the e-commerce platform focus on several areas, including products, the natural environment, employees, and society. It is executing a project with InPost concerning a secondary packaging circulation system in e-commerce, which allows for a potential reduction in the demand for single-use packaging by up to tenfold.

The development of logistical processes at Answear.com plays a pivotal role in its dynamic growth and international expansion. The company's logistics center is anchored by a modern warehouse located in Kokotów near Kraków, which supplies all market operations.

Thanks to its strategic location and infrastructure expansion (including the construction of a mezzanine to increase operational space), Answear effectively handles a growing volume of orders.

The company offers short delivery times—such as 24 hours in Poland and 2-3 days in Romania. Efficient logistics thus serve as a foundation for Answear's further growth and its competitiveness in the Central and Eastern European e-commerce market.

In light of the current evolution of the e-commerce market, there is but one direction: logistics must be modern, efficient, and increasingly environmentally friendly. Such

initiatives represent a significant aspect of fostering a green revolution in the e-commerce sector.

5. Evaluation of Modern Logistics Solutions in E-Commerce: A Case Study of the Zalando Platform in Light of Survey Research

Based on the conducted survey research pertaining to customer service and logistics solutions on the Zalando platform, it was possible to formulate a series of significant conclusions related to the research objectives set forth in this study. Selected survey questions along with the most frequently provided responses are presented in Table 2.

Table 2. Selected survey questions along with the most frequently provided responses.

Research Objective	Survey Question	Most Common Responses
1. Identification of factors influencing the perception of Zalando as an attractive shopping platform	What pre-transaction factors are most important to you when shopping online?	Other customers' reviews (39%), wide product selection (35%), appealing promotion system (11%), ease of using the platform (11%)
	What transactional factors are most important to you?	Speed of order fulfillment (37%), simplicity of the purchasing process (31%), quality of customer service (14%)
	How would you rate your familiarity with the Zalando brand?	Good (53.3%), Very good (25.3%)
	Would you recommend the Zalando platform to others?	Definitely yes (60%), Probably yes (24%)
2. Identification of areas of customer service that, according to users, require improvements	What changes could enhance the quality of customer service at Zalando?	Better problem-solving and complaint resolution (41%), increased customer support (25%), shorter response time to inquiries (20%)
	Which of the proposed changes are least significant?	Personalization of customer service (40%), improved communication with the company (26%)
	How would you rate the speed of product delivery from Zalando?	Very fast (54.7%), Fast (30%)
3. Identification of the most important elements of the purchasing process	What factors encourage you to repurchase from an online store?	Wide product selection (34%), speed of delivery (29%), attractive promotions (22%)

Research Objective	Survey Question	Most Common Responses
that determine customer satisfaction and loyalty	How would you rate your overall shopping experience with the Zalando brand?	Very good (55.3%), Good (32.7%)
	How would you assess the ease of returns and after-sales service?	Ease of returns and exchanges as the most important post-transaction factor (51%)

Source: Author's calculations based on the results of survey research.

The first objective was to identify the factors influencing the perception of Zalando as an attractive online shopping destination. The data collected clearly indicates that, for the majority of respondents, the key elements contributing to the platform's attractiveness include a wide selection of products, positive reviews from other users, and the speed of order fulfillment.

Respondents also highlighted the significant role of the simplicity of the purchasing process, which suggests that intuitive and transparent navigation on the website has a substantial impact on brand perception. The possibility of delivery customization, including the choice of delivery method and timing, was also highly rated and recognized as the most attractive logistical solution offered by Zalando.

The second aim of the study was to identify areas of customer service that, according to users, require improvements. Respondents most frequently pointed out the need for better customer support and more efficient handling of complaints and issues.

The importance of prompt responses to inquiries was also rated highly. On the other hand, personalization of customer service ranked among the least important proposed changes, with as much as 40% of respondents deeming this aspect insignificant. This may indicate that customers are more inclined to expect efficient, straightforward, and effective assistance rather than advanced personalization of communication.

The third goal was to identify the key elements of the purchasing process that influence customer satisfaction and loyalty levels. Analysis of the respondents' answers revealed that the most significant factors motivating repeat use of the platform are product variety and availability, delivery speed, and attractive promotions and offers.

Interestingly, personalized product recommendations were rated as the least significant factor. A high level of overall customer satisfaction is confirmed by the fact that 88% of respondents rated their shopping experiences on Zalando as good or very good, and 84% expressed that they would recommend the platform to others.

Based on the results of the conducted research, it can be concluded that Zalando's effectiveness in building customer loyalty primarily stems from high logistical efficiency, an intuitive purchasing process, and a broad product offering. At the same time, there is room for further improvement in the quality of post-sales service, particularly in the areas of technical support, problem resolution, and faster communication with customers. It is also noteworthy that not all modern logistical solutions—such as warehouse automation or an extensive distribution infrastructure—are recognized and appreciated by customers, which may result from their limited knowledge of the workings of the platform's logistical backend.

The obtained results indicate that Zalando effectively meets many of the expectations of contemporary consumers; however, to further strengthen its market position, it should focus on enhancing those elements of customer service that are visible and directly impactful to the end user. Only the integration of efficient logistics with high-quality customer engagement can contribute to the continued growth of customer loyalty and satisfaction.

Based on the survey results, an evaluation of Zalando's logistical solutions was conducted. Table 3 presents all the logistical solutions mentioned in the research along with their evaluations.

Table 3. *Evaluation of Zalando's logistical solutions based on the conducted survey research*

Logistical Solutions	Evaluation of Solutions
Zalando Logistics Centers	The Zalando logistics centers are not significant to the surveyed customers; however, this may stem from their lack of awareness regarding what logistics centers actually are. As facilities that enable efficient and rapid delivery of goods, sorting, acceptance, and shipping to customers across Europe, these centers constitute a key logistical element for the Zalando platform.
Warehouse Automation (e.g., robots and transportation systems)	From the perspective of the respondents, warehouse automation is not regarded as an important logistical solution offered by Zalando. This could be attributed to a lack of understanding that such solutions facilitate even faster order fulfillment. Through the use of robots, transportation systems, and other technological innovations, employees can be relieved of part of their duties, allowing them to dedicate more time to other job responsibilities, which is highly advantageous from the company's standpoint.
Same-Day Delivery in Selected Cities	As evidenced by the research findings, same-day delivery is a logistical solution provided by Zalando that holds moderate significance for customers. This service is not available in all locations within the country, which means that only a segment of residents in selected cities can benefit from it. Nevertheless, it is a highly advantageous solution that encourages time-sensitive customers to choose a platform offering

	the possibility of same-day order delivery.
Return Logistics and Ease of Return	The simplicity of returns and high-quality return logistics constitute a logistical solution that is highly significant for Zalando customers. As observed, a straightforward return process is a critical factor influencing the choice of a specific platform for placing orders. Although this solution encourages customers to order goods more willingly, it can present numerous additional obligations for the enterprise, especially if the proposed returns are not free of charge.
Delivery Personalization	Zalando provides a wide range of delivery options, enabling customers to tailor the fulfillment of their orders to their preferences and circumstances. For individuals who are not at home during the courier's arrival, it is crucial that packages can be delivered to designated pickup points, such as parcel machines, or to an address different from the customer's billing address. According to the research findings, delivery personalization is a pivotal logistical solution for customers of online platforms. The multitude of delivery options increases customer willingness to make purchases on a selected platform, while cooperation with various courier companies supports the economy and contributes to its ongoing development.

Source: Author's calculations based on the results of survey research.

In Table 4, an assessment of the logistics solutions on the Zalando platform is presented from the perspective of logistics customer service. Each logistics solution has been evaluated on a scale from 1 to 5, where 1 indicates a failing score, and 5 denotes an excellent score. The maximum weighted value is 5 points.

Table 4. Assessment of logistics solutions on the Zalando platform from the perspective of logistics customer service.

Logistical Solution	Weight	Assessment	Weighted Value
Number of logistics centers	0.15	1	0.15
Order processing	0.04	2	0.08
Order fulfillment speed	0.08	4	0.32
Automation of logistics processes	0.13	1	0.13
Inventory levels	0.1	3	0.3
Returns management	0.05	5	0.25
Claims handling	0.05	5	0.25
Delivery punctuality	0.08	5	0.4
Delivery personalization	0.05	4	0.2
Shipment tracking	0.08	4	0.32
Price attractiveness	0.04	5	0.2
Product quality	0.05	5	0.25
Customer communication	0.1	4	0.4
Total	1.0	-	3.25

Source: Author's calculations based on the results of survey research.

Based on the conducted research and self-assessment, it has been determined that the Zalando Platform received a score of 3.25 points. The factors exerting the greatest influence on the evaluation include order fulfillment speed, with a weighted average of 0.32, and shipment tracking, also scoring 0.32.

Conversely, the factors of least significance are order acceptance at 0.08, automation of logistics processes at 0.13, and the number of logistics centers at 0.15. The lowest scores can be attributed to the respondents' limited awareness and knowledge regarding the logistics operations of the company and customer service.

6. Conclusions

Logistics in e-commerce is one of the most critical factors determining a positive customer experience. The conducted study, exemplified by Zalando, indicates that consumers expect not only fast delivery but also efficient returns handling, transparent information, and flexibility in offerings.

Zalando, as a leader in the fashion e-commerce sector, fulfills these expectations at a high level; however, there remain areas that require improvement—particularly in the time taken to process returns and in the personalization of services.

For the continued development of logistics in e-commerce, it will be essential to:

- Develop solutions based on automation and artificial intelligence;
- Increase the number of delivery options;
- Build an eco-friendly and sustainable returns system;
- Continuously monitor customer feedback and preferences.

The research confirms that enhancing logistics experiences directly translates into increased customer loyalty and purchase frequency, making logistics not only an operational support function but also a strategic component of market advantage.

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