REPORT

E-COMMERCE LOGISTICS

Where Are We
and Where Do We Want to Be?

POLSKI
INSTYTUT
TRANSPORTU
DROGOWEGO

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E-COMMERCE LOGISTICS: Where Are We Now, and Where Do We Want to Be?

1 Introduction

In today's world, where online shopping is the norm and consumers expect fast, seamless deliveries, efficient logistics has become a crucial part of business strategy. While technology and innovation drive progress, they also introduce new challenges. Understanding and adapting to these challenges is essential for maintaining competitiveness in the e-commerce market.

This comprehensive publication offers an in-depth overview of the current state of e-commerce logistics and the challenges it faces. Our analysis covers the CEP market, emerging trends, B2C and C2C relationships, the role of OOH delivery, the application of algorithms in e-commerce, environmental concerns, consumer perspectives, and a detailed cost analysis of returns.

This report not only examines the present situation but also looks ahead, addressing the question: "Where are we now, and where do we want to be?" Answering this question involves not only operational aspects but also sustainable development, meeting the expectations of informed consumers, and effective cost management.

Additionally, we include a case study that sheds light on the practical aspects of e-commerce logistics, demonstrating effective strategies in real market conditions.

We hope our Report can serve as a comprehensive resource on e-commerce logistics. We are excited to share this publication with you, and we hope you find it insightful and informative.

This report was prepared in 2023, and therefore, statistics for that year were not yet available.

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CEP market, trends, B2C, C2C, OOH

2.1. CEP Sector Overview

When analyzing the domestic CEP (Courier, Express, and Parcel) sector using publicly available data, including the annual report of the Polish Office of Electronic Communications (UKE), we can observe that 2022 marked another year of growth for both postal and courier services. The sector handled nearly 922 million postal items and packages, reflecting an approximate 14.5% increase compared to 2021. This volume translated to total revenues of PLN 9.935 billion, representing a 15.4% increase over the previous year.

922 million postal items and packages in 2022

During this period, CEP operators also managed 894 million courier shipments, both domestic and international, resulting in revenues of PLN 9.593 billion. On an annual basis, volume increased by 15.2%, while revenues rose by 17.0% compared to 2021.

Courier shipments accounted for nearly 70% of the postal market value and 46% of the total volume of postal services in 2022. One noteworthy trend is that, similar to other

countries, Poland is also seeing a shrinking market for universal services, such as letter services, which saw an 8.2% decline in volume relative to 2021.

8.2% decline in letter services volume in 2022

Reviewing data from multiple companies and CEP operator statistics, we noticed that the European courier services market also experienced a volume decline of approximately 9% in 2022 compared to 2021. In practice, this translates to a volume of 16 billion shipments compared to 18 billion in 2021. [1] This decline is attributable to the pandemic subsiding and customers returning to brick-and-mortar stores. Despite the volume drop, company revenues increased by 2% over the same period, reaching nearly EUR 88 billion. Will 2023 see the CEP sector breaking the EUR 90 billion mark? It seems likely, given the high inflation and increased operational costs in the Eurozone, prompting many companies to raise their prices.

Preliminary, very optimistic estimates suggest that the domestic CEP sector might reach revenue levels of approximately PLN 19-20 billion in 2023, generated by 1.3 billion courier shipments. However, the economic slowdown, high inflation, and geopolitical instability could negatively impact these optimistic forecasts. We will need to wait for the full data for 2023 to confirm these estimates.

2.2. Trends in B2C and C2C flows

Total online sales in Poland reached over PLN 100 billion in 2021, with a CAGR of 28.1% since 2019. In 2022, sales grew further to over PLN 109 billion, with forecasts for 2023 predicting a figure close to PLN 120 billion. The continuous rise in online purchases, or e-commerce, remains the primary driver of the CEP sector.

E-commerce in Europe has been growing steadily since the mid-1990s, but the COVID-19 pandemic significantly accelerated online sales. In 2021, there was a surge in e-commerce, further increasing the demand for efficient last-mile solutions. However, consumer uncertainty due to the war in Ukraine, coupled with a return to shopping centers, led to a market decline in 2022, with revenues of USD 596 billion, directly impacting shipment volumes.

Fig. 2.1 Forecast e-commerce revenue in Europe from 2017 to 2027
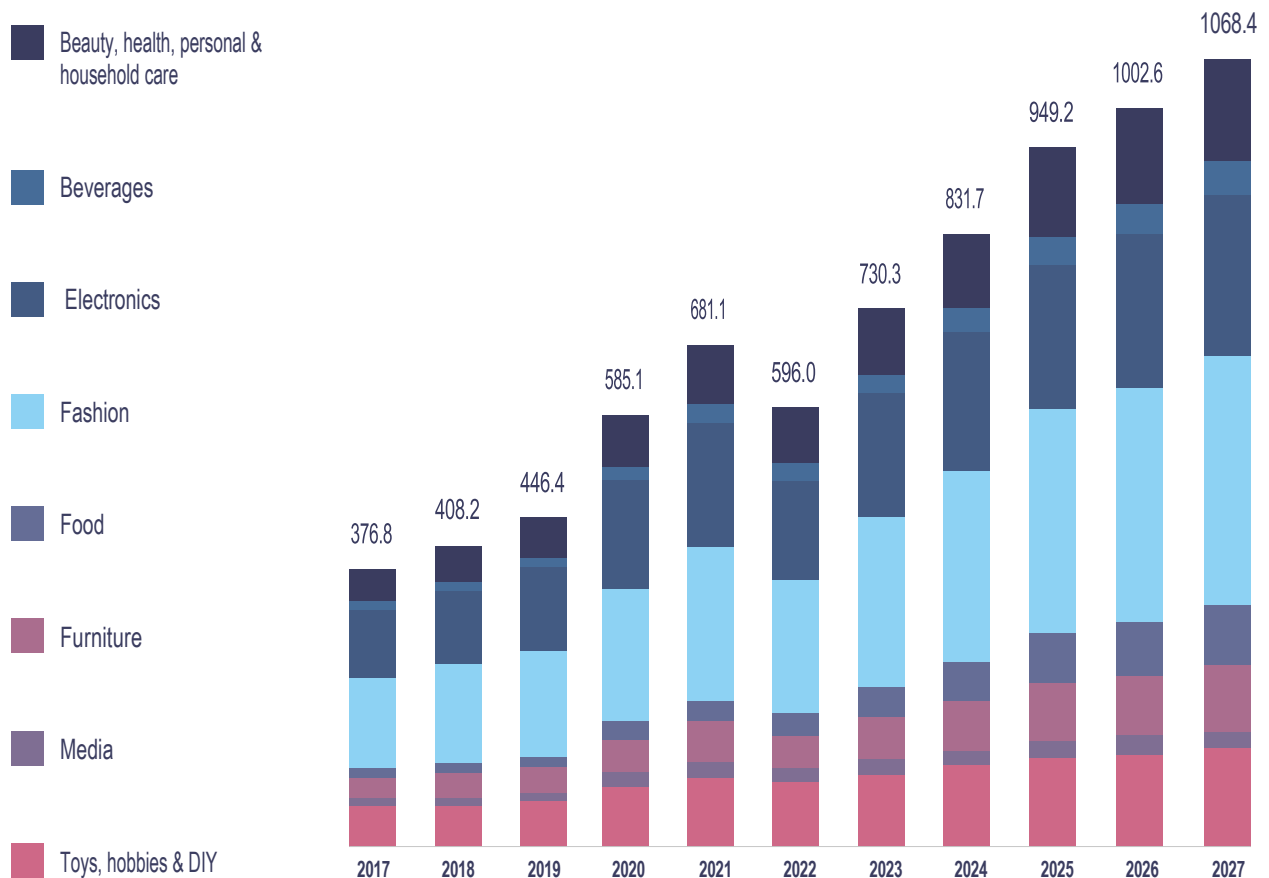
Source: Statista/Last Mile Experts, *Out of Home Delivery in Europe 2023. PUDOs and Automated Parcel Machines,* June 2023. Data shown is using current exchange rates and reflects market impacts of the Russia–Ukraine war (February 2023)

Experts believe that the market will recover in the last quarter of 2023 and into 2024 despite temporary issues. This optimism is partly based on Europe's high e-commerce user penetration rates. In 2022, Norway, the UK, and Germany had the highest penetration rates in the world at 82.8%, 82.7%, and 80.6% respectively. [2] Studies show that more consumers are choosing to shop online each year, with estimates suggesting that 70% to 80% of internet users have made online purchases.

At the same time, there is a growing trend towards second-hand sales. Consumers are turning to resale platforms (C2C) like Vinted, OLX, and eBay, which are seeing significant year-over-year growth. According to a 2022 survey by the GEOPOST group (DPD), 70% of online shoppers have engaged in C2C transactions as buyers or sellers.

The main factors driving this trend are low prices and sustainable development, particularly environmental care. Most consumers cite inflation as a key motivator for buying used goods. This trend is supported by an increasing number of brands entering the re-commerce space. Many retailers now offer take-back programs, allowing customers to exchange old clothing for discount coupons in traditional or online stores or for charity donations.

In 2021, the European re-commerce market was valued at approximately EUR 75 billion, and it is expected to grow to EUR 120 billion by 2025, a 60% increase, raising its share in e-commerce from 10% to 14%. This growth trajectory positions re-commerce as a new driving force in the CEP sector.

The re-commerce market was valued at EUR 75 billion in 2021

Sustainable development is also a critical consideration, extending beyond the production of goods to all aspects of the logistics chain. Increasingly, studies confirm that the "green last mile" is not just a trend but a genuine challenge and opportunity for retailers and logistics operators. Last-mile operators must address not only the economic aspects of transport and distribution but also the growing demand for sustainable, low-emission, and environmentally friendly transportation in order to remain competitive and customer-focused. This poses challenges for transport companies, who face rising operational costs and consumer expectations for low prices and high-quality services.

Poland is a leader in out-of-home delivery with 29,000 automated parcel machines in 2022

Consequently, the popularity in out-of-home deliveries, including OOH points, PUDOs, and APMs has been consistently growing. Poland is a frontrunner in terms of the number of these points available per capita, with an unmatched number of parcel machines. In 2022, customers had access to nearly 29,000 parcel machines, representing a 46% increase compared to 2021 when Poland had just under 18,000 machines. Further details regarding out-of-home delivery networks can be found later in this report.

2.3. E-commerce Deliveries – Out-of-Home Delivery Networks

The relationship between OOH delivery points and e-commerce is mutually beneficial: OOH delivery makes e-commerce more financially and operationally viable, while e-commerce drives the expansion of OOH networks. The years 2021 and 2022 served as a transitional period, bridging the old and new normal after the COVID-19 pandemic. This shift placed increased pressure on supply chains and infrastructure to adapt, particularly with the rise of automated parcel machines (APMs). In 2023, sentiments among retailers and consumers fluctuated, directly impacting carriers. The war in Ukraine, conflicts in the Middle East, and the highest inflation in years across many countries slowed down both the sales of goods and investments in logistics infrastructure.

Poland | 39 PUDOs and APMs per 10,000 inhabitants

However, to unlock the potential of OOH networks, which appear to be the optimal solution for B2C and C2C shipments, an effective business model and network development strategy are essential. This model should consider the complex relationship between the density of OOH points, ongoing e-commerce demand, new segments like C2C, and shifting consumer preferences affecting delivery choices. A denser network of OOH points can significantly support the growth of logistics operators who see potential in developing services for e-commerce and re-commerce. Poland serves as a leading example, boasting an impressive OOH network density. In 2022, the country had nearly 39 PUDOs and APMs per 10,000 inhabitants. [3]

According to Last Mile Experts' report from last year [3], European OOH networks had over 120,390 unique APMs, representing a 51% increase from 2021. The total number of PUDOs also increased by 7% year-over-year. Unique points refer to locations where shipments can only be sent or collected from one logistics operator.

Fig. 2.2 Countries with the largest number of unique PUDOs and APMs in 2022

	Country	PUDOs
	Germany	**51,090**
	France	**49,200**
	Italy	**47,740**
	United Kingdom	**45,340**
	Poland	**29,520**

	Country	APMs
	Poland	**28,880**
	United Kingdom	**15,460**
	Germany	**13,450**
	France	**8,750**
	Czechia	**7,480**

Fig. 2.3 Logistics operators with the most OOH points

Operator	PUDOs	APMs	Total OOH points*
Deutsche Post/DHL	100,300	23,930	**124,230**
Grupa DPD (GeoPost)	66,860	14,040	**80,890**
GLS	52,090	5,800	**57,890**
InPost	24,420	28,240	**52,660**
UPS	41,910	5 700	**47,610**

*Including partners and shared points. Shared points are those where shipments can be sent and collected from multiple logistics operators.

2.4. Development of OOH Deliveries and Preparation for Future Volume Growth

The report [3] developed a model to assess the preparedness of OOH networks in different countries for anticipated volume increases. OOH network density was classified into three levels:

- **Dense** (10 or more OOH points per 10,000 inhabitants)
- **Intermediate** (from 5 to 9.9 OOH points per 10,000 inhabitants)
- **Low** (fewer than 5 OOH points per 10,000 inhabitants)

OOH delivery network density is crucial, as the adoption, efficiency, and economics of OOH deliveries grow exponentially once the network reaches a density level of 10 OOH points per 10,000 inhabitants.

Fig. 2.4 Number of OOH delivery points per 10 thousand inhabitants in the EU and the UK (2022)
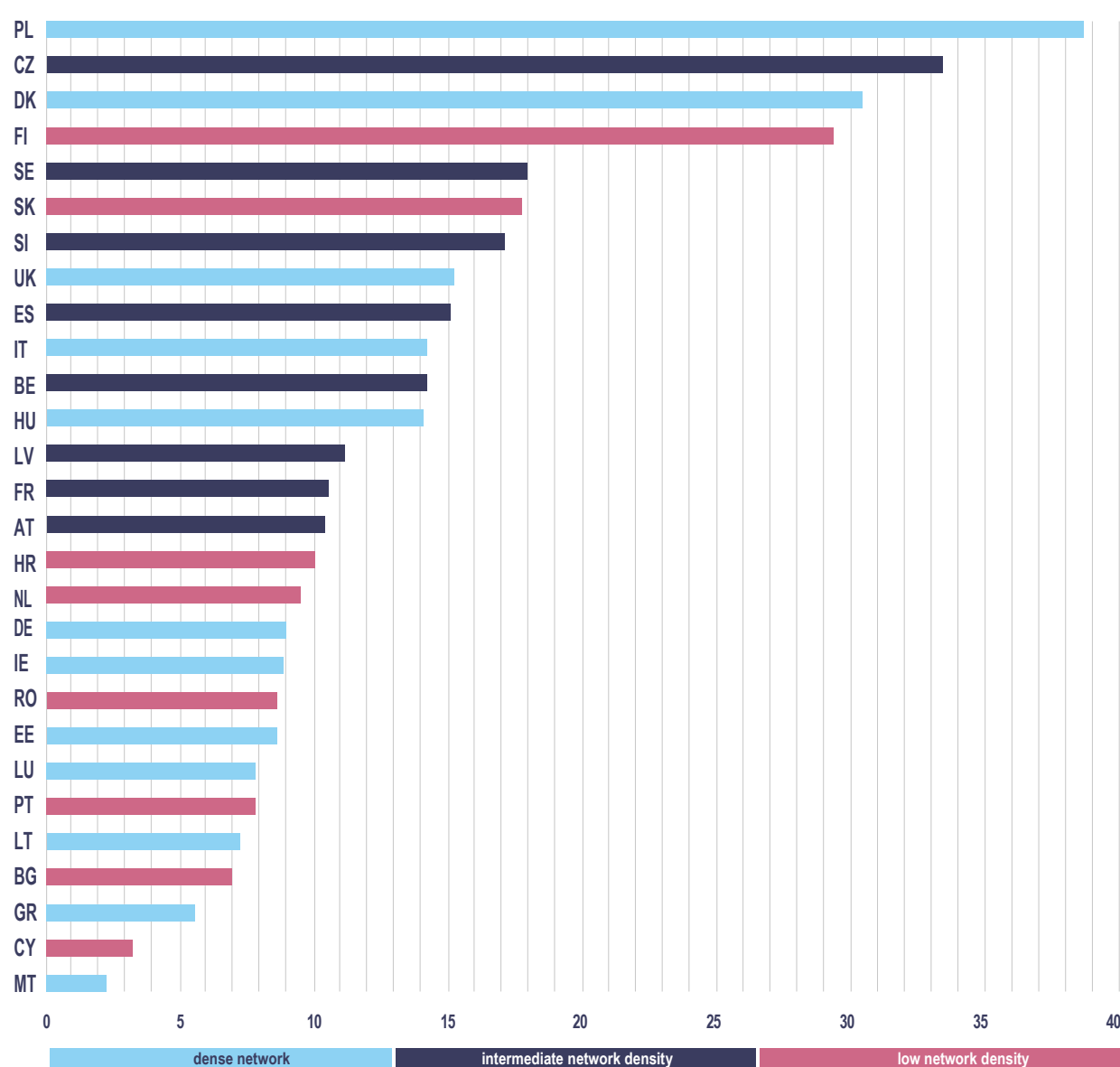
Pink group (poor adaptation)

Countries in the pink group, signifying poor preparation for expected B2C and C2C volume increases, generally have a low or medium OOH network density. However, the Netherlands (NL) falls into the intermediate category with 9.48 OOH options per 10,000 inhabitants. Finland (FI) stands out with a dense OOH network, providing 29.42 OOH options per 10,000 inhabitants. This suggests that despite relatively low OOH point numbers, volume growth can be absorbed in some countries thanks to the existing OOH networks.

Navy group (intermediate adaptation)

Countries in the navy group, indicating intermediate moderate preparation for anticipated B2C and C2C volume increases, show a high number of OOH points per 10,000 inhabitants. For example, Spain (ES) and France (FR) exceed the dense network threshold with 15.15 and 10.60 OOH options per 10,000 inhabitants, respectively. This means that a dense OOH network may offer better preparation for expected volume increases.

Blue Group (strongest adaptation)

All countries in the blue group, except Malta, showing the strongest post-pandemic resilience, have intermediate or high OOH network density. Estonia (EE), Germany (DE), and Ireland (IE) have intermediate density levels, while the UK, Italy (IT), and Poland (PL) boast dense OOH networks. Poland, in particular, has an extremely dense network with 38.72 points per 10,000 inhabitants, enabling it to absorb significant volume increases at relatively low operational costs for carriers. This suggests that a denser OOH network can absorb significant volume increases at relatively low operational costs for carriers.

In conclusion, while carriers' preparation for expected volume increases varies by country, the density of OOH delivery networks is crucial. Unique market conditions, shopping behaviors, and strategic responses to economic uncertainty also impact preparedness. A dense OOH network can positively contribute to shipment handling quality and customer satisfaction but must be part of a broader strategic approach to strengthen the CEP sector amid economic challenges and rising customer expectations.

3

Reverse logistics – return cost analysis

3.1. Consumer returns – Boon or Bane for E-commerce?

Many e-commerce retailers and business owners offer free return policies to enhance customer satisfaction and boost sales. However, this approach incurs significant costs that can negatively impact business profits.

In online sales, free returns have become an unavoidable reality. Research indicates that 72% of consumers say return policies directly influence their purchasing decisions, meaning that most customers will refrain from making a purchase without a return option. An effective return policy can convert casual customers into loyal buyers, leave a positive brand impression, and provide a competitive edge.

72% of consumers say return policies directly influence their purchasing decisions

At first glance, the return process might seem straightforward. The product is sent back to the seller, the customer receives a refund, and the item can be resold. However, the return process is more complex than it appears. Returned products often lose value due to the time it takes for the item to be returned to the warehouse (the period between the initiation of the return and the time the product is ready for resale).
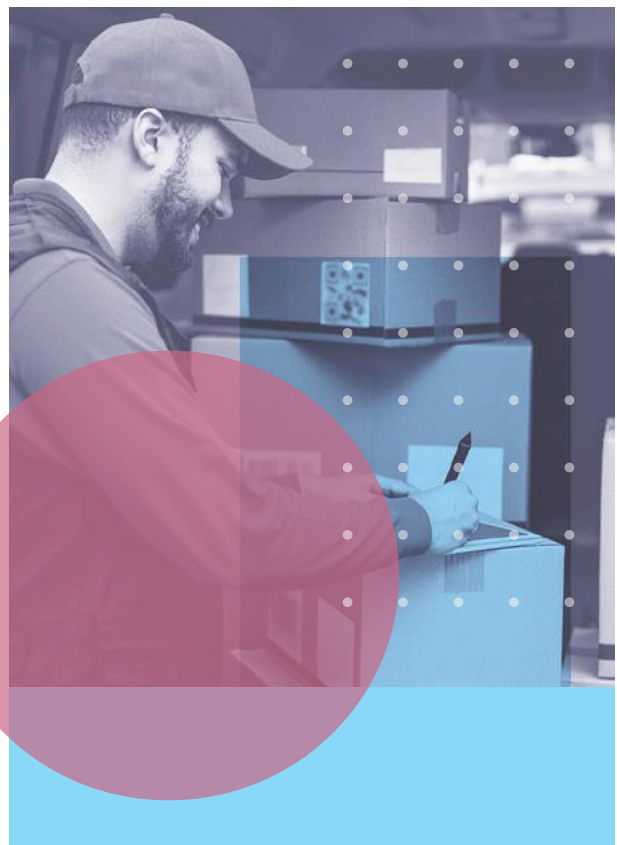
This is because fashion items are only in season for a limited time and must be offered at lower prices once the season ends. This is especially critical for clothing retailers, as their products often lose value after the fashion period, which typically lasts only six weeks. Fashion products can lose a significant portion of their retail value each day they are in the return process.

The average return rate for online clothing purchases was 21.4%

According to a 2023 study of Polish e-commerce retailers, the average return rate for online clothing purchases was 21.4%, a 6.9% increase from the previous year's average of 14.5%. Online clothing shoppers are more likely to return products compared to those who shop in physical stores, as it is difficult to gauge how clothing items will look or fit online.

3.2. Value of Consumer Returns

In the dynamic landscape of online commerce, forecasts indicate that by 2027, global online sales will reach an impressive USD 5.56 trillion. However, this growth brings challenges, as online sales channels generate the highest return rates.

According to data from *Logistyka RP* from 18 September 2023 [4], the fashion industry alone is predicted to contribute USD 1.1 trillion to global revenues by 2027, with USD 258.8 billion from Europe and USD 5.36 billion from Poland.

The share of returned orders (Fig. 3.1) in this context will be 17.1%, representing USD 188 billion globally, 14.7% or USD 38.04 billion in Europe, and 15.2% or USD 814 million in Poland. These figures underscore the scale of the return problem in e-commerce, especially in the fashion sector.

The combination of growing online trade, the rapid growth of the fashion industry, and increasing return rates presents a significant challenge for retailers and the entire e-commerce logistics sector. Market value and return rates remain critical indicators requiring attention and a balanced approach from e-commerce business owners in Poland. An effective return policy is not just about customer satisfaction but also a crucial element of business strategy.

Fig. 3.1 Value of e-commerce markets (B2C) and share of returns in 2023-2027

GLOBALLY

Revenue (USD trillion)
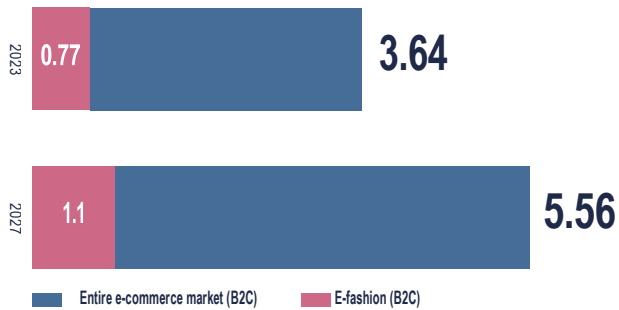
Year	E-fashion (B2C)	Entire e-commerce market (B2C)
2023	0.77	3.64
2027	1.1	5.56

■ Entire e-commerce market (B2C) ■ E-fashion (B2C)

Share of returned purchases (%)

	2023	2024	2025	2026	2027
(blue)	17.5	16.4	16.4	17.3	17.1
(pink)	10.6	9.9	9.8	10.7	10.6

EU-27

Revenue (USD billion)

Year	E-fashion (B2C)	Entire e-commerce market (B2C)
2023	111.6	400.3
2027	162.2	568.5

■ Entire e-commerce market (B2C) ■ E-fashion (B2C)

Share of returned purchases (%)

	2023	2024	2025	2026	2027
(blue)	16.3	16.5	16.5	17.8	17.5
(pink)	8.9	8.9	8.9	9.6	9.5
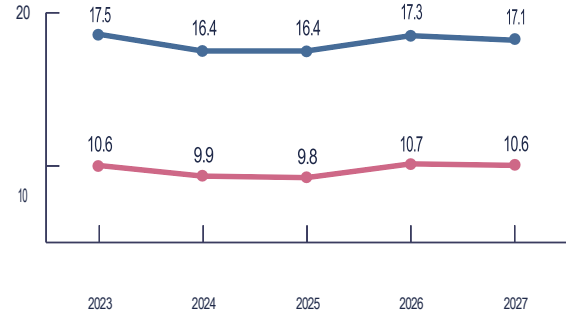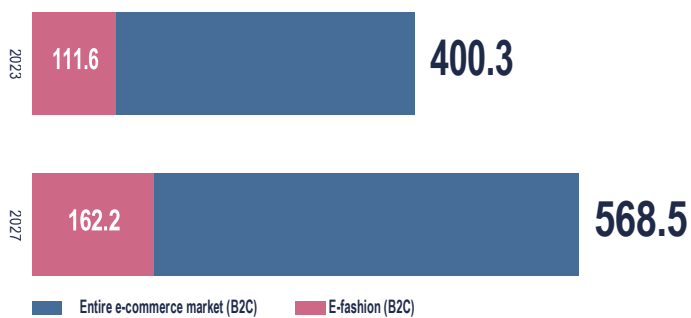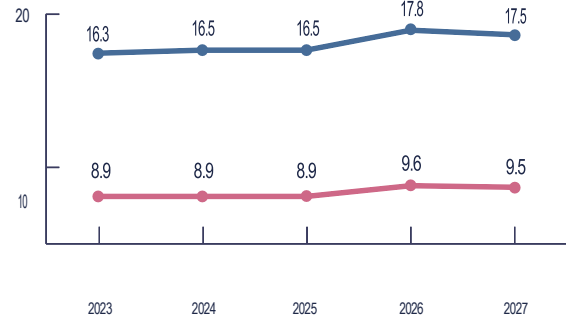
EUROPE

Revenue (USD billion)

Year	E-fashion (B2C)	Entire e-commerce market (B2C)
2023	177	631.9
2027	258.8	902.3

■ Entire e-commerce market (B2C) ■ E-fashion (B2C)

Share of returned purchases (%)

	2023	2024	2025	2026	2027
(blue)	13.2	13.7	13.6	15.0	14.7
(pink)	8.0	8.2	8.2	9.1	8.9
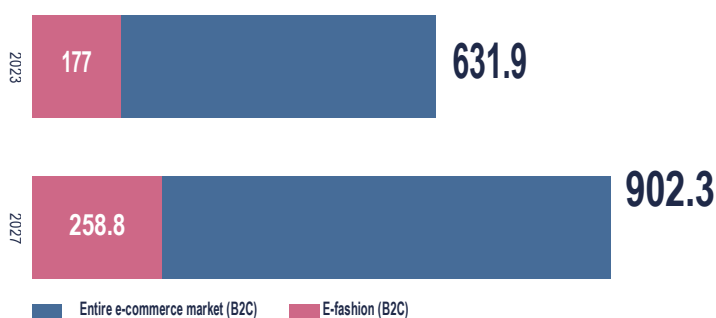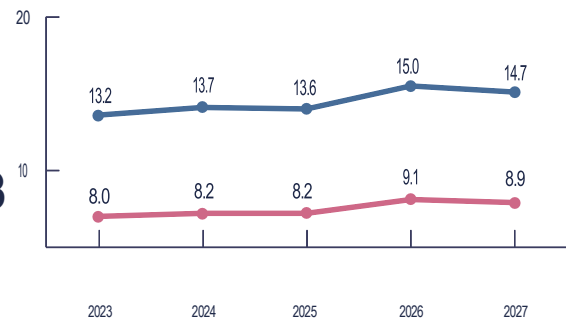
Poland

Revenue (USD billion)

Year	E-fashion (B2C)	Entire e-commerce market (B2C)
2023	3.37	14.45
2027	5.36	21.36

Entire e-commerce market (B2C) E-fashion (B2C)

Share of returned purchases (%)

	2023	2024	2025	2026	2027
(blue)	15,8	14,1	14	15,5	15,2
(pink)	8.2	7.2	7.2	7.9	7.7

Source: [4]
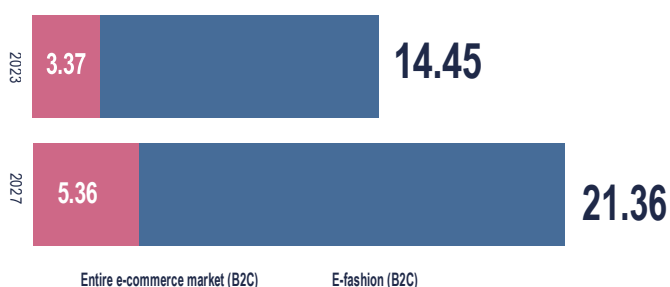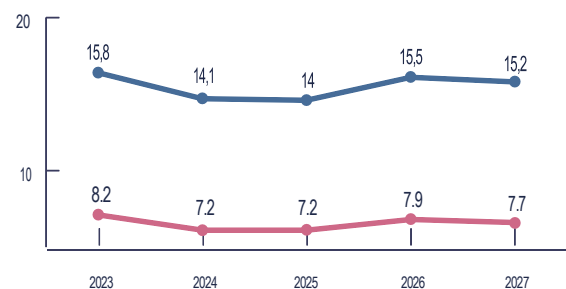
3.3.　How Much Do E-commerce Returns Really Cost?

Too much. The Polish fashion industry, for instance, recorded a return rate of 15.8% in 2023, amounting to USD 532 million (approximately PLN 2.3 billion) in returned goods.

Handling returns in e-commerce stores involves a variety of costs. The percentage breakdown of these costs can vary depending on the industry, business strategy, and return policy. The following are the main components of return handling costs and their estimated percentage breakdown:

1. **Return processing (20-30%):** Costs associated with receiving and registering the return, including verifying the condition of the product.

2. **Transportation (15-25%):** Costs related to transporting returns back to the warehouse, including potential costs associated with collecting the return from the customer.

3. **Storage and warehousing (10-20%):** Costs related to storing returned goods, including warehouse organization and inventory management.

4. **Disposal (5-10%):** Costs associated with disposing of returned goods, particularly if they cannot be resold.

5. **Quality control (5-10%):** Costs related to inspecting the quality of returned products, especially if they are used.

6. **Customer service (10-15%):** Costs for customer service related to return inquiries and providing information about the status of returns.

7. **Repackaging (5-10%):** Costs for repackaging returned goods for resale.

8. **Value loss (5-10%):** Losses due to the reduced value of returned goods, especially if they are used or damaged.

These percentages are general estimates, and actual costs can vary based on many factors. These values are indicative and may change depending on the specific operations of each e-commerce store. Stores often analyze return costs to identify areas for process optimization and cost reduction.

Analyzing return costs is crucial for e-commerce stores for several reasons:

- **Impact on profitability:**
  High return handling costs can significantly impact a store's profitability. Stores must cover costs related to the collection, processing, storage, and sometimes disposal of returned products.
- **Customer experience:**
  A straightforward and friendly return policy is essential for customer satisfaction. Complicated return processes or high return costs can negatively affect the customer experience and loyalty to the store.
- **Inventory management:**
  Returns can affect inventory and warehouse management. Returned products need additional space and organization in the warehouse.
- **Reselling returned goods:**
  It is not always possible to resell returned products as new. Losses can occur, especially if the product has been used or is in poor condition.
- **Transportation costs:**
  Many returns require transportation back to the warehouse, generating additional logistics costs.

Analyzing return costs is essential for several reasons:

- **Process complexity:**
  The return process can be complex and varies from store to store. A thorough analysis is needed to understand each stage to accurately assess costs.
- **Variable factors:**
  Numerous factors can influence return costs, including the type of goods, industry, return policies, and more.
- **Diverse costs:**
  Return costs can encompass transportation fees, processing, quality control, disposal, and the impact on the product's value.

Therefore, e-commerce stores must continuously monitor and analyze return costs, adapting their strategies to minimize these expenses while maintaining customer satisfaction. Investing in technologies and processes that enhance return management can help reduce costs and improve operational efficiency.

3.4. Calculating Return Costs

Returns pose a challenge for any store, particularly in e-commerce, where the costs of two-way shipping and packaging can be substantial. Beyond the potential dissatisfaction of customers, stores lose sales opportunities and incur costs related to two-way shipping and packaging. The return rate is a measure of how often customers return products in an online store.

Formula for calculating the product return rate

Formula

The formula for calculating the return rate is relatively simple. Divide the number of returned products by the number of sold products, then multiply by 100.

$$\text{Return rate} = \frac{\textit{Returned products}}{\textit{Sold products}} \times 100$$

Example:

Take a clothing store selling 12,000 items per year, with 4,000 of them being returned by customers.

The formula for calculating the product return rate will be:

$$\frac{4\,000}{12\,000} \times 100 = 33\%$$

In case of 10,000 items, with 1,000 of them being return, the formula will be as follows:

$$\frac{1\,000}{10\,000} \times 100 = 10\%$$

Formula for calculating the product return rate:
The formula for calculating the return rate is relatively simple. Divide the number of returned products by the number of sold products, then multiply by 100. The return rate is a measure of how often customers return products in an online store.

Determining a "good" return rate for e-commerce products can be challenging, as the average return rate varies by industry. For example, clothing retailers typically have higher return rates than beverage retailers.

> **In 2023, the average return rate for the fashion industry in Poland was 15.8%.**

A company's return policy significantly impacts its return rate. A generous return policy with free returns can increase the return rate because customers are less likely to keep a product they are not fully satisfied with. Other factors, such as price, seasonality, and the quality of product descriptions, also contribute to higher return rates. Companies offering higher-priced products may receive more returns due to higher customer expectations. Holiday returns are common, as some shoppers plan to return items after the holiday season. Poor product descriptions also impact the return rate, as insufficient information can lead to uninformed purchasing decisions.

The variability of return rates highlights the importance of analyzing this data in the context of customer behavior. Retailers can achieve optimal return rates by focusing on reducing the need for returns through high-quality products and excellent customer service.

Once the return rate is measured, the next step is to calculate the costs associated with handling a single return. Analyzing costs on the largest Polish e-commerce platforms reveals the significant challenges businesses in this sector face.

For this study, we focused on two market leaders in the fashion industry, members of the top five Polish online fashion sector, to obtain confidential information about return handling costs.

Company A

The first analyzed company revealed that the costs associated with handling a single return amount to PLN 3.46 net per item. These costs include various elements such as handling the return package and visually inspecting the received goods (PLN 1.23), servicing the goods, including ironing and folding (PLN 0.96), and individual and bulk packaging with updated product labeling (PLN 1.27).

Company B

The second company, also operating in the fashion industry, estimated the costs in the same categories at PLN 3.70 per item, with a breakdown into handling costs (PLN 1.89), servicing (PLN 1.19), and packaging and labeling (PLN 0.62). The average return cost for these two stores is 3.58 PLN.

> ## Return handling costs in physical and online stores are practically the same

It is worth noting that return handling costs in physical and online stores are practically the same, which may be surprising given the differences in the nature of these two sales channels.

Next, let's focus on analyzing the overall handling costs in the context of purchase and sales costs. Consider the cost breakdown for a cotton T-shirt purchased for PLN 10.00 gross and sold for PLN 50.00, with a gross margin of PLN 40.00. Adding shipping costs of PLN 8.50 (product preparation for sale: PLN 1.00, packaging: PLN 1.00, shipping handling: PLN 0.50, shipping label: PLN 6.00), the total cost to deliver the product to the customer is PLN 18.50, bringing the margin down to PLN 31.50.

If the product is returned, we have to add a return handling cost of PLN 4.90 (return process: PLN 4.40, accounting/financial handling: PLN 0.50). The total cost increases to PLN 23.40, reducing the margin to PLN 26.60.

Upon reselling the same product, the combined shipping (PLN 8.50) and return (PLN 4.90) costs amount to PLN 36.80, further reducing the margin to PLN 13.20 gross. This analysis excludes many hidden costs, such as storage, increased promotion during sales, and potential mechanical repair costs like ozone treatment. These elements can significantly impact the total return handling costs in the e-commerce industry. If the product is returned again after reselling, the margin on the product disappears, nearing zero and potentially generating losses.

Consider the impact of an unfriendly return policy on a product worth PLN 100.00 (expected profit: PLN 20.00, advertising cost: PLN 10.00 to acquire the customer):

- **No revenue is generated and a net profit of PLN 10.00 is lost.**

- **The customer may never return.**

- **Lost future sales and revenue from this customer.**

- **Spending an additional PLN 10.00 to replace the lost customer (customer acquisition cost).**

- **The customer may leave a bad review due to their bad experience.**

- **Missed sales as potential customers change their minds after reading bad reviews.**

A single return can equate to hundreds or even thousands of zlotys in lost revenue and profits. Given the high cost of returns, it is crucial to find ways to reduce consumer returns to increase revenue, profits, and the customer base in the coming months and years.

3.5. Consequences of Not Calculating Return Costs in E-commerce

Failing to properly account for return costs in e-commerce operations can lead to severe financial and operational consequences: Let's examine this from a more critical perspective:

1. **Decrease in profitability:**
   - Ignoring return costs affects the accuracy of profitability analysis for products and categories.
   - Stores that overlook return costs may incorrectly assess which products are profitable and which are not.

2. **Reduced marketing budget:**
   - Unaccounted return costs can result in unrealistic marketing budget allocations.
   - Stores might invest in advertising campaigns based on inaccurate profitability data, leading to wasted resources.

3. **Impact on pricing strategy:**
   - Uncontrolled return costs affect pricing decisions, potentially leading to mispricing products relative to their actual profitability.

4. **Increased logistics burden:**
   - Failing to account for return costs impacts demand forecasting and inventory management.

5. **Higher return volumes can overburden logistical processes:**
   - Increase in customer dissatisfaction.
   - Customers expect a fair return policy, and unclear return costs can negatively impact their shopping experience.
   - Inconsistencies in the return process can erode customer trust.

Properly calculating return costs is crucial for improving store profitability:

1. **Accurate profitability analysis:** Enables reliable assessment of which products generate profits and which incur losses.

2. **Efficient budget management:** Enhances the ability to allocate marketing budgets and other resources accurately.

3. **Pricing strategy optimization:** Enables prices to be adjusted to actual costs, increasing competitiveness.

4. **Effective logistics management:** Helps manage inventory better, minimizing the impact of returns on warehouse operations.

5. **Customer loyalty:** A clear and fair return policy builds customer trust, translating into increased loyalty.
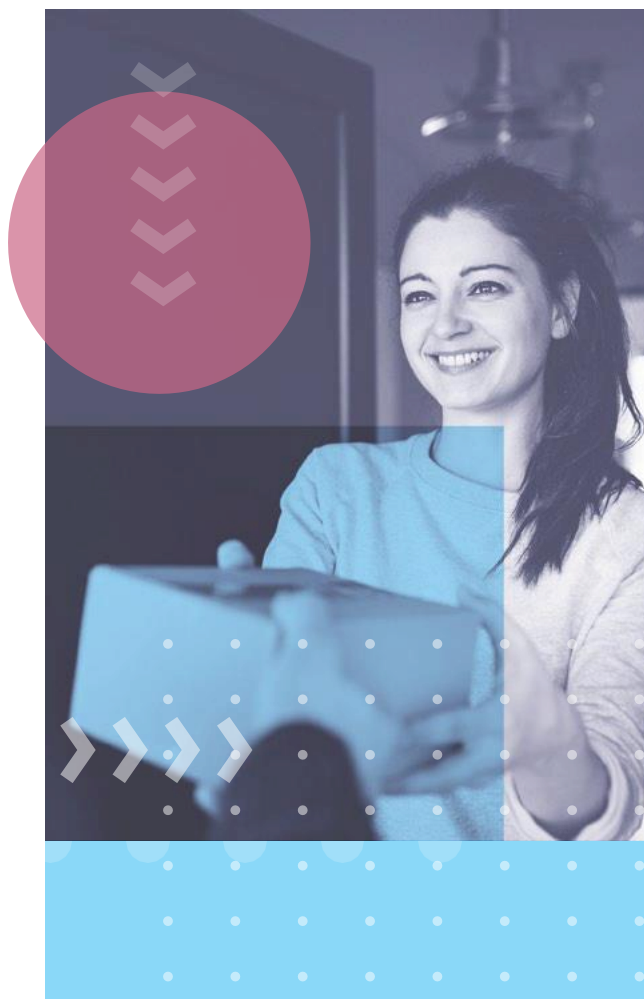
3.6. Reducing the Number of Returns in E-commerce

Provide a detailed size guide with the product.

Provide clear photos of the item on the website (without enhancing colors, etc.).

Provide accurate and complete details about the material composition, etc. in product descriptions.

Encourage customers to leave reviews (up to 97% of consumers check product reviews before making a purchase).

The goal is to help customers make informed purchasing decisions, thereby reducing the likelihood of returns.

Here are some best practices that help reduce the number of returns:

After analyzing various aspects of returns, we have compiled a list of recommended measures that will significantly reduce the costs of returns. These include:

1. Implement a return cost monitoring system. Use IT systems that accurately track the costs associated with returns.

2. Conduct regular data analyses. Perform regular profitability analyses and adjust your business strategy accordingly.

3. Establish a fair return policy. Implement clear return rules, informing customers about any potential costs associated with returns.

4. Invest in customer service. Enhance customer service to effectively manage returns and maintain a positive shopping experience.

In summary, calculating and properly accounting for return costs is essential for maintaining healthy profitability, ensuring customer satisfaction, and managing efficient e-commerce operations.

Returns can significantly impact your online business if not managed effectively. From shipping and storage costs to customer service and environmental expenses, return costs can erode profitability. However, understanding customer expectations regarding returns allows for the deployment of strategies that enhance satisfaction while minimizing return costs. Steps such as automating the return process, promoting the return policy, explaining return conditions, and defining the state of returned goods can significantly streamline the return process and reduce costs.

Optimization Algorithms: Indispensable Part of the E-commerce Ecosystem

Online sales are steadily and unwaveringly capturing market share, intensifying the competitiveness of the industry. A well-designed website is no longer sufficient for success in the e-commerce space. Meeting the ever-growing market demands requires implementing advanced technological solutions that perform complex tasks to ensure the shopping experience meets all consumer expectations. Optimization algorithms, applied at various stages of order fulfillment, are crucial components of these solutions.

4.1. Rising Consumer Expectations

According to the *E-commerce Delivery Compass 2023* report, consumers in Europe and the USA expect an average delivery time of three days. Additionally, 41% of respondents would welcome quick commerce (q-commerce), with deliveries within 10 minutes to a few hours after purchase, not just for groceries but for all online purchases. Meeting these expectations is vital for success in e-commerce, as 45% of people abandon their shopping carts if the delivery time is too long, and 23% do so if the store does not offer their preferred delivery method.

Going Green

However, that is not all. Environmental considerations are becoming increasingly important in the complex matrix of consumer expectations. Currently, 54% of respondents expect online stores to offer eco-friendly (carbon-neutral) delivery methods, and 37% are willing to pay extra for them. Expectations also extend to packaging, with a preference for fully recyclable materials and efficient packing methods that avoid oversized, largely empty boxes, following the spirit of "Fully recyclable packaging is not a choice; it's a necessity."

Optimization Algorithms
How to Meet the Market's Growing Demands?

> **"Obviously, there is no single recipe for success, and much depends on the relevant market, such as the level of infrastructure development, population density structure, or legal regulations,"** notes Krzysztof Chaładyn, Vice President of Otimo Sp. z o.o., specializing in solving combinatorial optimization problems.

"For example, to effectively implement same-day delivery or flash delivery, appropriate infrastructure is needed, such as micro-hubs, i.e. small consolidation and distribution nodes located near the final delivery point, serving a limited area and enabling the switch to low-emission (electric cars, scooters, or bicycles) or zero-emission (bicycles, walking) transportation. Finally, appropriate technology is required, utilizing advanced optimization algorithms that allow accurate demand estimation, rapid deliveries, and quick stock replenishment. It is not enough to simply pick and ship an order. You have to do it quickly and cost-effectively. Similarly, it is not enough to simply have a large fleet of vehicles – their routes must be optimized.

The more variables (number of vehicles, type of goods, time windows, etc.), the more complex the calculations required," says Krzysztof Chaładyn.

> **Let's take a closer look at selected algorithms currently shaping the logistics aspect of e-commerce.**

Order Picking
Warehouses are a key part of the e-commerce ecosystem, and order picking is one of the most critical functions within a warehouse. Order picking involves gathering individual items from various locations in the warehouse to be packed and shipped to the destination. A positive customer experience heavily depends on this process, with order accuracy and timely fulfillment being key to successful customer service. From the warehouse's perspective, order picking is crucial for overall operations and, ultimately, to business profitability. Order picking and packing are generally the two areas that offer the greatest potential for optimization, increased efficiency, and cost savings. According to a report [16], the order-picking process accounts for up to 55% of total warehouse operating costs. Optimizing this process, therefore, brings tangible benefits.

> **Order picking accounts for up to 55% of total warehouse operating costs [16].**

Many Elements of Order Picking
Order picking methods involve using different operational strategies to complete this first stage of order fulfillment.

Order picking strategies rely on a combination of Warehouse Management Systems (WMS), advanced algorithms, and automation. Effective picking minimizes picker travel time and ensures high accuracy. A good inventory control process significantly improves the accuracy and quality of orders. Clearly marked warehouses and easy-to-read picking documents or RF screens are also helpful. Proper product placement and consolidating orders in one pass can significantly reduce picking time. In larger distribution centers, methods such as voice picking, pick-to-light systems, automation, and robotics enhance efficiency. In each case, however, the proper selection of the right picking methods is essential.

4.2. Order Picking Methods

Depending on the product range and warehouse operations, different picking methods are adopted. Below are the most popular ones.

Single Order Picking:

The picker moves through the warehouse, retrieving products (SKUs) one by one to fulfill a single order at a time. This picking system is effective for small warehouses that handle simple orders, typically with only a few SKUs.

Batch Picking & Multi-batch Picking:

A more advanced model requiring a Warehouse Management System (WMS). In this method the picker receives a list of SKUs from the system to fulfill multiple orders simultaneously, thereby eliminating unnecessary trips to the same warehouse area.

Wave Picking:

A variation of batch picking, particularly suitable for large warehouses that regularly receive high-volume orders. Orders are grouped into "waves" based on factors such as customer location or delivery date (e.g., express delivery, same-day delivery). Workers assigned to a "wave" pick SKUs from multiple zones and send them for consolidation into individual shipments.

Zone Picking:

In this method, the warehouse is divided into zones, and dedicated workers are assigned to each zone. Pickers fulfill orders by adding SKUs stored in their zone. After collecting all items from a given zone, the order box is passed to other zones. The shipment ultimately reaches a central consolidation area where it is packed for shipping.

Smart Picking / Autonomous Order Picking:

An increasing number of logistics centers have become fully or partially autonomous in recent years, using self-driving vehicles, machine learning, or artificial intelligence to, for example, locate and retrieve specific bins from shelves and deliver them to designated consolidation areas. There, a worker or another automated system selects the desired SKU and places the bin on a track to return to its designated place in the warehouse.

Each type of order picking requires specially designed algorithms that:
• Consider the warehouse layout and its zones,
• Manage shuttle schedules (linehaul),
• Optimize picking paths, and tailor order fulfillment processes,
• These algorithms also optimize routes for forklifts or AGVs (Automated Guided Vehicles) to avoid collisions and expedite goods release,
• Continuous evaluation and updating of picking paths and vehicle routes are necessary to eliminate errors and adapt to changes.

"Our experience shows that selecting the right order-picking methods during the planning phase of the technological ecosystem in the warehouse or distribution center is the most effective solution. Considering the individual nature of the given warehouse in designing optimization algorithms for various processes allows for fully utilizing their potential. I am confident that I can speak on behalf of the entire industry when I say that optimization solution providers are eager to participate in initial discussions, share their knowledge, point out the pros and cons of each order-picking approach, and highlight elements that clients often overlook.

We are talking about a process that accounts for over half of operational costs, yet is highly complex and influenced by many seemingly insignificant factors. Both from the supplier's and the recipient's perspective, the pre-implementation analysis and design phase is extremely important," says Krzysztof Chaładyn.

Effective optimization of order picking not only guarantees warehouses greater efficiency and generates savings, but by quickly preparing products for shipment, it is also the first step to customer satisfaction, with the second being efficient delivery.

4.3. VRP (Vehicle Routing Problem)

Once an order has been processed in the warehouse, the next stage is its journey to the destination chosen by the customer. As with warehouse operations, transportation efficiency largely depends on the algorithms used. Why is that the case?

> Manual route planning is a time-consuming, inefficient, and often error-prone solution. This is especially true when dealing with large fleets of vehicles, where there is often a need to consider many additional factors, such as: the type of transported goods (e.g., pallets, non-standard shipments, goods requiring refrigeration); the quantity and dimensions of transported goods; the number and types of available vehicles; the number of bases, their locations, and the necessity (or not) to return to them; the number and schedule of drivers; the number, type, and location of route points; time windows (specific times when a location can be visited); finding additional cargo for the return trip; traffic restrictions (movement/entry bans, rush hours, etc.). Adding the handling of returns and backhauling to reduce empty runs (wasted time, fuel, and money) and CO2 emissions, even the best specialist with extensive experience cannot optimize this complex puzzle of individual elements and connections to compete with advanced algorithms," explains Krzysztof Chaładyn.

The comprehensive issue of route optimization mentioned above is known as VRP (Vehicle Routing Problem), and like order picking, it has many variants, among which the most commonly used for e-commerce order fulfillment are:

- **CVRP – Capacitated Vehicle Routing Problem:** A VRP problem considering vehicle capacity and the amount of goods a fleet needs to handle. The goal is to determine the most efficient vehicle routes to reach all customers while adhering to capacity constraints. Example: Courier companies use CVRP to optimize parcel delivery processes to various addresses, considering available vehicles with different capacities.

- **VRPTW – Vehicle Routing Problem with Time Windows:** Each point (customer) has specified time intervals during which they can be serviced. The goal is to determine the optimal routes for a vehicle fleet to visit all customers within the specified time windows while minimizing total distance or costs. Example: Courier companies use VRPTW to optimize routes to meet the time window selected by the customer, similar to platforms like Uber Eats or Takeaway.com that handle food deliveries.

- **VRPDD –** Vehicle Routing Problem with Pickup and Delivery: A routing problem for a fleet of vehicles that must first pick up goods or resources from pickup locations and then deliver them to designated delivery locations. Example: 1) Return logistics, where vehicles must pick up returned products from customers and deliver them back to warehouses; 2) Retail chains with multiple stores or warehouses use VRPPD to optimize routes for picking up stock from distribution centers and delivering them to specific retail locations; 3) Courier companies that deliver parcels to customers, parcel lockers, or PUDO points while picking up those sent by customers to take them to the central hub.

Other types of VRP include:

- **VRP with Bin Packing:** Considers the loading space of vehicles and the order of loading/unloading goods.

- **PVRP – Periodic VRP:** Used when routes are planned for an entire week or month in advance, and selected points must be visited on specified days.

- **VRP with loading constraints:** Assumes that specific goods can only be transported by certain vehicles, e.g., refrigerated trucks, or certain goods cannot be transported together.

- **Territory-based VRP:** Routing based on a fixed area where points are grouped based on a specific warehouse or a specific driver.

- **DVRP – Time-dependent VRP:** Takes into account traffic data for specific time periods.

- **Clustered VRP:** Involves grouping of points that must be visited during the same route.

Why is Route Optimization So Important?

Fuel, maintenance, and repair costs account for 37% of the total operating costs per kilometer in the transportation industry (according to the "An Analysis of the Operational Costs of Trucking: 2023 Update" report). [17] Moreover, Eurostat reports that up to 20% of all freight transport in Europe involves empty road journeys, where trucks return without any cargo after delivering goods. [5] Examples from Poland and around the world show that implementing a route optimization system can reduce the mileage of an entire fleet by 20%. By using appropriate algorithms, routes can be optimized to minimize empty runs. Similar to optimization in logistics centers, even a small improvement in transportation brings tangible financial benefits, especially in the context of the last mile.

Fig. 4.1 **Empty road journeys (ERJ) | Cross-trade in 2022**

[% of vehicle-kilometers for ERJ | % of ton-kilometers for cross-trade and cabotage]
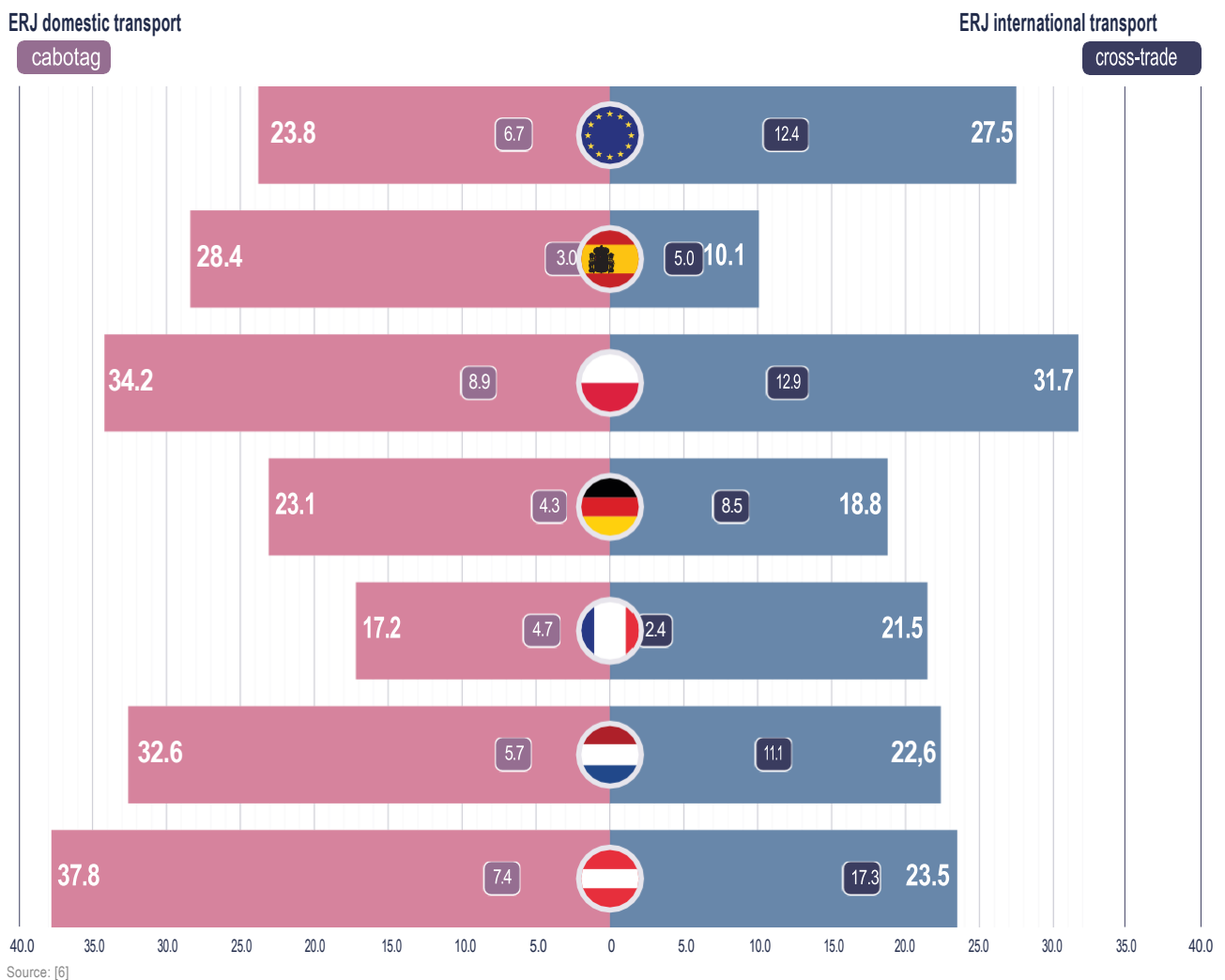
4.4. Last Mile Delivery

The final leg of a product's journey from the warehouse to the customer's hands is known as the "last mile." This stage is crucial for the overall e-commerce shopping experience in many ways. Firstly, it is the most time-consuming and cost-intensive element as it is estimated that the last mile accounts for about 50% of all transportation costs. Secondly, as the point where the product reaches the customer, it is essential for customer satisfaction. The goal is no longer just to deliver goods but to do so quickly and in a way that meets the customer's needs, such as delivery to a chosen location, same-day delivery, or the aforementioned q-commerce. To meet these challenges, it is necessary to implement solutions based on advanced optimization algorithms that can swiftly process large and dynamic data sets.

> **The last mile is estimated to account for about 50% of all transportation costs.**

4.5. Are Algorithms the Future of E-commerce Logistics?

Optimization algorithms alone are not the be-all and end-all for all e-commerce logistics challenges, but they are an indispensable part of the solution. All signs indicate that their importance will only grow.

"Claiming that success in e-commerce will depend solely on optimization algorithms is an exaggeration. However, it is hard to imagine any significant market player not using them. On one hand, they enable a response to changing customer needs, and on the other, they enhance efficiency at every stage of logistics, giving companies that use them a clear competitive advantage. Another advantage is that they are relatively easy to integrate with emerging technologies such as the increasingly popular AI. Artificial intelligence techniques like machine learning and deep learning are already being used to

improve VRP algorithms, learning from historical data and making decisions on route planning and vehicle allocation," forecasts Krzysztof Chaładyn.

"The future of e-commerce logistics will depend on the industry's ability to effectively leverage technology. However, while the development of innovative tools can significantly facilitate efficient last-mile management, returns handling, and environmental impact reduction, technology alone will not solve all problems. In response to the growing interest in expanding into foreign markets, cross-border logistics is an area of intensive development in both products and technology. Continuous process improvement will play a key role in meeting increasing customer expectations and maintaining a competitive market position,"

Magda Magnuszewska, CEO of Alsendo Group

4.6. Warehouse Automation: The Future of E-commerce Warehouse Logistics

The quick, efficient, and error-free fulfillment of orders remain a constant challenge for the e-commerce industry. Most e-shoppers want to receive their ordered goods as quickly as possible. Customers make a purchasing decision, select products for their shopping cart, spend money, and want to receive their order the next day. Thus, e-shop warehouses or fulfillment service providers must be equipped with solutions that ensure very short shipping times.

Warehouse automation is gaining increasing importance in the context of warehouse logistics for e-businesses.

It involves using **modern technologies to streamline warehouse processes**, such as:

- Receiving and shipping goods,
- Storing and warehousing,
- Order fulfillment,
- Handling returns and complaints,
- Stock taking.

Regardless of the logistics model that the online store employs, market changes and customer awareness compel e-businesses to create new logistical processes, including even drone delivery of products.

Thus, companies engaged in online sales must adapt their storage systems, transport equipment, and fulfillment processes to handle more demanding loads than traditional pallets or seek external solutions for comprehensive fulfillment services.

Implementing automation for comprehensive logistics management is one of the key ways to streamline e-commerce logistics. Some of the most important advantages include:

- Simplified order processing,
- More efficient use of warehouse space,
- Much higher frequency of product receipts and shipments,
- More streamlined management of receiving deliveries, storage management, and order fulfillment processes,
- Greater safety in the flow of goods,
- Full control over the e-shop's inventory.

Among the solutions used in modern warehouses for intensive e-commerce order fulfillment are:

- Warehouse Management Systems (WMS), which enable efficient control of orders, inventory, and article placement,
- Order picking robots,

- Automatic storage racks,
- Robotic automation.

However, the automation of a logistics facility would not be as effective without a warehouse IT system that coordinates all activities performed in the warehouse.

"**The e-commerce industry particularly needs these types of solutions to effectively tackle market challenges. E-commerce has broken the traditional logistics model, emphasizing issues like the last mile or 24-hour delivery. As it turns out, building a competitive advantage on comprehensive logistics service using intelligent packaging forms or automated solutions is more beneficial than solely competing on price with competitors,**"

Piotr Streker, Director of Fulfillment at 3LP SA

5. Polish E-commerce Logistics: Budget-friendly – Eco-friendly – Short distance – Timely

BEST represents the recipe for success from the customer's point of view. Let's dive into the fascinating world of Polish e-commerce logistics, where Poland stands out as a leader, offering eco-friendly solutions from the beginning of the customer's shopping experience. We will explore the key innovations, tools, and strategies that have made the Polish logistics market ready for dynamic growth and a green revolution.

B Budget-friendly **E** Eco-friendly **S** Short distance **T** Timely
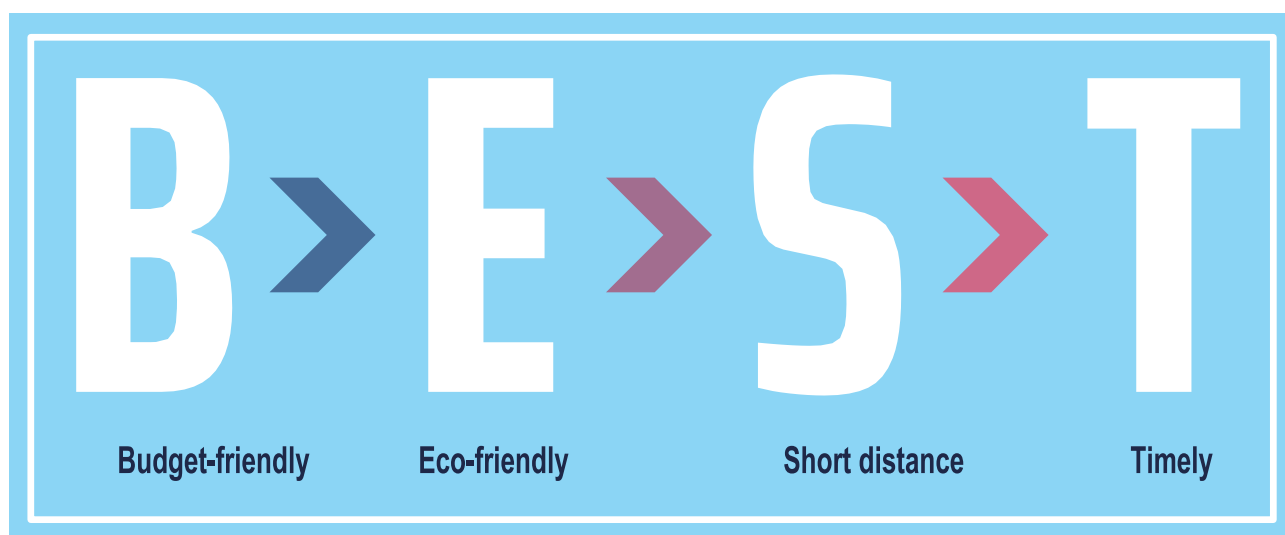
In the context of e-commerce, the Polish logistics market deserves a leading position not only in Europe. The saying "the grass is always greener on the other side" perfectly reflects customers' views on the quality of logistics services in Poland. Let's discover why Poland is approaching this BEST standard, thanks to the benefits offered to customers in a well-developed logistics services sector. This does not just refer to the country's favorable geographical layout, where it is possible to reach even the most remote corner

of Poland from the country's geometric center (the town of Piątek in the Łódź Province) in less than 5 hours, thanks to the recently expanded network of expressways. The comfort of using services by individual customers is supported by a wide range of services that bolster the logistics services sector.

Poland excels in providing exceptional comfort and security in online shopping, matching the highest global standards across the entire shopping process. This includes product selection, user-friendly shopping experiences, secure payments, and advanced delivery methods. These advantages are worth highlighting and leveraging in business operations for the benefit of both customers and the environment.

5.1. Price Defect Rate

Firstly, the low Price Defect Rate (PDR), which indicates the value and percentage of products that can be purchased cheaper, for example, in another country, is very attractive in the Polish market. This gives potential for further rapid development and motivates customers to shop locally. Thanks to healthy market competitiveness, Poles enjoy the privilege of not overpaying for the same products, unlike their Czech neighbors, for example. This is certainly one of the key reasons why Allegro decided to expand into this market, where the same products sold online in Czechia are from several to several dozen percent more expensive. Although every second Pole says they shop abroad, the biggest advantage is simply a great offer on the local market. Barriers to shopping abroad certainly include higher delivery costs and complicated and expensive returns.

5.2. Buy Now

Secondly, tools like "Buy Now," the Allegro Smart subscription program, and payments via Blik, Google/Apple Pay mean that people of all age groups are now shopping online. This trend is solidifying, as evidenced by the Gemius report, where the share of online non-shoppers in the 50+ group has fallen below 33%, which is the same as in the 35-49 age group.

5.3. Shopping Apps

Thirdly, shopping apps like InPost Fresh, Allegro, and eobuwie, along with convenient label-free returns, enhance the sense of convenience and security. Notably, InPost Fresh recently surpassed 1 million users of their app, a significant milestone

as selling fresh products is the most challenging segment of the e-commerce market. And here, a lot can change, as InPost has the unique ability to change user shopping habits, as they successfully did with the unconventional invitation to pick up a parcel from an APM during a walk. All thanks to a clever and resonant customer invitation: "Don't wait for the courier with your parcel, let the parcel wait for you." This is a great opportunity to mention the fourth argument.

The extensive network of pickup points, such as popular Żabka convenience stores or dedicated pickup and drop-off points (PUDO), like Epoka, and Pakersi, is another asset for Poland. Poland has over 30,000 unique pickup points and at least 33,000 automated parcel machines, putting the country at the forefront worldwide. According to a report [3], Poland has nearly 40 such points per 10,000 inhabitants. For comparison, the largest e-commerce market in Europe, the United Kingdom, offers just 15. This ensures that the country is not at risk of network overload with further volume growth. Equally important is how these external pickup points are rated by buyers, where the Net Promoter Score (NPS) for APMs among the top two rated networks is 75 (One Box by Allegro) and as high as 81 (InPost APMs). [7] It is worth emphasizing that these scores are unattainable for door-to-door deliveries.

5.4. Delivery Methods in E-commerce

Same-day delivery to over 26 metropolitan areas with One Kurier by Allegro encourages abandoning traditional shopping. As confirmed by research commissioned by Allegro from Kantar, as many as 71% of respondents who shop on Allegro are ready to order products like contact lenses, diapers, or coffee with same-day delivery instead of going to a supermarket or shopping mall.

**As many as 71% of respondents who shop on Allegro are willing to order products like contact lenses, diapers,
or coffee for same-day delivery instead of going to a supermarket or shopping center.**

This poses a potentially huge threat to traditional stores. However, thanks to such ambitious products, Poland is at the forefront, literally spoiling e-customers.

The rapidly growing re-commerce, i.e. the selling of pre-owned products, synonymous with OLX, Vinted, and Allegro Lokalnie, presents an opportunity to at least slightly reduce the demand for new items. Polish customers can easily take advantage of this type of shopping thanks to the extensive network of pickup points. Interestingly, Vinted in France has just exceeded 1,000 dedicated parcel lockers, enabling effective resale between individual customers. Poland already has such a network!

Therefore, logistics operators and the e-commerce market are ready for dynamic growth. Even problems such as overfilled parcel lockers during the holiday season are becoming much rarer. It is evident that the market leader, InPost, has understood that frequent redirections of parcels to other APMs drive customer conversion to alternative APM networks.

This is a good moment for a brief, non-obvious logistics moral: How is it possible that alongside speed, proximity, and price, the "eco-friendly" aspect grows in importance as a key argument? Customers expect to mitigate the guilt of contributing to CO2 emissions in e-commerce transportation. Choosing more eco-friendly delivery methods is one of the top two reasons, alongside price and the logistics company brand, for selecting InPost Parcel Lockers, as the company argues in its reports. Compensating nature for generated air pollution is one of the top three reasons for choosing One Box by Allegro, with the company pledging to plant trees for every tenth collected parcel. **Allegro claims to have planted over 800,000 trees this way and plans to continue this effort.** Another interesting benefit is the free return option for used electrical equipment, which One by Allegro initially introduced and was later also adopted by InPost.

5.5. Carbon Footprint Reduction

The drive to reduce the carbon footprint even further is evident, with InPost leading the way with its electric fleet. Currently, they have over 1,100 vehicles and have set a goal to have 100% of their deliveries served by electric vehicles by 2040. Solutions to the problem of congestion in city centers caused by a growing number of courier vehicles blocking streets during delivery hours are possible through consolidation, which has already shown its potential in Poland. However, it is time to take further steps, such as providing access to the parcel locker network for all courier companies (agnostic network) and developing local distribution points (micro-hubs). Otherwise, we may end up with a situation like Manhattan in New York, where there is a "hunting season" for illegally parked courier vehicles. In Manhattan, an app was introduced that allows residents to report courier vehicles blocking streets in exchange for a financial reward.

As living standards rise, we are increasingly bothered by the noise of slamming doors, light pollution from APMs that are illuminated 24/7, and even littering in their surroundings with boxes. In an ideal world, we would expect further facilitation of e-shopping through partial automation (AI) and improvements to peripheral devices such as Alexa speakers or Polish-speaking Home Pods. After all, there is no joy in making shopping lists or answering the question, "Are you running out of laundry detergent?" Hopefully, there is room for another great innovation that Poles can be proud of and boast about!

In summary, customers in the logistics industry expect the "BEST," representing a service that is Budget-friendly, Eco-friendly, Short distance and Timely. Adding an intelligent advisor to this will allow us to maintain Poland's leading position for future generations!

The rapid growth of e-commerce requires innovative approaches to customer service, supply chain management, and data utilization. Companies must continuously monitor market trends and adapt to changing conditions to remain competitive. Additionally, the importance of environmental issues affecting sustainable development and integrating more eco-friendly solutions into business operations is growing. In this way, companies can not only meet customer expectations but also contribute to creating more sustainable business models

Michał Wójcik, Partnership Director at the Alsendo Group

6 Environmental Aspects in E-commerce: Overview of Key Issues

In addition to the challenges of reducing delivery costs, increasing delivery flexibility, and ensuring timeliness, environmental aspects are gaining significant importance. That is why we often hear about eco e-commerce, green last mile, or green logistics. Green has become the most popular and desirable color we want to see in the logistics of online commerce (and beyond). UPIDO estimates suggest that the carbon footprint associated with e-commerce could reach as much as 5.5 million tons by 2032. These figures highlight the critical role that efforts to improve the environmental quality of e-commerce logistics play in the fight to protect our planet.

6.1. Consumer Environmental Awareness

Periodic studies conducted for the purposes of e-Izba's (Chamber of Digital Economy) 2023 report "Odpowiedzialny e-commerce" ("Responsible E-commerce") show that 23% of surveyed consumers are aware of what sustainable development and corporate social responsibility (CSR) mean, up from 13% in 2022. [8] This indicates a growing level of public knowledge, which is a good sign. But does this knowledge translate into action? At a declarative level – yes, as 60% of internet users claim that they consider whether an e-store operates according to sustainable development principles when shopping online. [8]

Let's take a closer look at consumer declarations. Studies show that nearly 80% of customers choose eco-friendly deliveries when given the option. However, there is a small but significant catch: they are not willing to pay more for these eco-friendly options. A Blue Media report confirms that Poles are unwilling to pay extra for green solutions, showing a decrease in the percentage of people willing to pay more for products in eco-friendly packaging (non-plastic).

In 2022, this percentage was 40%, compared to 31% in 2021. Thus, we quickly move from environmental issues to the economy, confirming that in logistics, we should seek solutions consistent with the idea of sustainable development, where eco-friendliness, economy, and society are in a trade-up relationship.

Unfortunately, in business practice and when implementing new solutions in e-commerce logistics, trade-off relationships are much more common, meaning that increasing environmental efficiency often requires higher costs. In times of crises, high inflation, and economic instability, both consumers and businesses looking to save money are less willing to bear these costs. However, avoiding trade-offs is not always possible, at least at the current stage of implementing eco-friendly solutions. This builds the conclusion that implementing environmentally friendly solutions requires some compromises and concessions but also a consistent approach from both customers and sellers or logistics operators. The declared,

increasing awareness of social and environmental issues, as well as the demand for sustainable solutions, serve as strong motivators for e-stores to meet new expectations.

Referring back to consumers and their commitment to the environment, the 2023 Gemius report "E-commerce w Polsce ("E-commerce in Poland") provides valuable insights. According to the report, 42% of respondents consider the environmental impact of delivery to be significant. [9]
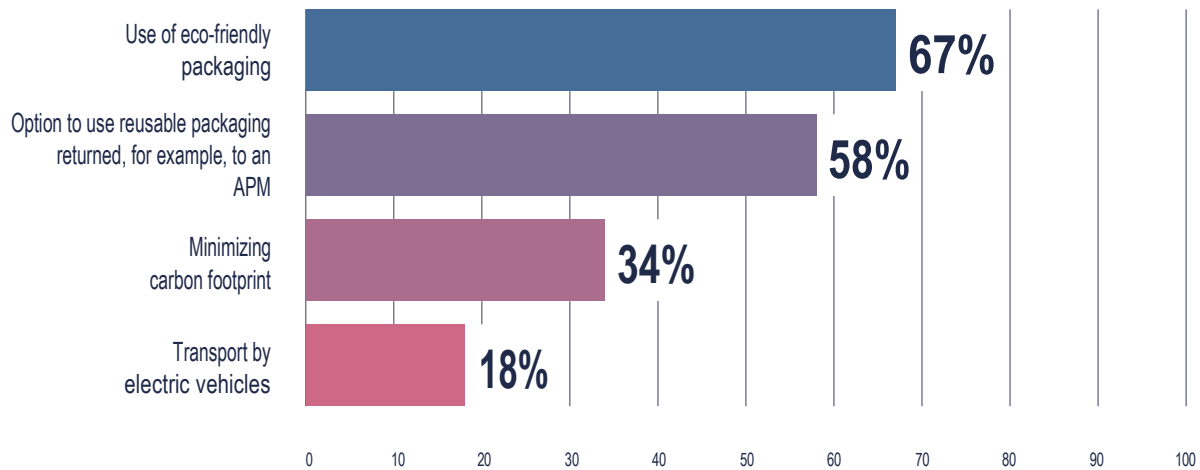
67% of respondents declare using eco-friendly packaging, with 58% expressing interest in using reusable packaging.

As depicted in Figure 6.1, the most crucial factors for e-commerce customers when it comes to eco-friendly delivery are related to packaging. Specifically, 67% of respondents declared using eco-friendly packaging, and 58% expressed interest in using reusable packaging [9]. This interesting finding suggests that, from the buyers' perspective, the "eco-friendly" nature of their purchases is largely determined by packaging rather than emissions from delivery. A report by Polityka Insight supports this notion, revealing that 55% of internet users pay attention to the eco-friendliness of product packaging, although this is a 6% decrease from 2022. Interestingly, the willingness to pay extra for eco-friendly packaging has increased in 2023, with 34% (+6%) of respondents expressing this preference. However, if

additional costs were to be incurred, they would generally be minimal. 39% would pay an extra 3-5 PLN, and 35% would pay 1-2 PLN. [10] Nevertheless, this result may indicate the emergence of a customer segment within society that is highly conscious and consistent in making eco-friendly choices, especially when additional costs are involved.

Studies have demonstrated that respondents perceive carbon footprint and electric vehicle transport as less important factors in terms of delivery eco-friendliness. However, from the perspective of sustainable efficiency in logistics processes, the last mile presents the greatest challenges for logistics operators. What do consumers think about this issue? In terms of delivery emissions, consumers are resolute, with 7 out of 10 respondents considering APM delivery as the most eco-friendly option (see Figure 6.2). This eco-friendly consideration likely contributes to the popularity of this delivery method among Poles, as 82% of respondents frequently choose automated parcel machines, with 93% of them opting for InPost APMs. Consumers clearly view home delivery as the least eco-friendly option.
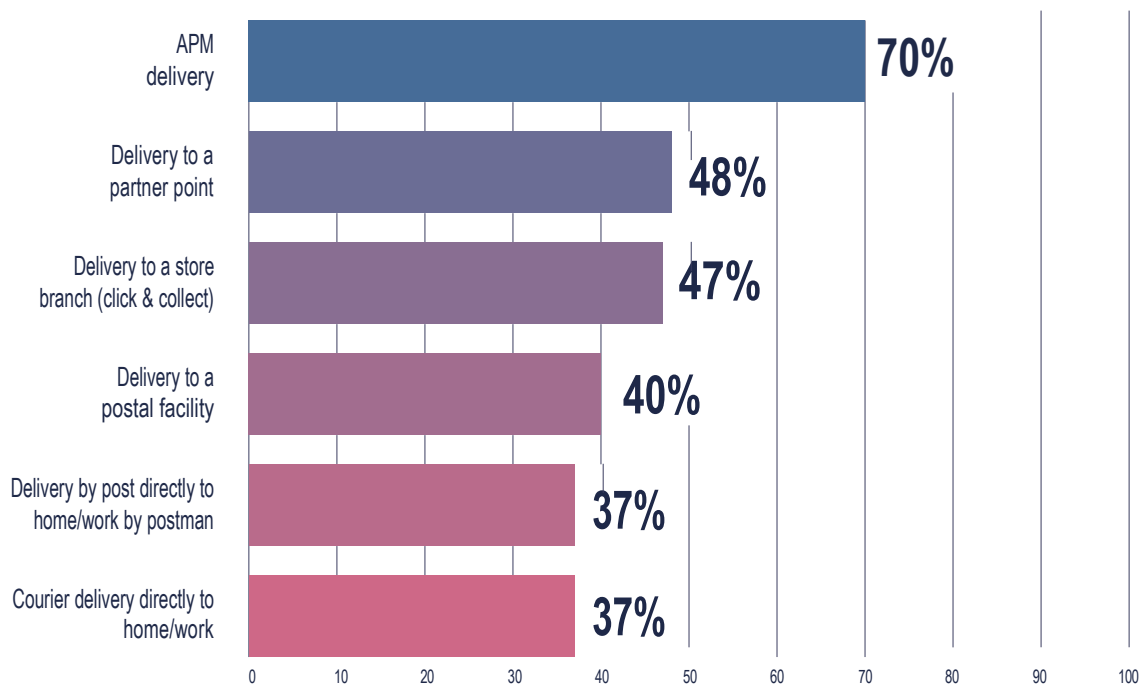
Fig. 6.1 Key areas related to eco-friendly delivery or return methods

Category	Percentage
Use of eco-friendly packaging	67%
Option to use reusable packaging returned, for example, to an APM	58%
Minimizing carbon footprint	34%
Transport by electric vehicles	18%

Percentage basis: individuals who rated the importance of the environmental impact of delivery and return methods as 4 or 5 (important or very important) (N=530).

Source: [10]

Fig. 6.2 Perception of delivery methods through the lens of eco-friendliness

Category	Percentage
APM delivery	70%
Delivery to a partner point	48%
Delivery to a store branch (click & collect)	47%
Delivery to a postal facility	40%
Delivery by post directly to home/work by postman	37%
Courier delivery directly to home/work	37%

Percentage basis: people shopping online (N=1235) sum of the percentages of answers 4 and 5.

Source: [10]

Polityka Insight's report identifies meeting the expectations of different customer groups as a barrier to the growth of e-commerce in Poland. [9] Therefore, the opinions and declarations of customers mentioned will be an important indicator of the changes we can expect in the e-commerce logistics sector in the future.

However, it is important to recognize that there is often a gap between what customers say they want and how they actually behave. This can pose challenges for both sellers and logistics operators.

6.2. Greenwashing: A Conjured Reality

Last-mile delivery and product packaging account for 40% of all e-commerce emissions. [11] Additionally, last-mile delivery can represent up to 35% of total delivery costs, depending on the delivery type. Sustainable optimization of last-mile deliveries and packaging methods is, therefore, crucial and equally challenging. It requires a high level of awareness, consistency in action, and sometimes compromises from both consumers and businesses. However, many businesses find it difficult to shift from their primary goals of reducing costs and maximizing profits. Consequently, when faced with decisions about implementing new environmentally-friendly solutions that involve additional costs based on trade-off relationships ("something for something"), they often opt for methods that guarantee economic objectives.

On the other hand, in today's world, it is unacceptable not to be eco-friendly. Numerous European Commission regulations permeate national legislation, although these are not yet defined strongly enough to provide specific operational guidelines or concrete indicators of environmental development. In the absence of a high and genuine awareness of sustainable development within companies, we often see instances of **greenwashing**. It is one of the most disappointing, yet unfortunately still widespread practices in the modern world. This term describes the practice of companies communicating eco-friendly actions or information that are false or have no practical reflection in their actual activities. Relatively few market players in e-commerce logistics have a coherent and effective "green last mile" strategy that they consistently implement.

What do the studies show? According to the e-Izba report "Responsible E-commerce," 9 out of 10 surveyed managers in 2023 rated their companies as responsible. [8] Moreover, over half of e-businesses (55%) now declare having responsible development strategies. Furthermore, 9 out of 10 e-companies indicated that they benefit from conducting business responsibly, though these benefits are mainly in terms of image. [8]

While these results theoretically provide a basis for optimism, the same businesses somewhat weaken this foundation. A Google survey shows that nearly three-quarters (72%) of managers believe that most organizations in their industry would be found guilty of greenwashing if audited. [11] Such results are far from optimistic. Although the importance of sustainable development and the balance of social, environmental, and economic issues has been discussed for a long time, the sector has only recently started to take real action. Initially, eco-friendly approaches were more of a trend, perceived as modern and desirable. It was relatively easy to be eco-friendly because this "eco-friendliness" was largely declarative, both among businesses and consumers. There were no real definitions of pro-environmental actions or indicators that could regularly measure whether a company genuinely implements environmental practices. Fortunately, this situation is changing.

Local authorities and governments are increasingly engaged in monitoring and controlling environmental impact. With the introduction of the Corporate Sustainability Reporting Directive (CSRD), greenwashing practices will be treated similarly to financial reporting fraud. E-commerce companies, like all other businesses practicing greenwashing and exploiting the existing information overload around ESG requirements, will soon be exposed. It is, therefore, high time to move from talking to planning specific actions that seriously address the requirements of sustainable development.

6.3. Product Packaging as an Element of Environmental Efficiency in E-commerce

In the context of product packaging for online orders, three factors are crucial:

 The materials used for packaging (and filling the packages)

 Proper sizing of packaging to match the product

 The possibility of reusing the packaging

The fundamental principle in designing the life cycle of packaging is the 3R principle – Reduce, Reuse, Recycle. Eco-friendly packaging should be produced responsibly, consuming the least amount of natural resources while limiting the emissions of pollutants. One of the most commonly chosen materials for eco-friendly e-commerce packaging is cardboard made from recycled paper pulp. Plastic is highly discouraged. This also includes using the "right" materials for sealing and filling packages. Packaging should be 100% recyclable or made from recycled materials, and paper tape or biodegradable fillers should be used. These fillers often include old or damaged boxes cut or shredded to replace bubble wrap.

When it comes to fillers, their use should be minimized. This means ensuring that the size of the packaging matches the product(s) as closely as possible. Studies show that about 24% of space in packages is unused, with an even higher percentage in the fashion industry due to irregular shapes. This negative phenomenon, known as "air-commerce," involves improper packaging fitting more air than goods. The negative impact of this practice from an environmental standpoint is quite obvious: oversized boxes require more space in delivery vehicles, which means more vehicles are needed to transport the packages, ultimately resulting in a larger carbon footprint, etc. A DS Smith study found that packaging shipments in poorly fitting boxes generates over 42,000 tons of unnecessary CO2 annually. [11] Increasingly, "packing on demand" devices that cut perfectly fitting cardboard packaging based on 3D scanning of the items to be shipped are used to combat this issue.

Eco-friendly packaging should also be used sustainably, preferably multiple times. The design should enable repeated use, thus extending its life cycle. Reuse can be interpreted in many ways and does not necessarily mean using the packaging for the same purpose. The goal is for the packaging to be reused rather than discarded. When the packaging can no longer serve its purpose, it should be recycled. This brings us back to the materials used – they should allow for reuse and/or recycling. Increasingly, companies are "branding" their packaging with information about the materials used and recycling instructions.

6.4. Clean Courier Transport

Cities are recognizing the problem and are increasingly implementing clean air zones, which are specific areas in city centers where combustion engine vehicles are banned. [13] Clean air zones already exist in over 300 European cities. In Poland, the first such zones, restricting access for vehicles below certain emission standards, will be implemented in 2024. This follows from an amendment to the Electromobility Act of December 2021, which allows municipalities to create clean air zones in response to alarming air quality studies in Poland's largest cities. [14] Consequently, the level of fleet electrification, especially among courier fleets, is increasing.

All major courier companies are investing in zero-emission transport and expanding their fleets with electric vehicles, making them the first industry to adopt this new propulsion technology on a large scale. In 2022, GLS added 100 new electric vehicles to its delivery fleet, while DHL Express aims to have 60% of its fleet electric by 2050. DPD purchased 50 electric Crafter vans in 2021, and InPost's electric fleet surpassed 300 vehicles in the same year. InPost's Decarbonization Strategy sets a goal of achieving net-zero greenhouse gas emissions across its entire value chain by 2040.

In addition to numerous APMs and electric vehicles for last-mile delivery, cargo bikes have also become more common in recent years. Cargo bikes are effective tools for reducing transport emissions in parcel deliveries (and beyond). According to the Green Alliance report "Sharing the Load," replacing just 7.5% of urban delivery vans with electric bikes could reduce CO2 emissions by up to one-third. Furthermore, cargo bikes do not require extensive charging infrastructure like electric vehicles do since their batteries can be easily swapped out. A study conducted by the University of Westminster in London showed that cargo bikes in city centers are not only more environmentally friendly but also 1.6 times faster than delivery vans, achieving higher average speeds. However, cargo bikes do come with certain limitations, such as limited capacity for large packages, restricted use in adverse weather conditions (e.g., winter, heavy snow), and challenges posed by poor urban road infrastructure like a lack of bike lanes, high curbs, and poor road surfaces. Nonetheless, the increasing adoption of cargo bikes by courier operators demonstrates their positive impact on sustainable last-mile delivery.

6.5. Returns and Re-commerce

The issue of returns and re-commerce has been extensively discussed in previous chapters of this report. However, it is

concerning that e-commerce customers do not recognize them as activities with negative environmental consequences. According to the e-Izba report, in 2022, 50% of respondents acknowledged this link, but by 2023, only 34% did. [8]

The re-commerce market has experienced global growth at an average rate of 10% annually over the past five years, reaching a value of USD 174 billion in 2022. However, comprehensive data to estimate the size of the re-commerce market in Poland or Europe is still lacking. [16]

6.6. Micro-Hubs and Cargo Bikes

While electric vehicles are increasingly used in courier deliveries, achieving full electrification of courier fleets is still a distant goal. Additionally, EVs do not address issues such as increased urban traffic, congestion, and delivery vans obstructing sidewalks or other vehicles. [13] To address these challenges, micro-hubs and cargo bikes offer a potential solution.

The concept is simple: a micro-hub, or urban transshipment hub, would be located in city centers or large residential areas such as housing complexes where parcels would initially be delivered by traditional transport, such as delivery vans. From the micro-hub, couriers would collect the parcels on cargo bikes for final delivery to recipients. This concept will be implemented as part of the **GRETA** project, funded by the Interreg Central Europe program, with Polish partners Łukasiewicz-PIT and the city of Poznań. The Polish pilot program will be launched in Poznań and will involve analyzing the requirements for hubs and cargo bikes, practical implementation in a selected area of Poznań, and assessing the benefits and drawbacks of this solution. GLS is the business partner supporting the GRETA project.
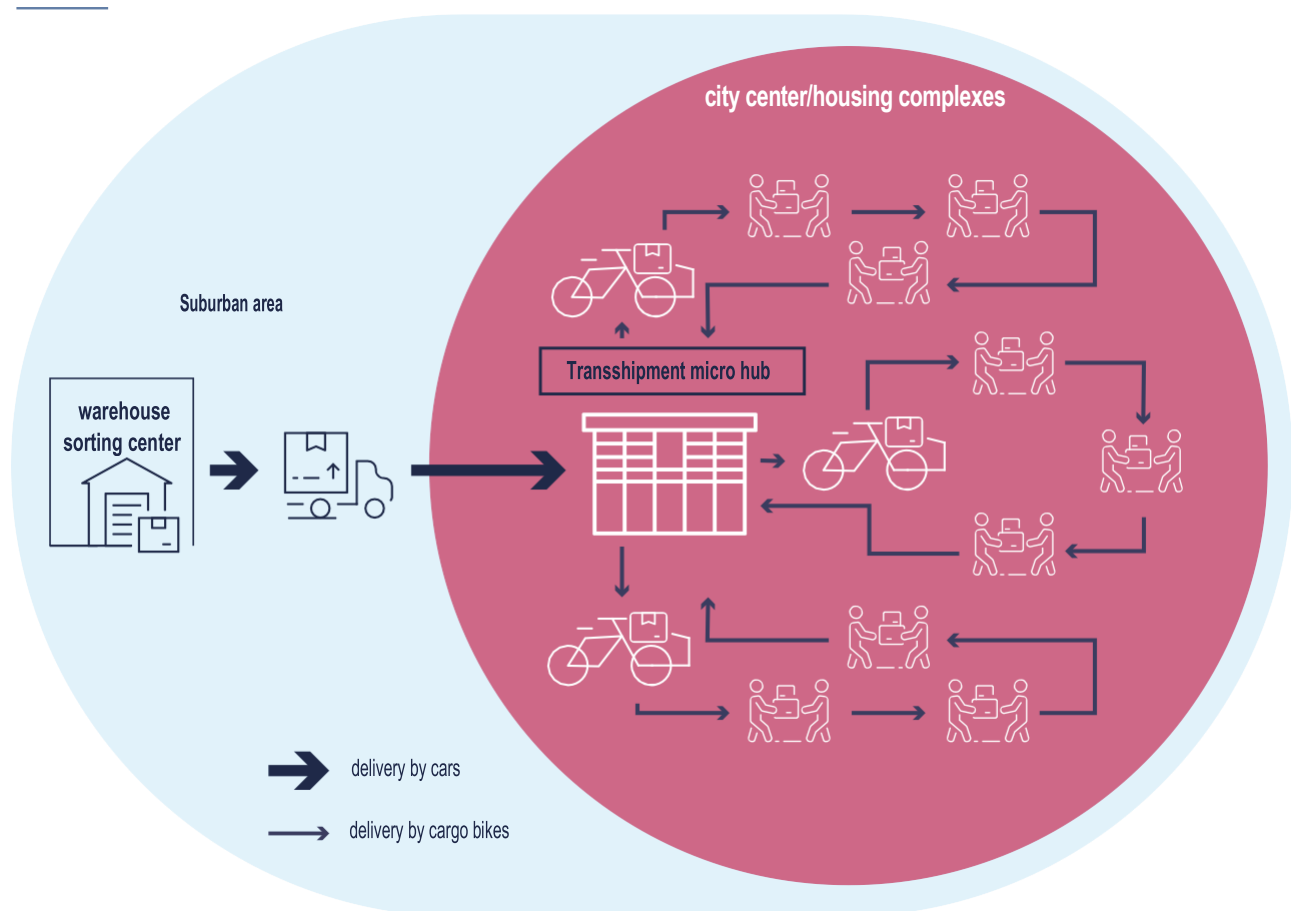
The Polish pilot aims to define the technological and organizational conditions for the effective operation of such a hub and to verify the actual impact of this solution on the economic, social, and environmental aspects of delivery operations. Initially, the hub's primary function will be transshipment, but other functions, such as parcel drop-off points for individual recipients, can also be considered.

Several issues need to be resolved, including the hub's size, construction, equipment, technological advancement (access control, parcel flow monitoring, etc.), appearance to fit the surroundings, and additional equipment for storing/charging bikes. All these aspects will be investigated in the pilot project.

The pilot will also assess the potential benefits, such as reducing urban delivery vehicle traffic, CO2 emissions, and the negative impact of delivery vehicles on city or residential life, including noise and disruptions to pedestrian traffic.

The project's findings will be used to evaluate the cost, quality, and timeliness of deliveries. The prospects for implementing a transshipment hub combined with cargo bikes are promising, but the pilot will provide definitive confirmation of the hypotheses and fully define the solution for maximum efficiency and scalability. The GRETA project will last 36 months, starting in April 2023 and concluding in May 2026.

Fig. 6.3 Concept of micro-hub operations

city center/housing complexes

Suburban area

warehouse sorting center

Transshipment micro hub

→ delivery by cars

→ delivery by cargo bikes

Source: own study by Łukasiewicz-PIT

6.7. E-Pack

E-Pack is an intelligent returnable packaging solution for the e-commerce sector, developed as part of a research and development project of the same name. This project was a collaboration among three institutes of the Łukasiewicz Research Network: Łukasiewicz – PIT, Łukasiewicz – IMiF, and Łukasiewicz – ŁIT, funded by the President of the Łukasiewicz Center. The project produced a prototype e-Pack, a durable, reusable logistics package that allows precise monitoring of shipment condition and location, reduces the carbon footprint, and controls access to the contents (see Fig. 6.4).

The concept of this packaging can be best illustrated by the sequence of activities performed using it. It starts with placing products or goods inside the e-Pack without fillers, tape, or cardboard. An integrated mesh prevents the contents from shifting, and the electronic lock allows easy access only to authorized users. The label is displayed on an e-ink screen, eliminating the need for preparation, printing, or sticking.

The sorting and delivery process proceeds just like with a traditional package. What sets e-Pack apart from traditional packaging is the ability to precisely monitor the location and condition of the package throughout its journey, including temperature, drops, delays, and the presence of water. The recipient then opens the package using their phone or another device. The user can subsequently use this packaging for returns, send another package, or fold it flat and return it empty to the nearest PUDO point. The same e-Pack can be reused hundreds of times, and when it wears out or is damaged, both the material and the electronics can be reused. The benefits of using e-Pack include simplified processes and elimination of errors related to shipment identification, advanced analytics on shipment movement, increased security of shipments, and ultimately the reduction of the carbon footprint and resource consumption through its reusability. Currently, the e-Pack prototype is undergoing further testing. The project is open, meaning additional partners interested in pilot implementation can join.

Fig. 6.4 e-Pack prototype

Source: Łukasiewicz-PIT materials

6.8. Directions for the Development of Sustainable E-commerce Logistics

When analyzing sustainable development issues in e-commerce, particularly focusing on the environmental aspects of order fulfillment logistics, it becomes evident that there is enormous potential for new organizational and technological solutions in this field. The implementation of these solutions should become increasingly common and tangible, driven by a growing awareness among consumers and businesses of the importance of mitigating the negative impacts of human activity on the natural environment. The benefits associated with adopting environmentally friendly solutions can increase as their usage scales up.

For instance, if logistics operators decide to widely adopt transshipment hubs and cargo bikes, the increased demand for cargo bikes would make them more readily available and affordable. Moreover, companies that implement green solutions can expect support from local authorities or European institutions in the form of grants, projects, and other assistance. It is also crucial to implement these solutions using the principles of the **sharing economy**. This can take various forms:

- Joint organization and execution of transportation (preferably electric vehicles) by independent transport operators, including CEP operators.

- Implementation of shared consumption, such as using private vehicles for parcel delivery, assuming that this "delivery" is done, for example, on the way to work or home.

- Implementation of shared APMs, where any courier can deposit a package; this would alleviate the current "environmentally unhealthy" competition among CEP operators who rush to install more machines. It would be preferable to create agnostic networks of APMs, i.e., networks that are open to every logistics operator.

- Adoption of shared urban transshipment hubs, which would not be exclusive to one company but used by several courier companies and managed by an independent entity; this is already being practiced in several European cities, such as Hamburg and Salzburg.

The sharing economy, while challenging to implement and requiring specific business models, effectively addresses the need to protect the natural environment. We can only hope that this concept will continue to actively develop in the coming years, supporting the trend of green e-commerce logistics (and beyond).

7
Case Studies

In this chapter, we will examine how various e-commerce companies implement specific optimization actions.

7.1. Utilization of Local Return Channels in the MODIVO Group

When discussing logistics in the e-commerce sector, the focus is usually on the last mile and how it affects customer satisfaction. While a stable infrastructure, flexibility, punctuality, and a wide range of fast and secure delivery methods are undoubtedly crucial for the customer journey and how an online store is perceived by its consumers. However, it is equally important to consider reverse logistics, specifically return logistics.

With the widespread availability of the Internet and the growing importance of the mobile channel in sales, the Polish e-commerce market is expected to continue expanding. Forecasts suggest that it will reach a value of PLN 187 billion by 2027, with fashion being one of the most profitable categories. [18] In the fashion segment, consumers often make spontaneous purchasing decisions, ordering different sizes and color variations of a particular design to choose the best-fitting product. For e-commerce logistics, this means dealing with a range of internal and external processes in the supply chain, such as warehouse transfers, reprocessing received items, quality control, and managing the waste generated.

To minimize the risk of customers being dissatisfied with their purchases, businesses offer various functionalities. At MODIVO Group, one such solution is the "Try Before You Buy" service, which allows customers to order any product from the online store and try it on for free at a designated physical store. Another useful tool is esize.me, which recommends the best-fitting shoe models based on a 3D scan of customers' feet. MODIVO also pays great attention to the quality of their product descriptions, photos, and videos to support successful purchases.

These solutions significantly impact avoidance (avoiding returns) and gatekeeping (limiting the number of returns). However, it is important to remember that legal regulations guarantee consumers the right to return a product purchased off the company's premises within 14 days, without having to provide a reason. Many businesses even extend this return period for the convenience of their customers. This creates a need to develop logistics processes that take into consideration customer experience and the synergy of available sales channels.

A holistic approach to the return policy is core to the MODIVO Group's operations as evidenced by our straightforward return procedures, detailed on our sales pages. Additionally, we provide additional support to customers through our chatbot

and Customer Service Office. Operating in a brick-and-click model, we not only offer online returns but also utilize local return channels for the MODIVO product range. This is a convenient and free alternative to post offices or APMs, and with our extensive retail network, it provides an opportunity for customers to explore our in-store offerings when they visit their chosen shopping center.

In-store returns also provide several benefits for e-commerce. For instance, it helps reduce costs and streamline processes. On-site product inspection ensures quality, and sales assistants can gather all the necessary information for a refund. Additionally, returning items to the central warehouse through the store channel has a smaller environmental impact. It is worth noting that only 36% of respondents perceive returns as negatively impacting the environment, according to e-Izba's report [8].

Nowadays, the standard of service expected by customers extends beyond just the last mile. Stores are evaluated based on overall experiences, including return logistics. For brick-and-click retailers, leveraging channel synergy allows for agile logistics management and provides an added omnichannel benefit for customers.

7.2 Re-commerce at Expondo

Expondo is a well-known e-commerce company with a distribution center in Zielona Góra, headquarters in Warsaw and Berlin, and branches in Guangzhou and Shanghai. They offer over 6,000 products, mainly from their own brands, catering to 3 million customers. These products are designed to meet the specific needs of customers in the catering, industrial, sports, home, and garden sectors.

Expondo's development strategy includes informed re-commerce. Re-commerce is an increasingly influential market force with significant impact. It is projected that the global re-commerce market will be valued at USD 245 billion by 2024, with an annual growth rate of 10-14%. In addition to the obvious environmental benefits, re-commerce affects economic dynamics, consumer behavior, and technological innovation. Customers' attitudes to re-commerced products have changed in the past two years and it has become a global trend driven by conscious consumerism, sustainable development, and eco-friendly consumer practices.

The rising inflation and changes in customers' purchasing power, who now more often factor in the cost of products, have also influenced consumer decisions.

Re-commerce is supported by two main reasons: economic prudence and commitment to sustainable practices - the circulation of used products and environmental protection. Today, re-commerce is more than just buying used products; the business models presented below depend on the specifics of the company but aim for the same goal – recirculation.

- Resale: Selling used products (without repair) to new customers.

- Repair: Fixing and refurbishing a product to extend its usability.

- Rental: Renting/leasing products for a specified time, after which they are returned to the lessor.

- Refill: Refilling original containers/cartridges.

- Return: Returning unwanted products, often combined with re-inspection, repair, and resale.

Why should companies be interested in re-commerce? It is estimated that 82% of customers prefer brands that support the circular economy.

Re-commerce, despite the positive aspects associated with the recirculation of goods, also has its negative effects on the environment. According to Statista, the global value of returned goods in 2023 was USD 700 billion, and alarming forecasts indicate a 36% increase in this value, exceeding USD 900 billion by 2029. Unfortunately, every return involves greenhouse gas emissions, which at such a scale of returns translates into hundreds of millions of kilograms of CO_2 emissions. Fortunately, this problem has been recognized by the European Parliament.

In November 2023, the "Consumers' Right to Repair" law was passed, encouraging sustainable consumption and repairing devices instead of replacing them, obligating manufacturers to provide solutions that facilitate restoring products to a usable condition. This may include open access to spare parts, repair instructions, or access to non-authorized repair shops.

Four Pillars of Re-commerce at Expondo

This process has been embedded in our DNA for over 10 years and is built on four pillars.

1. Quality information to minimize returns

The re-commerce process starts on our "Trusted Returns" portal, where we introduced symbolic return fees in 2023 to reduce their frequency and CO2 emissions for the sake of the environment. Our goal is to raise consumers' environmental awareness and encourage thoughtful purchasing decisions. As sellers, Expondo has a significant impact on customers' post-purchase behavior. We take responsibility for providing customers with accurate and high-quality information about our products. Photos, videos, product descriptions, and expert video blogs all contribute to customers' shopping experiences and overall satisfaction.

2. Optimization of return logistics and on-site repairs

Expondo has a presence in practically every European Union country. Our return logistics project minimizes CO2 emissions by consolidating returned goods in EU warehouses and bringing them to our service center in Zielona Góra. By leveraging consolidation in return logistics processes our transport fleet is used efficiently, eliminating empty journeys. Over the years, we have also compiled a database of repair instructions and instructional videos based on the expertise of our service center. We share this valuable resource with our customers so they can repair their products on-site, eliminating the need to send the items to our service center and reducing their carbon footprint.

3. Reduction of paper and packaging use

Our papers-free & reuse philosophy is implemented throughout the process, from receiving goods to refunding customers. This approach significantly reduces our environmental impact as we are able to recover and reuse 80% of cartons, while the remaining 20% is used as fillers to protect products during transportation. In 2023 alone, we reduced polystyrene usage by 15%. By having control over the entire supply chain, we can optimize the quantity and size of packaging, tailoring it to the dimensions of our products. We often use bulk packaging and emphasize recycled packaging.

4. Repair and resale

Our technicians at the service center in Zielona Góra have acquired extensive expertise over the past decade. When analyzing and repairing returned products, we adhere to the philosophy of minimizing waste. Instead of replacing entire circuit boards, for example, we focus on replacing the smallest defective components, such as resistors.

Synchronization of spare parts deliveries

The synchronization of spare parts deliveries is based on a DDMRP (Demand Driven Material Requirements Planning) ordering system, which ensures that spare parts are delivered in conjunction with product orders. This not only has economic benefits but also reduces the carbon footprint by consolidating spare parts deliveries with other products available in our stores. In conclusion, the re-commerce process at Expondo involves classifying products into grades: Grade A indicates excellent condition, while Grade B signifies fully functional devices with minor signs of use. Expondo provides a 2-year warranty for all products.

8 Summary

In 2022, the CEP sector served close to
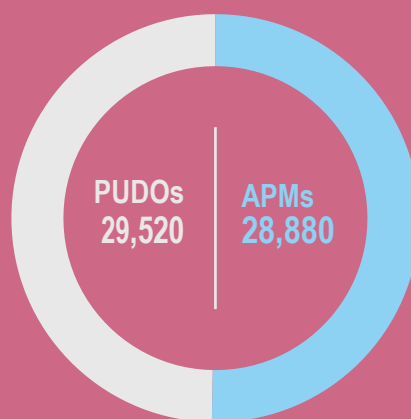
922m

Postal items and packages

It is estimated that CEP generated

1,300m

courier shipments

Poland is one of the leaders in OOH deliveries with **29,000** APMs in 2022

PUDOs
29,520

APMs
28,880

72% of consumers say that return policies directly affect their purchasing decisions the average return rate for online clothing orders was 21.4%.
In 2023, the average indicator for the fashion industry in Poland was 15.8%

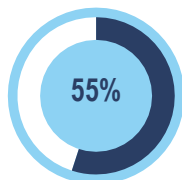The average return cost for two sample stores was 3.58 PLN per package.

How to avoid returns?
Up to 97% of consumers check product reviews before purchasing.

- Size guide
- Clear product images
- Accurate and exhaustive product descriptions
- Positive store reviews

Costs in e-commerce
Order picking accounts for up to 55% of total warehouse operating costs

55%

The last mile accounts for about 50% of all transportation-related costs

Success in e-commerce
Budget-friendly → **Eco-friendly** → **Short** → **Timel**
is the recipe for success from the customer's POV

67% of respondents pointed to the use of eco-friendly packaging.
58% indicated the possibility of using reusable packaging.

How much extra are Poles willing to pay for green solutions in e-commerce?
PLN 3-5: 39%
PLN 1-2: 35%

E-commerce trends:
q-commerce
41% of respondents in the USA and Europe would like to the option to use recommerce and eco e-commerce

Sustainable e-commerce of the future: **42%** respondents say the environmental impact of delivery methods is significant to them.
Eco-friendly delivery motivates about 5 out of 10 online shoppers.

The future of packaging lies in the 3R principle:
Reduce,
Reuse,
Recycle

Sustainable Logistics of the Future:

- Collective use of electric vehicles
- Use of private vehicles for delivery
- Implementation of shared parcel machines
- Shared urban transshipment hubs

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