

# The Relationship Between E-Commerce Last-Mile Logistics and Online Repurchasing Intention in Egypt

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## العلاقة بين لوجستيات الميل الأخير للتجارة الإلكترونية ونية إعادة الشراء في مصر

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## **The Relationship Between E-Commerce Last-Mile Logistics and Online Repurchasing Intention in Egypt**

### **Abstract**

The widespread accessibility of the Internet, alongside the rapid advancements in digital technologies, has resulted in a marked surge in the adoption of e-commerce, both on a global scale and within the Egyptian market. Online shopping has increased significantly due to consumers' convenient access to a wide range of goods and services they may purchase anywhere and anytime. This significant change has caused businesses to operate differently and influenced how consumers behave, creating new challenges to overcome and opportunities for businesses to grow. The final customer touchpoint of delivering physical products, last-mile logistics, has always been known for its complexity and cost within the supply chain. This crucial stage involves navigating busy cities, handling large volumes of deliveries, and meeting specific customer needs. Recognizing the importance of last-mile delivery for e-commerce success, this study aimed to uncover the challenges and opportunities to understand its impact on customer satisfaction. Delving into the heart of Egypt's B2C e-commerce scene, this research investigates the relationship between consumer experiences with last-mile logistics and their tendency to repurchase from online platforms. Here, "last-mile logistics" encompasses both the forward delivery of products to customers and the reverse logistics of managing returns. The study focused on consumer electronics, a dominant category in Egypt's online market, accounting for over 60% of online purchases (Statista.com, 2022). The study was applied on Amazon.eg. to account for the diverse performances across different platforms and ensure a comprehensive examination of research hypotheses. The analysis revealed a strong association between order fulfillment, reverse logistics, and the likelihood of repeat online purchasing in Egypt. It also highlighted the pivotal role the refunding process plays for return orders and how these returns are managed.

**Keywords:** E-commerce dynamics, last-mile logistics, order fulfillment, repurchasing intention, reverse logistics

## Introduction

Over the past decade, the rapid advancement of digital technologies has given rise to electronic commerce (e-commerce), transforming the conventional landscape of purchasing tangible goods and services. This paradigm shift, driven by advanced information and communications technology (ICT), has not only streamlined global economic activities but also revolutionized consumer behavior and the strategies employed by businesses (Cao et al., 2018; Kawa, 2017; Kawa & Światowiec-Szczepańska, 2021). The macroeconomic process benefits from e-commerce's large share of global commercial sales. E-commerce sales account for 18.1% of global retail sales, or 4.9 trillion US Dollars from 2.14 billion buyers (E-marketer, 2022; Statista.Com, 2020). It has been noted that Egyptian e-commerce has witnessed a significant increase in the last decade, according to regional reports (Fabre, et al., 2019; Market Line Industry Profile, 2020; NGAGE-Consulting, 2018).

Although the e-commerce industry in Egypt is experiencing significant growth, e-commerce firms are encountering challenges in efficiently delivering orders to customers' residences. They lack skilled personnel, have gaps in their processes, and use outdated technology, which makes it difficult to deliver packages on time. According to a report by Fabre, et al. (2019), the rate of return and failed deliveries in the Middle East and North Africa (MENA) region, is five times higher than the global average. This does not only impact sales but also leaves customers dissatisfied. Additionally, a significant challenge is the payment methods that people in Egypt use for their online orders. Many customers, about 62%, prefer cash on delivery (COD) over using credit cards, citing several concerns among them about delivery reliability and fraud.

Last-mile logistics is a crucial component for sustaining the success of e-commerce businesses. If a customer is dissatisfied with their purchase or delivery, statistics show that about 32% of them will stop doing business with that company, whether it is online or in a physical store (PWC, 2020; Statista.Com, 2020). This highlights the importance of delivering orders efficiently, particularly in the final stage of the delivery process (known as last-mile logistics), in order to retain customers. Due to the importance of online shopping in people's lives, this study aims to explore the relationship between e-commerce and last-mile logistics, which are two essential components of order fulfillment and reverse logistics. It also seeks to determine the extent to which consumers are willing to engage in future purchasing transactions. In addition, this study provides key recommendations that can improve the long-term sustainability of e-commerce companies.

The study aimed to investigate certain hypotheses related to e-commerce platforms in Egypt. However, due to the varying performances of different platforms, it was not feasible to conduct the study on all platforms. Thus, the study was conducted on Amazon.eg. Moreover, testing the hypotheses across all product categories was not possible due to the distinct nature, size, and physical dimensions of each category, which results in different experiences from a logistics services perspective. Therefore, the consumer electronic products category was chosen for this study as it represents more than 60% of online purchases in the Egyptian market according to Statista.com in 2020.

To achieve the research objective, the paper is organized as follows: First, it begins with a comprehensive literature review of previous theoretical and empirical studies on e-commerce logistics and online repurchasing behavior. This is followed by the development of hypotheses, methodology of the study, and data analysis. The final results, main findings, and managerial implications are then presented.

## Literature Review

### Dynamics of E-commerce Last-Mile logistics

E-commerce in B2C (business-to-consumer) refers to the process of consumers purchasing goods or services directly from a seller without the need for an intermediary service. However, this method of shopping can sometimes lead to uncertainty due to the lack of physical interaction between the buyer and the seller. Online shopping, on the other hand, offers numerous benefits such as saving customers' time, effort, and money, allowing them to purchase products anytime and from anywhere (Sunitha & Gnanadhas, 2014).

In e-commerce, there are various competing definitions of the term "last-mile", but it generally refers to the logistics operations involved in delivering on line ordered goods, such as parcels to private customer households in urban areas on both the forward and reverse sides of the product flow. According to Boysen et al. (2020) and Lim et al. (2018), it refers to the supply chain activities that are initiated by consumers and aimed at delivering the product to a specific destination. This involves the use of a storage facility, means of transport, and handover options to ensure that the product reaches the end consumer.

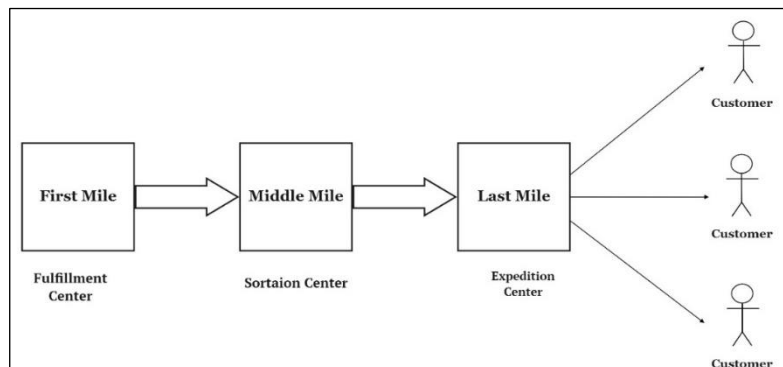
The e-commerce last-mile is a critical part of the e-commerce value chain (Kull et al., 2007; Olsson et al., 2021). However, it is often considered the most inefficient and complicated stage of the end-to-end supply chain. The contradiction mainly arises from the consumer's perspective. This is the stage where the sale is realized tangibly. Additionally, how customers place their orders and how they anticipate receiving them will have a significant impact on the transaction costs, bottom line profitability, and customer service (Leung et al., 2016).

Dias et al. (2022) and MacCarthy et al. (2016) have discussed the dynamic nature of e-commerce transactions and, how they require the supply chains and logistics to respond to individual consumer demand. This change has driven the need for better logistics management and order fulfillment. Retailers have been compelled to invest in supply chains and logistics management initiatives to provide improved and revolutionary shopping experiences, although the improvements are not uniform across all companies.

Last-mile operations can be divided into three stages: first mile, middle mile, and last mile. Companies have different demarcation points across these stages, but the overall structure is the same. Figure (1) illustrates the e-commerce value chain.

**Figure 1**

*E-commerce Value Chain*



*Source:* Compiled by the researcher.

The process of delivering packages can be broken down into three stages. The first stage is the first mile and it involves collecting packages in fulfilment centers, then transporting them to a sortation center (SC) or distribution center (DC). The second stage, known as the middle mile, involves transferring packages to expedition centers (ECs). Lastly, in the last mile stage, packages are grouped into unit loads and collected by ECs drivers. These packages are then delivered to the final customers.

**E-Commerce Order Fulfillment**

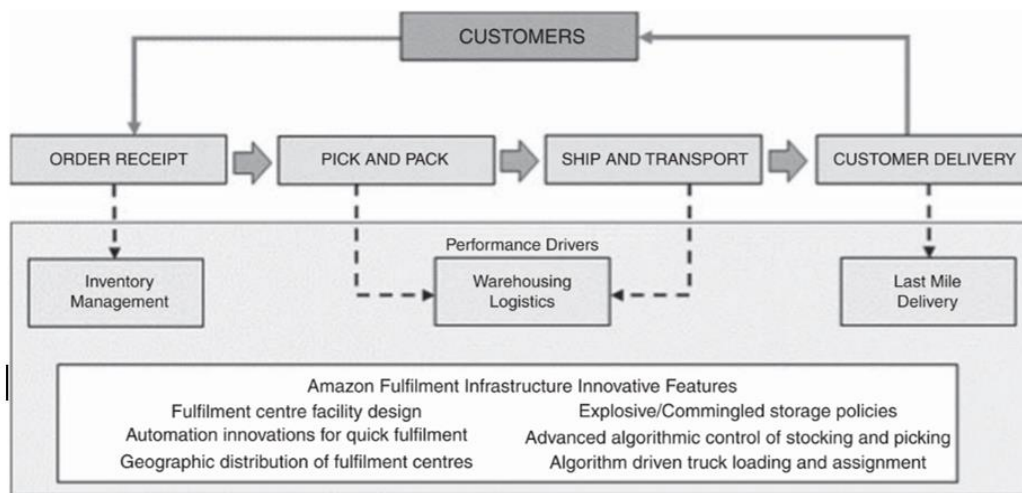
The process of order fulfilment in e-commerce varies depending on the type and nature of the product or service being sold. However, it generally involves several steps starting with the customer's order and end with the delivery.

As explained by Zhang et al. (2016) and Zoroja et al. (2020), this process is referred to as e-order fulfillment process in the context of e-commerce. The process involves all the steps that product or services sellers must take from the moment they receive an order from the customers until the items/services are delivered to them.

Order fulfillment is essential for e-commerce business sustainability and gaining a competitive edge. Various studies have shown that efficient order fulfillment and high-quality performance are crucial factors in the success of e-commerce. In fact, better order fulfillment stimulates customers to purchase more on line. According to Nguyen et al. (2018) and Zhang et al. (2016) the four key functions of order fulfillment are the base for any e-retailer, but how, when, and where they are performed is a differentiator. These basic functions are outlined in Figure (2).

**Figure 1**

*Basic Functions of Order Fulfillment*



Source: Nguyen et al., 2018 & Zhang et al., 2019.

**E-Commerce Reverse Logistics**

According to the European Working Group on Reverse Logistics (REVLOG) and American Reverse Logistics Executive Committee, reverse logistics is the process of planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin to recapture or create value

or proper disposal. It includes activities to avoid returns, reduce materials in the forward system, and ensure reuse and recycling of materials and packaging.

In the context of E-Commerce, reverse logistics can have a special definition and procedures, as indicated by (Alfonso-Lizarazo et al., 2013) and supported by (Wang et al., 2019) and (Jalil, 2019). The authors agreed on defining reverse logistics (commonly used interchangeably with return management) as the product return management in reverse flow from the consumer to the supplier (or exchanges) of products, mostly triggered by the consumer due to several reasons, they might be damaged, unwanted or faulty, or simply not functioning as described in the product description. (Wang et al., 2019) emphasized that the return process is often found to be detailed by the e-commerce return policy, which is the set of rules or regulations that indicate the cases, steps to be followed, and level of difficulty associated with returning products from consumers to retailers because they are damaged, faulty, or not as expected.

Having a return policy for a product is crucial for the success of online retailers. It has strong impact on customer confidence when making online purchases, which directly affects the bottom line profits of the firms. To address this issue, numerous authors, including Nguyen et al. (2018) Pei et al. (2014), Wang et al. (2019), and Yu & Kim (2019) have researched the procedures of reverse logistics. These procedures include returns preparation, returns options, refunds, and returns handling. Returns procedures consist of the necessary steps an online consumer must take to return a product to a retailer. Returns preparation involves ensuring that return labels and forms are available, and that appropriate packing materials are supplied. Returns options involves having the returned product picked up from home or sending it back via couriers.

### **Online Repurchase Intention**

Researchers and industry professionals have responded to the growth of e-commerce by making strides towards a better understanding of the elements that inspire and/or discourage customer loyalty and recurring purchases via e-commerce platforms.

According to Fishbein and Ajzen (2010) and Solomon (2020), the standard consumer decision model starts with need awareness, then information search, alternative evaluations, making the purchase decision, and finally, post-purchasing behavior or action. However, with the advent of IT technologies, busy schedules and trust in the e-commerce environment, consumers are changing their traditional purchase habits. This poses significant challenges for online retailers who need to understand consumers' expectations, their behavior and the level of their satisfaction during and after online shopping.

In market studies, the two commonly used approaches to investigate customers' purchase behavior through online platforms are repurchase intention and decisions. Repurchase intention, also known as repeated purchase, is the likelihood and measure of how much consumers will continue to purchase products from the same online retailers and websites after their prior purchase activity (Chiu et al., 2014; Mou et al., 2019; Peña-García et al., 2020; Wang et al., 2019; Zhang et al., 2011).

This dimension of consumer behavior was initially discussed by Pavlou (2003), who explained multiple compelling factors that encourage consumers to participate in commercial transactions. According to him, these factors can be categorized into two groups: pre-purchase and post-purchase factors. Pre-purchase factors help to encourage consumers make their initial purchase and shape their perceptions as customers. On the other hand, post-purchase factors refer to the elements that emerge

from the customer's experience with the e-retailer, including their overall shopping experience and their perceptions of the services provided.

### **Logistics and Repurchase Intention**

With the large-scale emergence of e-commerce recently, online shopping has become an integral aspect in people's daily lives. In this regard, Hajli (2019) indicated that the level of competition intensified as more businesses entered the market and competed to persuade customers to make purchases through their platforms. According to Yu et al. (2017), the rise in e-commerce prompted researchers and practitioners to study the factors that influence consumer behavior in this environment. These studies aim to enhance our knowledge of the drivers and barriers that influence customers' decision to repeat purchases on online platforms.

Various studies examined the factors that affect consumer behavior in an e-commerce environment. Murfield et al. (2017) and Rao et al. (2014) summarized these factors to include web and technology awareness, e-loyalty, pre-purchase factors, during-purchase factors, e-trust, e-satisfaction, perceived value, convenience motivation, and order fulfilment logistics. Online seller's failure to fulfil the product or late delivery increases the overall customer's perception of risk and incurs losses for the firm. Finally, fulfilment attributes like timeliness of delivery, order accuracy, and delivery conditions are correlated to e-service quality, and superior online stores should enhance the performance of fulfilment services to ensure timeliness, accuracy, and good condition.

Katawetawaraks and Wang (2011) found that various variables negatively impact customers and decrease their likelihood of making future purchases. Dissatisfaction resulting from bad encounters has a big influence on customer's decisions, as well as delayed delivery, receiving erroneous or damaged goods, especially if online sellers refuse to reimburse the value of the damaged product.

As per the findings of Ranieri et al. (2018) and Wang et al. (2016), the last-mile logistics stage of the supply chain is the least efficient. In e-commerce, the last-mile costs can account for up to 28% (and can reach up to 53%) of the complete end-to-end delivery cost. According to a recent study by Ernest and Young (Ankur Pahwa et al., 2021), the quality of last-mile logistics services is the most critical touchpoint that influences customers' decision to purchase online. Riley and Klein (2019) found that the consumer's online purchasing experience, which then shapes purchasing attitude, is not just influenced by marketing efforts, but also by the last-mile logistics capability offered by the e-commerce companies. Das et al. (2020) and Wang et al. (2019) indicated that providing a return policy and a well-functioning reverse exchange system for a product has always been a challenge.

Last-mile is regarded as a significant success factor in online commerce and its consequences on bottom-line profits for enterprises due to its effect on client risk perception. (Hou & Cheng, 2017) agreed to that opinion and added that a retailer's sales and reverse logistics costs increase with a more flexible return policy.

Thus, the success of e-commerce is dependent on the frequency of usage of e-commerce websites by customers and their continuous purchases. If the last-mile logistics of delivery fail to work well or do not work at all, it can lead to customer dissatisfaction and discouragement (Bihua, 2021; Chiu et al., 2014; Hefny, 2021; Kato, 2019; Lu et al., 2018; Wen et al., 2011). Any failures or delays in delivery can negatively impact a customers' experiences and potentially discourage them from engaging in online ordering behavior (Nguyen et al., 2018; Rao et al., 2011).

## Theoretical Background and Hypotheses Development

The impact of logistics on a firm's performance and consumer behavior has been studied for decades. In the literature review, various authors have attempted to identify and explore the logistics processes and factors that influence consumers' repeat purchase decisions, but there is no full consensus. However, most studies agree that order fulfillment and reverse logistics are associated with online re-purchasing to varying degrees.

The Technology Acceptance Model (TAM) is the main theoretical model that has been originally used to predict consumer purchase intention in several sectors, including information technologies, e-learning and shopping (Aref & Okasha, 2020; Chiu et al., 2014; Elseidi, 2018; Katawetawarak & Wang, 2011; Li, 2012; Lu et al., 2018; Sullivan & Kim, 2018; Yu & Kim, 2019). According to TAM theory as suggested by Davis (1985), people's intention to use and accept information systems, which impact their actual behavior, is primarily influenced by two factors: perceived usefulness and perceived ease of use of the e-commerce websites.

The TAM was originally derived from the theory of reasoned action (Fishbein & Ajzen, 2010), and was designed to explain consumers' computer usage behavior in the field of Information Systems (IS) as noted by Vallerand et al. (1992).

Numerous studies in the e-commerce domain related to consumer behavior relied on TAM from the perspectives of website characteristics or customer characteristics (Ananda et al., 2020; Aref & Okasha, 2020; Kalpoe, 2020; Makame et al., 2014; Nasution et al., 2019; Valencia et al., 2019). The TAM model focuses on functional and hedonic values that arise from website use and their impact on consumers, it pays little attention to the impact of service dimension on consumers' continued intention to engage in e-commerce transactions. It is not surprising that, TAM, if generally applied, does not capture or contradict some of the unique contextual logistics of last-mile features due to a lack of domain specifics. Thus, TAM is not suitable for studying logistics services and consumer intention where general theories are often lacking domain specifics (Chiu et al., 2014; Nguyen et al., 2019).

Instead, this study used the dimensions outlined by Li (2012) that were later expanded by (Nguyen et al. (2018, 2019), then examined fully or partially by Gârdan et al. (2021); Grashuis et al. (2020); Hefny (2021); De Borba et al. (2021); Sakai et al. (2020); Thomas-Francois, Kimberly and Somogyi (2021); Xu and Jackson (2019) to establish a model that tests the relationship of last-mile logistics dimensions with consumer behavior.

The major dimensions of last-mile in e-commerce logistics can be summarized as follows:

### Fulfilment Dimensions

- 1. Order Fulfilment Speed.** The time taken from order placement to customer receipt at the specified location.
- 2. Order Fulfilment Delivery Options.** Choices offered to consumers, including delivery window, courier selection, preferred delivery locations, and time slots.
- 3. Order Fulfilment Information Update (Order Tracking).** Updates from the seller or e-commerce platform on order status post-order placement, providing insights into the fulfilment process.



4. **Order Fulfilment Information Reliability.** Matching the actual delivery date and time with the promised figures before or after order placement.
5. **Fulfilment Cost (Shipping or Handling Charges).** Additional costs imposed by the e-commerce company and borne by the customer, covering IT platform, storage, warehousing, order processing, packing, and last-mile delivery cost.

## **Reverse Logistics Dimensions**

### ***Return Procedures***

The return procedures consist of the necessary steps mandated by online retailers, which describe the flow the consumer must follow to return the product to the retailer.

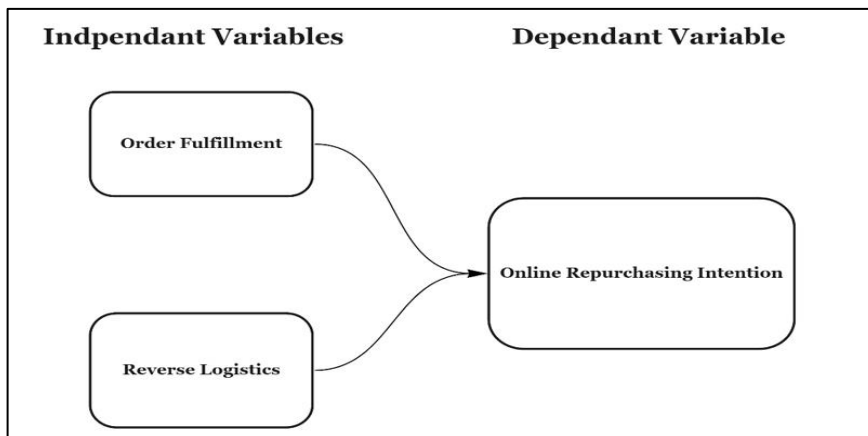
1. **Return Procedures.** The returns procedures outline the steps mandated by online retailers for consumers to return products to them. Consumers value clarity and ease of finding returns procedures.
2. **Return Process Information Update.** Regular, automated updates sent on line to inform customers about their order returns. These updates may include informing the customer of the return order's receipt, inspection, approval and/or disapproval, and refund of the returned item.
3. **Return Options.** They are part of the return policy and indicate how products can be returned to the online retailer. The online retailer may pick up the product from the customer, drop it off at a nearby station, or self-ship it.
4. **Return Orders Refunds.** They are given to customers who return products. Refunds cover shipping costs. The online retailer's strictness or tolerance depends on the product's condition, refund speed, method, and whether a consumer receives a full or partial refund. Refunds usually result in a chargeback, an exchange for another product, or a credit release for future purchases. Consumers in the EU (EU, 2020) are entitled to a minimum of a 14-day return policy ('cooling-off period') with a full refund of product costs and forward shipping costs.
5. **Return Handling.** This refers to the quality of an online retailers' service, based on how efficiently and effectively their support team handles consumer return requests and issues.

Based on various studies, it can be concluded that the major dimensions of e-commerce last-mile logistics include order fulfillment and reverse logistics. Order fulfillment comprises order fulfillment speed, delivery options, information updates, reliability, and cost. On the other hand, reverse logistics includes return procedures, returns process information updates, return options, order refunds, and returns handling.

Therefore, the following study model was developed and illustrated in Figure (3) presenting two independent variables and one dependent variable.

**Figure 2**

*Study Model*



*Source:* Developed by the researcher.

The dimensions of each of the main independent variables and the dependent variable are summarized in Table (1).

**Table 1**

*Independent and Dependent Variables Measurements*

Independent Variable 1: Order Fulfillment (X1)	
Dimension	Measured By
1. Order Fulfillment Speed (X1-1)	Speed
2. Order Fulfillment Options (X1-2)	Availability & Flexibility
3. Order Fulfillment Info. Update (X1-3)	Availability
4. Order Fulfillment Info. Reliability	Deviation from info. at Ordering stage
5. Order Fulfillment Cost (X1-5)	Customer's Consent
Independent Variable 2: Reverse Logistics (X2)	
Dimension	Measured By
Order Return Procedures (X2-1)	Easiness to locate and comprehend
Returns Process Info. update (X2-2)	Availability of this feature
Order Return Options (X2-3)	Existence and Leniency
Return Orders Refunds (X2-4)	Speed and Complexity of Process
Return Orders Handling (X2-5)	Convenience and Professionality
Dependent Variable Online Repurchasing Intention (Y)	

*Source:* Developed by the researcher.

Hence, the following hypotheses are proposed:

**H<sub>01</sub>:** There is no significant relationship between order fulfillment and online repurchasing intention.

- H<sub>01-1</sub>:** There is no significant relationship between order fulfillment speed and online repurchase intention.

2. **H<sub>01-2</sub>**: There is no significant relationship between order fulfillment options and online repurchase intention.
3. **H<sub>01-3</sub>**: There is no significant relationship between order fulfillment information update and online repurchase intention.
4. **H<sub>01-4</sub>** There is no significant relationship between order fulfillment information reliability and online repurchase intention.
5. **H<sub>01-5</sub>** There is no significant relationship between order Fulfillment cost and online repurchase intention.

**H<sub>02</sub>**: There is no significant relationship between reverse logistics and online repurchase intention.

1. **H<sub>02-1</sub>** There is no significant relationship between the order return procedure and online repurchase intention.
2. **H<sub>02-2</sub>** There is no significant relationship between order return information update and online repurchase intention.
3. **H<sub>02-3</sub>** There is no significant relationship between order return options and online repurchase intention.
4. **H<sub>02-4</sub>** There is no significant relationship between return orders refunds and online repurchase intention.
5. **H<sub>02-5</sub>** There is no significant relationship between return orders handling and online repurchase intention.

## **Methodology**

This study is exploratory in nature. Therefore, the researcher adopted a quantitative research methodology to obtain the necessary understanding of the researched relationships. This methodology helped build a significantly more objective and accurate knowledge of the association between order fulfilment and reverse logistics and the likelihood of consumers making repeat purchases.

Employing deductive reasoning, the conceptual model was formulated. To identify the independent variables, various secondary data sources, including reference publications, periodicals, textbooks, and online directories focusing on e-commerce logistics dynamics in e-commerce environments, were explored. Subsequently, utilizing secondary data derived from literature and previous research, the researcher constructed the theoretical framework.

### **Sample and Data Collection**

This study was conducted in Egypt, using a survey questionnaire as the primary source of data collection. The survey constitutes the entire evaluation of both the dependent and independent variables.

The study sampling frame included consumers who purchased consumer electronic products from Amazon Egypt. Certain screening questions were used to ensure that only consumers who met the criteria were selected. These questions were: Firstly, how frequently did you shop online last year? (once/week, once/month, once/year, never). Respondents who answered "Never" were disqualified from the survey. Secondly, have you ever purchased any consumer electronic products from Amazon Egypt (formerly Souq.com)? (Yes, No). Respondents who answered "No" were not allowed to continue with the survey.

A total of 767 surveys were distributed from December 2021 to May 2022 using Google forms and shared via social media networks like Facebook, Twitter, LinkedIn, Telegram, and WhatsApp. The final sample consisted of 398 accepted answers; 369 respondents were excluded as they either never bought online or never bought consumer electronics from Amazon, Egypt., before.

**Statistical Analysis**

In this study, the researcher initially employed bivariate analysis, specifically calculating Pearson's correlation coefficients, to assess the structural relationship between dependent and independent variables following the recommend model of Anderson and Gerbing (1988). This initial step aimed to infer the strength and direction of the relationships among the variables using Pearson’s correlation coefficients. However, recognizing the need for a more nuanced and quantitative understanding of these associations, we have decided to extend our analysis through regression testing.

While correlation provided valuable insights into the presence of relationships, regression will enable the researcher to delve deeper by quantifying these associations, assessing their significance, and modeling the intricate interaction between independent and dependent variables. This methodological progression is driven by the researcher’s commitment to conducting thorough and comprehensive research, which seeks not only to identify but also to understand and quantify the complexities inherent in the relationships under investigation.

**Reliability Analysis**

The reliability test was performed through the computation of Cronbach's alpha ( $\alpha$ ) on each set of statements in every scale variable to determine the internal consistency of each scale, which shows how a set of statements are closely related to form this scale, as follows:

**Table 1**

*Reliability Analyses Summary*

Sub-Variables	Cronbach's Alpha
Independent Variable: Order Fulfillment	
Order Fulfillment Speed	0.725
Order Fulfillment Options	0.746
Order Fulfillment Information Update	0.85
Order Fulfillment Information Reliability	0.795
Order Fulfillment (Last-mile) Cost	0.737
Independent Variable: Reverse Logistics	
Return Procedures	0.87
Return Process Information update	0.879
Order Return Option	0.771
Return Orders Refunds	0.854
Return Orders Handling	0.932
Dependent Variable	
Repurchase Intention	0.845

*Source: Developed by the researcher.*

Table (2) illustrates that Cronbach's alpha value for every scale variable used in this study exceeds 0.7, which indicates that the scales used are reliable, internally consistent and that the data is acceptable to perform further analysis.

**Descriptive Statistical Analysis**

The sample consisted of 59.5% females and 40.5% males. The age profile of the overall sample (n = 398) distributed as follows: smaller than 18 years of age (2.3 % respondents), 18-25 years of age (23.4%), 26-35 years of age (34.9%), 36-45 years of age (32.2%), 46-55 years of age (5.3%), and older than 55 years of age (2.0%).

**Table 3**

*Respondents' Demographic Profile*

Variables	Category	Frequency	Percentage (%)
<b>Gender</b>	Female	237	59.5
	Male	161	40.5
<b>Age</b>	< 18 Years	9	2.3
	18-25	93	23.4
	26-35	139	34.9
	36-45	128	32.2
	46-55	21	5.3
	> 55 years	8	2
<b>Education</b>	High School	35	8.8
	Bachelor	233	58.5
	Master's/MBA	77	19.3
	Ph.D./DBA	53	13.3

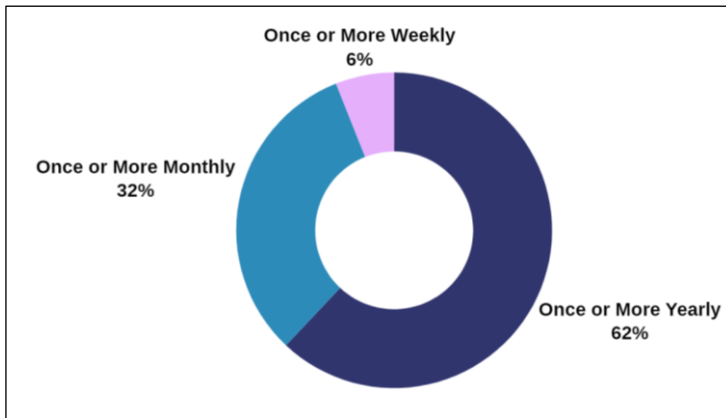
*Source:* Developed by the researcher.

From the perspective of the highest education degree, 8.8% of respondents were high schoolers, 58.5% had a bachelor degree or similar, 19.3% had a master's degree or similar, and 13.3% had a Ph.D. degree or similar. Respondents' purchasing frequency was typically once or more per year for consumer electronics.

The purchasing frequency of consumer electronic devices was annual for most of the respondents, while for more than 60% of them, it was once and more per year. Figure (4) shows respondents' purchasing frequency.

**Figure 4**

*Respondents' Purchasing Frequency*

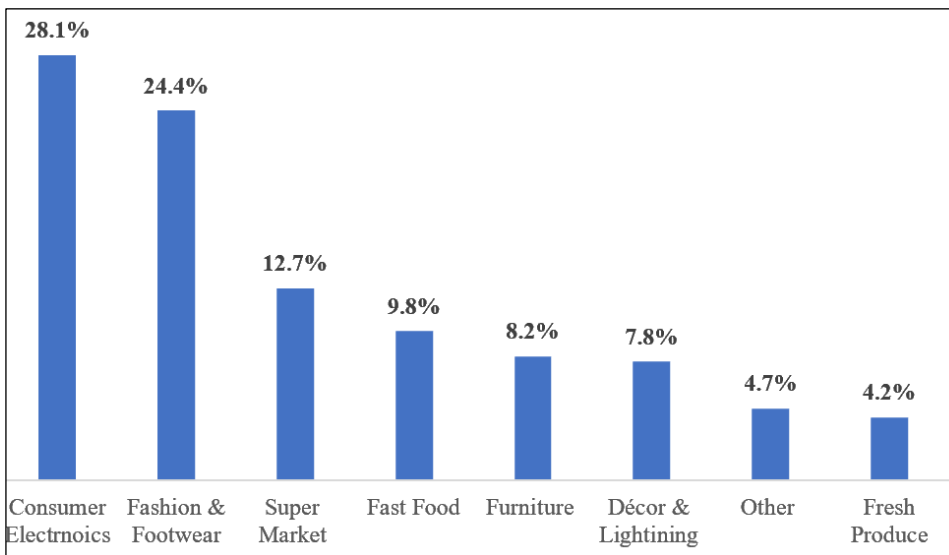


**Source:** Developed by the researcher.

The respondents were asked about their most frequently purchased items on line. The results showed that consumer electronics come at the top of the chart with 28.1%, followed by fashion apparel products and footwear for over 24% of respondents. In the third place, 12.7% of the respondents purchased grocery or supermarket products, while fast food comes in fourth place. Furniture comes in fifth place with 8.2% of respondents, and fresh produce was the least popular item.

**Figure 5**

*Categories Bought on Line*



**Source:** Developed by the researcher based on the survey results.

As shown in Figure (5), the researcher concludes from this analysis that consumer electronics is one of the most appealing categories for people and that they prefer to buy it online. Interestingly, furniture, which most of the time requires special packages and even requires a supply chain strategy, starts to be visible and appealing in the Egyptian market.

The descriptive analyses of all the constructs involved in the study: Mean, standard deviation, variance, and coefficient of variation as calculated for questionnaire statements, are show in Table (4).

**Table 4***Descriptive Data Analyses Summary*

Sub-Variables	Mean	Std. Deviation	COV
Independent Variable 1: Order Fulfillment			
Order Fulfillment Speed	3.732	0.808	0.217
Order Fulfillment Options	3.422	0.867	0.253
Order Fulfillment Information Update	4.001	0.884	0.221
Order Fulfillment Information Reliability	3.831	0.884	0.231
Order Fulfillment (Last-mile) Cost	3.685	0.779	0.211
Independent Variable 2: Reverse Logistics			
Return Procedures	3.576	1.027	0.287
Return Process Information update	3.652	0.970	0.266
Order Return Option	3.758	1.107	0.295
Return Orders Refunds	3.370	0.938	0.278
Return Orders Handling	3.554	0.957	0.269
Dependent Variable			
Repurchase Intention	3.530	0.904	0.256

**Source:** Developed by the researcher.

The statistical results indicate that the mean for all sub-variables of the two independent variables of concern ranges between 3.37 and 4, while the standard deviation ranges between 0.779 and 1.107, and the coefficient of variation perspective ranges from 0.211 to 0.295.

The order fulfillment cost has the lowest coefficient of variation factor, which amounts to 211, and the order return options have the highest coefficient of variation, indicating the relative importance of the sub-variable.

### **Inferential Statistical Analysis**

#### ***Pearson Correlation***

Several socio-economic studies found that Pearson's ( $r$ ) can reflect link strength. A perfect correlation coefficient is nearly  $\pm 1$ . When the correlation coefficient approaches 0, the link between the variables weakens. The association can either be good or negative (Cuadras & Greenacre, 2022). The researcher utilized correlation bivariate analysis to examine the degree and direction of the associations between variables. Correlation coefficients reflect the strength and direction of a linear relationship and conclude the measurement. Correlation coefficients range from +1 to -1, indicating association strength.

The researcher also computed coefficient of determination  $r^2$  in order to quantify the degree of which the change in independent sub-variable can explain the change of dependent variable.

The results of Pearson’s correlation and determination coefficients are shown in Table (5). In a correlation analysis between order fulfilment and repurchasing intention, the Pearson's correlation coefficient (r) was computed and found to equal 0.621, indicating a positive linear relationship between the two. P was computed and found to be less than 0.0001 and less than 0.01 in a two-tail t-test, indicating statistical significance.

Reverse logistics and repurchase intention had a Pearson's correlation value of 0.631. P was computed and found to be less than 0.0001 in a two-tail t-test, indicating the statistical significance of the statistical analysis.

**Table 5**

*Correlation Data Analyses Summary*

Sub-Variable	Pearson’s (r)	Coeff. of Determination (r <sup>2</sup> )
Order Fulfillment	0.621	39.00%
Reverse Logistics	0.631	40.00%

**Source:** Developed by the researcher.

According to the Pearson's correlation statistical analysis and resulting significance figures, the researcher concludes that there are sufficient statistical evidences to reject both H<sub>01</sub> and H<sub>02</sub> of this study and, as a result, concludes that there is a relationship between online repurchasing intention and order fulfilment, as well as a relationship between online repurchase intention and reverse logistics. Table (6) presents a summary of the sub-variables, sorted by the strength of their relationship.

**Table 2**

*Sub Variables Correlation Data Analyses Summary*

Sub-Variable	Pearson’s (r)	Coeff. of Determination (r <sup>2</sup> )
Return Orders Refunds	0.613	37.36%
Return Orders Handling	0.585	34.07%
Order Fulfillment Cost	0.577	33.14%
Order Return Options	0.542	29.16%
Return Process Info. Update	0.535	28.49%
Order Fulfillment Speed	0.519	26.70%
Order Fulfillment Infor. Reliability	0.498	24.60%
Order Return Procedures	0.475	22.65%
Order Fulfillment Info. Update	0.457	20.67%
Order Fulfillment Options	0.453	20.33%

**Source:** Developed by the researcher.



### **Regression Analysis**

The outcomes from the linear regression analyses offer valuable insights into the relationships between two independent variables: Reverse Logistics and Order Fulfillment, and their impact on Repurchasing Intention.

For Reverse Logistics, the ANOVA test affirms the model's adequacy ( $F=262.173$ ,  $\alpha < .05$ ). The regression model details a significant and positive influence of Reverse Logistics on Repurchase Intention, explaining 39.8% of the variation ( $R^2 = .398$ ). Expressed as  $\text{Repurchase Intention} = 1.177 + (.657 * \text{Reverse Logistics})$ .

Similarly, for Order Fulfillment, the ANOVA test supports the model's appropriateness ( $F=248.705$ ,  $\alpha < .05$ ). The regression model emphasizes a positive and significant impact of Order Fulfillment on Repurchase Intention, elucidating 38.6% of the variation ( $R^2 = .386$ ). Represented as  $\text{Repurchase Intention} = 0.437 + (.828 * \text{Order Fulfillment})$ .

A short summary of the results of the regression analysis conducted on the sub variable level with respect to the dependent variable is presented in Table (7) and Table (8). Additionally, the tables also include the collective independent variables that were investigated in this study in relation to the dependent variable.

**Table 3**  
Regression Analysis Results (Sub-variables)

Indpdt. Sub Variables 1	Dependent Variable: Customer Online Repurchasing Intention					Goodness of Fit					
	Intercept		x		t Statistic	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F	F Stat	
	a	Std. Error	b	Std. Error							
Order Fulfillment Speed	1.365	0.184	0.58	0.048	7.435	12.067	0.519	0.269	0.267	145.623	<0.001
Order Fulfillment Options	1.913	0.165	0.472	0.047	11.607	10.116	0.453	0.205	0.203	102.336	<0.001
Order Fulfillment Info. Update	1.661	0.187	0.467	0.046	8.864	10.218	0.457	0.209	0.207	104.413	<0.001
Order Fulfillment Infor. Reliability	1.579	0.175	0.509	0.045	9.012	11.423	0.498	0.248	0.246	130.494	<0.001
Order Fulfillment Cost	1.063	0.179	0.67	0.048	5.927	14.062	0.577	0.333	0.331	197.75	<0.001
Indpdt. Sub Variables 2	Intercept		x		t Statistic	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F	F Stat	
	a	Std. Error	b	Std. Error							
	Return Procedures	2.035	0.145	0.418	0.039	14.054	10.743	0.475	0.226	0.224	115.42
Return Process Information update	1.868	0.135	0.442	0.034	13.825	12.823	0.535	0.287	0.285	159.164	<0.001
Order Return Option	1.54	0.134	0.59	0.038	11.503	15.422	0.542	0.293	0.292	164.424	<0.001
Return Orders Refunds	1.565	0.142	0.553	0.038	11.048	14.359	0.613	0.375	0.374	237.83	<0.001
Return Orders Handling	0.437	0.199	0.828	0.053	2.194*	15.77	0.585	0.342	0.341	206.181	<0.001

**Source:** Developed by the researcher.

**Table 4**  
*Regression Analysis Results (Aggregate Variables)*  
**Dependent Variable: Customer Online Repurchasing Intention**

Aggregate Variables	Intercept			x			Goodness of Fit				
	a	Std. Error	t Statistic	b	Std. Error	t Statistic	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F	F Stat
Order Fulfillment	0.437	0.199	2.194*	0.828	0.053	15.77	0.621	0.386	0.384	248.705	<0.001
Reverse logistics	1.177	0.15	7.875	0.657	0.041	16.192	.631 <sup>a</sup>	0.398	0.397	262.173	<0.001

*Source:* Developed by the researcher.

## Findings

The study's results provide strong statistical evidence supporting the presented hypothesis, confirming a significant correlation between order fulfillment, order reverse logistics, and consumer repurchase intention. The analysis provides compelling grounds to endorse the alternative hypothesis for both variables.

**First**, the study found sufficient statistical evidence to support the alternative hypothesis over the initial null hypothesis ( $H_01$ ) regarding order fulfillment. This suggests a positive relationship with consumer repurchase intention. Similarly, in the domain of order reverse logistics, the study provides significant statistical evidence to support the corresponding alternative hypothesis and reject the second null hypothesis ( $H_02$ ).

**Second**, reverse logistics factors exhibit a stronger and more pronounced association with consumer repurchase intentions compared to order fulfillment factors. This implies that these reverse logistics elements serve as more potent predictors of the online shopping behavior of Egyptians than the performance of order fulfillment. These nuanced insights provide valuable contributions to our understanding of the complexities of e-commerce dynamics and shed light on the factors that exert greater influence on consumer decisions in the Egyptian online market.

That first finding was based on alternative hypothesis  $H_{a2}$ . According to statistical analysis, the quality of the return experience can predict repurchases intention in a way that is consistent with earlier researches on the subject. The results highlight the reverse logistics importance, which is in line with previous research (Hjort et al., 2013; Mollenkopf et al., 2007; Y. Wang et al., 2019; Xing et al., 2010; Żurek, 2015).

Similarly, the second primary finding is derived from hypothesis  $H_01$ , which suggests a positive relationship between order fulfillment and the likelihood of online repurchase intention in an e-commerce environment. The result is supported by previous researches conducted by Ankur Pahwa et al. (2021); Cho, (2015); Mou et al. (2020); Nguyen et al. (2018), who found that order fulfillment experience is a major predictor for repurchase intention.

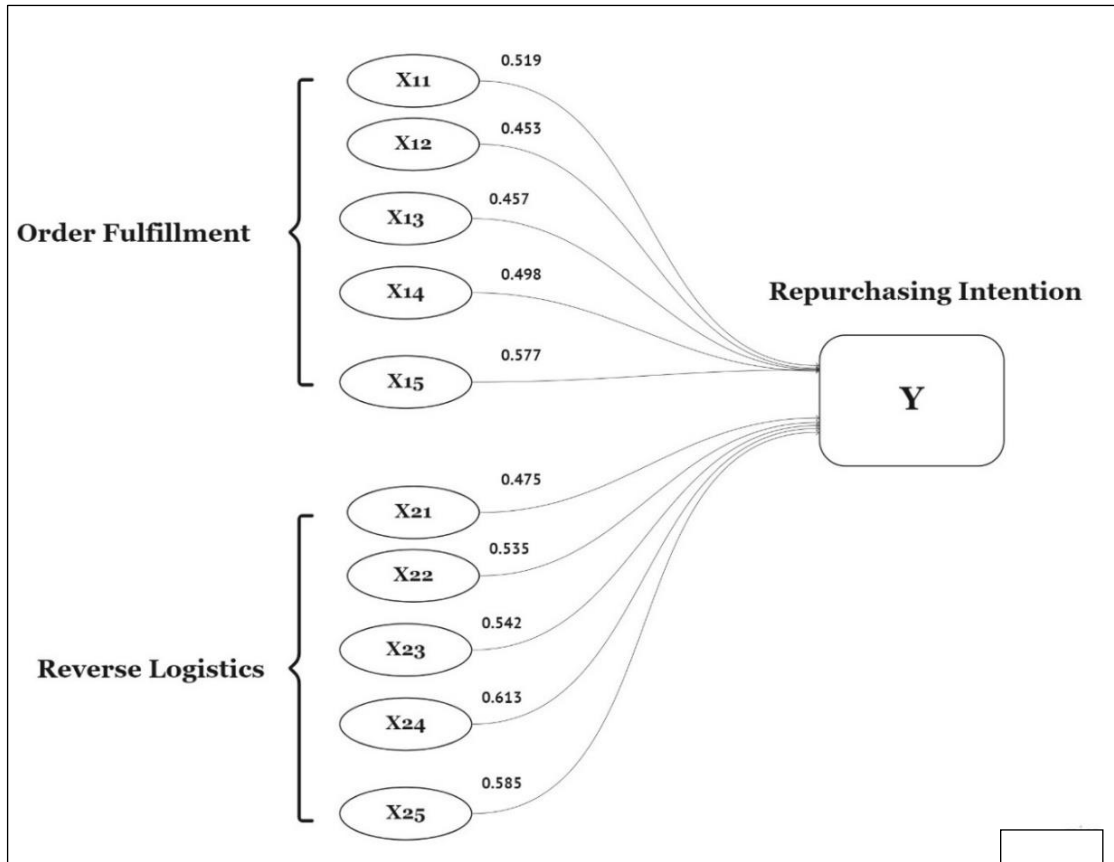
The study found that the most significant factors influencing customers to engage in repurchasing from an online platform in an e-commerce environment are related to order fulfillment. These factors include the speed of order fulfillment, the available options for order fulfillment, the reliability and timeliness of information updates related to order fulfillment, and the overall cost of order fulfillment.

Additionally, the research identified several key factors related to reverse logistics that could impact the likelihood of customers returning to an online platform for future purchases. These factors include the ease and efficiency of order return procedures, the availability and accuracy of information updates related to the return process, the options available for returning orders, the process for obtaining refunds for returned orders, and the overall handling of returned orders.

**Third**, Sub-variables for each of the independent variables have been identified and statistically analyzed. The researcher then found that some sub-variables are more important than others according to the correlation outcome, as presented in Figure (6).

**Figure 6**

*Last-Mile Factors Affecting Repurchase Intention*



**Source:** Developed by the researcher.

The sorting according to the largest  $R^2$  (coefficient of determination) is as follows: Return order refunds, return orders handling, order fulfillment cost, order return options, return process info update, order fulfillment speed, order fulfillment information reliability, return procedures, order fulfillment information update, and lastly, order fulfillment options. It is also clear from the statistical results that the reverse logistics relation to repurchasing intention is stronger than that of order fulfillment.

### Conclusions

In conclusion, the evolution of E-Commerce from a supplementary business extension to an essential component in today's competitive landscape has transformed consumer buying habits and heightened the importance of overall shopping experiences. Beyond traditional methods, focusing solely on competitive pricing, it is now imperative for businesses to provide a comprehensive shopping experience to ensure long-term success.

This study delved into the relationship between online consumer repeat purchase intention and last-mile logistics services, specifically examining order fulfillment and reverse logistics as independent factors and customer repurchase intention as a dependent variable. Empirical support for the hypotheses was established through data collected from an online survey, and subsequent statistical analysis that revealed positive relationships between the variables.

The findings underscored that improvements in last-mile logistics operations not only impact the bottom-line profits of e-commerce companies but also significantly influence online repurchase intentions, thereby affecting top-line revenue and long-term business sustainability. The study emphasized the pivotal role of well-performing last-mile services in retaining existing customers and attracting new ones, as customer retention proves to be more efficient than acquiring new clientele in terms of effort, time, and financial resources.

In summary, this study concludes that strategic efforts to enhance last-mile logistics operations not only contribute to improving the profitability for e-commerce companies but also play a crucial role in shaping online repurchase intentions, subsequently influencing top-line revenue and establishing a retailer's success and reputation. Well-executed last-mile services are emerging as a key determinant in shaping the future purchasing behavior of online shoppers.

## **Recommendations**

The study provides key recommendations for enhancing e-commerce last-mile logistics, focusing on critical touchpoints that influence consumer repurchase intentions.

### **Last-Mile Logistics Optimization**

- Prioritize attention to last-mile logistics for enhanced consumer repurchase intentions.
- Develop techniques to minimize perceived risks associated with refunding money for return orders.
- Localize and outsource last-mile operations to businesses near customer zones for improved cost structure.

### **Refund Process Improvement**

- Devise innovative tactics to reduce perceived risks and enhance customer satisfaction in refund processes.
- Set and communicate clear refund process expectations on websites or applications.
- Utilize last-mile delivery teams for efficient return order retrieval and processing.

### **Return Orders Handling**

- Create an internal customer service-oriented business academy to enhance skills continuously.
- Conduct hands-on improvement programs for customer service representatives.
- Segment customer requests based on importance, giving priority to return orders.

### **Order Fulfillment Cost Reduction**

- Work on reducing delivery and order fulfillment costs. Evaluate the possibility of outsourcing last-mile operations for cost optimization.

### **Order Return Options**

- Establish partnerships with companies or store chains for wider geographical presence in handling return orders.

- Provide the option of returning to micro-receiving centers for added flexibility and reduced recovery process costs.

#### **Return Process Information Update**

- Develop a software workflow system for instant automatic updates on return and refund procedures.
- Integrate software with logistics management systems for accuracy and elimination of human error.

#### **Order Fulfillment Speed & Options**

- Utilize additional assistants for order delivery, especially in crowded city areas.
- Explore motorcycle delivery for small parcels in densely populated areas for increased flexibility.
- Inform and involve customers explicitly when arranging time windows for better order delivery success.

#### **Cross-Functional Team Implementation**

- Implement recommendations through a cross-functional team across the entire e-commerce organization.

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## العلاقة بين لوجستيات الميل الأخير للتجارة الإلكترونية ونية إعادة الشراء في مصر

### المستخلص

يشهد العالم ثورة رقمية هائلة ومستمرة تُعيد تشكيل مختلف جوانب الحياة، بما في ذلك مشهد التسوق والتجارة الإلكترونية. وتعدّ مصر من الدول التي تأثرت بشكل كبير بهذه الثورة، فمع ازدياد انتشار الإنترنت وتطور الهواتف الذكية وتوفر وسائل الدفع الرقمية الآمنة، بات بإمكان المستهلكين المصريين شراء مختلف السلع والخدمات بسهولة ويسر من أي مكان وفي أي وقت. وتُشير التوقعات إلى أن حجم سوق التجارة الإلكترونية في مصر سيتراوح بين 13 و15 مليار دولار أمريكي بنهاية عام 2030. ويُعد هذا التطور علامة فارقة في سلوك المستهلك المصري، حيث أصبح التسوق عبر الإنترنت هو الخيار المفضل للكثيرين، مما يُلقي بتحديات جديدة ومتعددة الجوانب على الشركات. وتعتبر الخدمات اللوجستية -وخصوصًا في الميل الأخير- هي العصب النابض للتجارة الإلكترونية، حيث تلعب دورًا محوريًا في نجاح عملية الشراء، فمن خلال هذه الخدمات تُسَلَّم المنتجات إلى المستهلكين في الوقت والمكان المُحدَّدين، وتُحافظ على سلامة المنتجات وتضمن وصولها للعملاء بحالة ممتازة؛ مما يساهم في تُقدِّم تجربة الشراء المتكاملة. ولكنها في نفس الوقت تُعد أيضًا من أكثر الجوانب تعقيدًا وتكلفة، لأسباب متعددة منها: الازدحام السكاني في المدن، وارتفاع حجم الطلبات، وتنوع تفضيلات العملاء لطريقة استلام المنتجات. وتُسلط هذه الدراسة الضوء على أهمية الخدمات اللوجستية للميل الأخير كعامل رئيسي في نجاح التجارة الإلكترونية، وتهدف بشكل مُعمَّق إلى استكشاف علاقة تجارب العملاء السابقة مع خدمات توصيل المنتجات وإعادتها بنيتهم إعادة الشراء من منصات التجارة الإلكترونية. واقتصرت الدراسة على فئة المنتجات الإلكترونية الاستهلاكية، والتي تمثل أكثر من 60% من حجم عمليات الشراء عبر الإنترنت في مصر (طبقاً لإحصائيات Staistia.com لسنة 2022)، وقد تم اختيار عملاء منصة أمازون مصر كعينة للدراسة لضمان عمل تحليل شامل لفرضيات البحث، وأيضًا نظرًا لعدددهم في مصر والعالم. وأوضحت نتائج الدراسة وجود علاقة قوية وذات دلالة إحصائية بين عمليات الوفاء بالطلبات وأيضًا الخدمات اللوجستية العكسية مع احتمالية انخراط العملاء في معاملات شراء لاحقة ومتكررة عبر منصات التجارة عبر الإنترنت في مصر. وتُسهم هذه الدراسة مساهمةً قيِّمة في فهم تأثير الخدمات اللوجستية على سلوك المستهلكين في التجارة الإلكترونية بالسوق المصرية، وتقدّم نتائج وتوصيات قيِّمة لأصحاب الأعمال وشركات التجارة لتطوير استراتيجيات أكثر فاعلية.

**الكلمات الدالة:** ديناميكيات التجارة الإلكترونية، لوجستيات الميل الأخير، الوفاء بالطلب، نية إعادة الشراء، اللوجستيات العكسية