

Article

Last-Mile Delivery Performance Through the Eyes of Gen Z and Millennials

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Abstract

The rapid growth of e-commerce has increased the strategic importance of last-mile delivery as a critical determinant of customer satisfaction and retention. This study examines consumer perceptions of last-mile delivery performance in the Greece e-commerce market, focusing on Millennials and Generation Z. Data were collected from 1252 consumers through a structured questionnaire covering demographics, online purchasing behavior and satisfaction with third-party logistics (3PL) services. Reliability analysis confirmed strong internal consistency of the measurement scales. The findings show that Greek logistics service providers generally meet consumer expectations at a moderate-to-high level, particularly in tracking information, pre-order information and service quality. However, delivery time, communication during delays and compensation procedures remain weaker service dimensions. Comparative analysis revealed no significant differences in satisfaction between Millennials and Gen Z. Regression analysis demonstrated that communication quality, delivery execution and problem resolution positively affect satisfaction, while longer lead times reduce it. Furthermore, positive customer experience significantly increases future intention to continue online shopping, highlighting the strategic importance of efficient last-mile delivery.

Keywords: last-mile delivery; e-commerce; logistics service providers (LSPs); customer satisfaction; service quality; Gen Z; Millennials

1. Introduction

Digital transformation has fundamentally changed the way consumers shop and how retailers operate. Over the last decade, e-commerce has evolved from an alternative purchasing channel into an integral part of everyday life, becoming one of the fastest-growing sectors of modern economies (Sagar, 2024; Dabija & Lung, 2019). As online shopping expands, logistics systems face increasing pressure to deliver products quickly, reliably and conveniently. In this environment, last-mile delivery (the final movement of goods from a distribution center to the customer) has become a critical determinant of customer satisfaction and an important source of competitive advantage for retailers and logistics service providers (LSPs) (Escudero-Santana et al., 2022; Lim et al., 2018). For many consumers, the delivery experience is the final and most visible stage of the purchasing process and often shapes their overall evaluation of an online transaction.



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At the same time, managing last-mile delivery has become increasingly challenging. Growing order volumes, urban congestion, delivery accessibility issues and rising expectations for speed and convenience have significantly increased the complexity of logistics operations, particularly in large urban areas (Lim et al., 2018; Gevaers et al., 2011; Browne et al., 2012; Collier & Bienstock, 2006; Vakulenko et al., 2018; Juga et al., 2010; Holguín-Veras & Sánchez-Díaz, 2016; Bachofner et al., 2022). Consumers no longer evaluate delivery services solely based on whether a product arrives. They increasingly expect real-time information, delivery flexibility, transparent communication and reliable service experiences (Collier & Bienstock, 2006; Vakulenko et al., 2018; Juga et al., 2010; Collier & Bienstock, 2006; Vakulenko et al., 2018; Juga et al., 2010; Wang et al., 2022; Rai et al., 2019; Nguyen et al., 2018). Consequently, logistics providers are under pressure not only to improve operational efficiency but also to deliver a customer experience that meets increasingly demanding expectations (Boysen et al., 2021; Edwards et al., 2010). The rapid expansion of e-commerce has also generated broader concerns regarding the environmental implications of urban freight transport and the sustainability of delivery systems (Wang et al., 2022; Rai et al., 2019; Nguyen et al., 2018).

The importance of customer perceptions in last-mile delivery has therefore increased considerably. Delivery reliability, timely information, communication during disruptions, professionalism and effective problem resolution all influence how consumers evaluate logistics services and whether they remain satisfied with their online shopping experiences (Collier & Bienstock, 2006; Vakulenko et al., 2018; Juga et al., 2010; PricewaterhouseCoopers (PwC), 2018). In many cases, a delivery delay may be tolerated if customers receive timely information and appropriate support, whereas poor communication can negatively affect customer perceptions even when the delivery itself is completed successfully. Understanding how consumers perceive and evaluate these service dimensions has therefore become essential for both logistics providers and online retailers.

Despite the growing interest in last-mile delivery, important gaps remain in the literature. Existing research has often treated logistics performance and consumer behavior as separate research streams, focusing either on operational optimization or on customer satisfaction, without adequately integrating both perspectives (Rao et al., 2011; Maravić et al., 2025; Ma et al., 2022). Moreover, although several studies have examined consumer adoption of innovative delivery solutions and alternative delivery models, many behavioral and contextual factors that shape customer evaluations and satisfaction remain insufficiently explored (Firdaus, 2023; Cauwelier et al., 2024). As a result, there is still limited understanding of how operational delivery performance translates into customer satisfaction and future behavioral intentions.

Another limitation of the existing literature concerns geographical context. Most empirical studies have been conducted in highly developed markets, while countries with different economic and infrastructural characteristics remain underrepresented (Lim et al., 2018; Ma et al., 2022; Firdaus, 2023; Cauwelier et al., 2024). This gap is particularly relevant in the case of Greece, where e-commerce has expanded rapidly in recent years and consumer dependence on courier and third-party logistics services has increased substantially. At the same time, Greece presents several characteristics that make last-mile delivery especially challenging, including strong urban concentration, geographical fragmentation and extensive insularity.

Studying younger consumers is particularly important within this context because Millennials and Generation Z constitute the most active users of digital technologies and among the most frequent online shoppers (Dabija & Lung, 2019). Their purchasing habits and service expectations are likely to influence the future direction of e-commerce and logistics services. Although both generations are highly engaged in digital commerce, prior

research suggests that they may differ in their expectations and online shopping behaviors. Millennials experienced the transition from traditional to digital retailing, whereas Generation Z are digital natives who have grown up with continuous access to mobile technologies and real-time digital services. These differences may influence how consumers evaluate delivery attributes such as speed, transparency, communication and service quality. However, existing evidence remains inconclusive regarding whether these differences translate into distinct evaluations of last-mile delivery performance, particularly in the Greek market. Consequently, the present study focuses on these two cohorts to examine whether generational cohort influences customer satisfaction with last-mile delivery services, while also exploring whether meaningful differences in satisfaction exist between them. Although environmental sustainability constitutes an increasingly important dimension of contemporary last-mile logistics, the present study focuses specifically on customer satisfaction, service experience and future behavioral intentions associated with delivery performance.

Against this background, the present study examines consumer satisfaction with last-mile delivery services in Greece by focusing on Millennials and Generation Z consumers who have recently used courier-based third-party logistics services. The study aims to evaluate how logistics service providers perform across key delivery dimensions and to identify the factors that shape customer satisfaction and future behavioral intentions. Specifically, the study addresses the following research questions:

RQ1: To what extent do logistics service providers (LSPs) in Greece meet e-commerce consumers' expectations across key last-mile delivery service attributes?

RQ2: Are there significant differences in overall satisfaction between Gen Z and Millennials?

RQ3: How do delivery factors affect overall satisfaction?

RQ4: Does customer experience affect future intention to continue online shopping?

By integrating descriptive and inferential analyses, this study contributes to the growing literature on e-commerce logistics and customer satisfaction by providing empirical evidence from an underexplored market and examining whether generational cohort influences perceptions of last-mile delivery performance among two digitally active consumer groups. The findings also offer practical insights for logistics service providers and online retailers seeking to improve delivery reliability, communication practices, service recovery mechanisms and long-term customer retention in an increasingly competitive e-commerce environment.

2. Materials and Methods

Regarding sample selection, the study targeted consumers in Greece belonging to Millennial and Generation Z cohorts who actively engage in online shopping and had recently used courier-based 3PL services. A total of 1252 valid responses were collected, comprising 488 Millennials and 764 Gen Z respondents. Although the two generational groups were not equally represented, the imbalance was considered acceptable for comparative analysis, as both subsamples remained sufficiently large. Furthermore, the statistical procedures employed in the study, including Welch's *t*-test and the Mann–Whitney U test, are robust to unequal sample sizes and variance heterogeneity. Consequently, the difference in group sizes was not expected to compromise the validity of the intergenerational comparison.

A convenience sampling method was applied, enabling efficient and cost-effective access to participants who had recent experience with online shopping and courier-based delivery services. This approach was considered appropriate for an exploratory, consumer-focused study aiming to examine satisfaction patterns among digitally active younger consumers. However, convenience sampling may introduce self-selection bias, as individuals with stronger interest in online shopping or more positive or negative delivery experiences may have been more likely to participate. Therefore, the findings should not

be interpreted as statistically representative of all Greek consumers but rather as indicative evidence regarding the perceptions of the surveyed Millennials and Gen Z respondents. This approach is particularly suitable for customer-focused research, especially when respondents can be reached through online distribution channels (Golzar et al., 2022). Data were collected through a structured questionnaire consisting of three sections, designed to address the research objectives and capture a comprehensive overview of consumer characteristics, online purchasing behavior and satisfaction with last-mile delivery and 3PL services in the Greek e-commerce market.

Section A collects demographic information (including gender, age group—Millennials or Gen Z, education level, income, employment status, household size and mean monthly expenditure), which is essential for profiling respondents and ensuring accurate comparison between consumers, in line with the objective of examining differences between demographic groups.

Section B focuses on online purchasing behavior, incorporating 8 questions on the critical success factors influencing the choice between in-store and online purchases (such as delivery cost, time, availability and online user experience), the typical lead time consumers expect and the frequency of purchasing different product categories over the past six months. These questions directly support the objective of identifying behavioral patterns and uncovering which factors shape satisfaction and purchasing decisions. Moreover, there was a question about the usual delivery time that consumers report on receiving their online orders.

Section C evaluates customer satisfaction with third-party logistics (3PL) performance through 32 Likert-scale statements examining key dimensions of last-mile delivery service quality with 3 possible answers: Disagree, Neither Disagree or Agree and Agree. A three-point Likert response format (Disagree, Neither disagree nor agree, Agree) was selected to reduce respondent burden and facilitate questionnaire completion, given the relatively large number of items included in this section (32 statements). This simplified response format was considered appropriate for capturing overall consumer perceptions while minimizing response fatigue and improving completion quality in an online survey. Although five- or seven-point Likert scales may provide greater measurement sensitivity, the three-point format was deemed sufficient for the exploratory objectives of the present study and for distinguishing between negative, neutral and positive evaluations. These items assess perceptions related to the ease of online ordering, delivery reliability, timeliness of tracking and delivery notifications, communication effectiveness before and after purchase, professionalism of delivery personnel, packaging condition, handling of delays, compensation and reshipment procedures and responsibility attribution for delivery failures. In addition, the section includes items measuring consumer interaction with sellers and delivery companies during service disruptions, such as seeking online information or contacting customer support. The final part of the section captures behavioral intentions, including continued use of online shopping and willingness to use specific delivery companies for future shipments, allowing the examination of how satisfaction influences future consumer behavior. Overall, the questionnaire is structured to connect consumer characteristics, online purchasing patterns and service quality perceptions, providing comprehensive evidence for evaluating last-mile delivery performance among Generation Z and Millennials in Greece.

3. Results

This section presents the empirical findings of the study, structured to address the research objectives and answer the four research questions. It begins with an assessment of the reliability and internal consistency of the measurement scales, followed by a descrip-

tive overview of the sample characteristics and consumers' online purchasing behavior. The section then examines consumer perceptions and satisfaction with last-mile delivery services, providing an initial descriptive understanding of key service dimensions. Finally, inferential statistical analyses are conducted to explore generational differences in satisfaction, the effect of delivery-related factors on overall satisfaction and the relationship between customer experience and future intention to continue online shopping. Together, these findings provide a comprehensive evaluation of last-mile delivery performance and consumer satisfaction in the Greece e-commerce market.

3.1. Descriptive Findings

First, to assess internal consistency, separate composite variables were constructed for the five-point items included in Section B and the three-point agreement items included in Section C. The Part B scale, consisting of eight Likert-scale items measuring satisfaction-related aspects of online purchasing and delivery services, demonstrated high reliability (Cronbach's $\alpha = 0.882$), indicating excellent internal consistency. Similarly, the Part C scale, consisting of 32 agreement-based items evaluating consumer perceptions of last-mile delivery and 3PL service performance, also showed high reliability (Cronbach's $\alpha = 0.859$). These results confirm that both scales are internally consistent and suitable for use in subsequent statistical analyses.

The demographic profile (Section A of the questionnaire) of the examined sample of the 1252 individuals is presented in Table 1. Gender distribution is almost equal, with women representing 50.2% and men 49.8% of respondents. The sample consists of two major generational cohorts: Millennials (born 1981–1996) and Generation Z (born 1997–2012). Specifically, the sample includes 488 Millennials ($M = 3.402$, $SD = 0.724$) and 764 Gen Z participants ($M = 3.423$, $SD = 0.672$), indicating a stronger representation of younger respondents and relatively similar mean scores between the two generations. The sample is generally highly educated, as 62.4% hold tertiary education degrees, while 11.8% possess postgraduate or doctoral qualifications and 25.8% have completed secondary education. Geographically, respondents are primarily concentrated in Athens (58%), with 42% residing in Thessaloniki, the two biggest cities in Greece on which the survey was focused. Income distribution indicates that most participants belong to low-to-middle income categories, with 46.2% earning below €5000 annually and 35.8% between €5001 and €15,000, while only 4.7% report income above €25,001. Employment status reflects diverse labor conditions: 42.3% are employed full-time, 24.2% part-time and a notable 33.5% are unemployed. Regarding household composition, the majority (62.5%) live in medium-sized households of three to four members. Finally, the reported mean monthly expenditure of €73.42, combined with a high standard deviation of €95.70, suggests substantial variation in consumption patterns among respondents.

Table 1. Profile of sample.

Category	Data/Percentages
Gender	Women: 50.2%/Men: 49.8%
Age group	Millennials: 39%/Gen Z: 61%
Education	Tertiary education: 62.4%/Secondary education: 25.8% Postgraduate/Doctorate: 11.8%
Place of residence	Athens: 58%/Thessaloniki: 42%
Income	<€5000: 46.2%/€5001–15,000: 35.8%/€15,001–25,000: 13.4%/>€25,001: 4.7%
Employment status	Full-time: 42.3%/Part-time: 24.2%/Unemployed: 33.5%

Regarding Section B, the focus is placed on online purchasing behavior and the factors that influence consumers' choice between in-store and online purchases. The results show that consumers attach high importance to most of these factors, especially availability, price, delivery cost and delivery time. Availability is considered important or very important by 70.0% of respondents, while a similar percentage rate price highly at 70.4%. Delivery cost and delivery time are also key determinants, with 66.6% and 67.3% of respondents, respectively, evaluating them as important or very important. By contrast, user experience and safety/health, although still relevant, show greater variation in responses, with 48.2% and 51.3% rating them as important or very important, while 30.6% and 25.3% remain neutral, respectively. In terms of usual delivery time, most consumers report receiving their online orders within 3–5 days (48.1%), followed by 1–2 days (16.9%), 6–10 days (15.9%), same-day delivery (14.9%) and more than 10 days (4.3%). Overall, Section B highlights that consumers' online purchasing decisions are mainly shaped by practical and economic considerations, while delivery expectations are generally concentrated within a reasonable 3–5 day timeframe.

Finally, regarding the 32 satisfaction-related statements in Section C, the findings show generally positive perceptions of the online ordering process and several core aspects of last-mile delivery performance, while also revealing more mixed views on communication, delay management and compensation procedures (Table 2). A strong majority of respondents agreed that placing an order online was easy (72.1%), that high order volumes are a major reason for delays (69.7%) and that they were informed in a timely manner about the tracking number (66.0%). Similarly, 65.3% stated that they will continue using the internet for shopping, while 64.5% confirmed that they were informed when their order had arrived and was ready for delivery. Positive evaluations were also observed for the external condition of the packaging (60.9%) and knowledge of the company responsible for delivery (57.7%). However, perceptions were more moderate regarding service execution. Less than half of respondents agreed that delivery personnel behaved professionally (48.1%), that the delivery company is important to them (47.8%), that the delivery company was responsible for delays (47.3%), or that the order fulfillment schedule was adhered to (43.5%). Similarly, only 37.7% agreed that the necessary time and care were taken during delivery, while neutral responses were particularly high across several service-quality items.

Communication during delays appears to be one of the weaker areas. Agreement levels were relatively low for satisfaction with information received from the delivery company (29.9%), the delivery company's website (31.4%), the seller (27.2%) and the seller's website (27.6%). At the same time, high neutrality rates, ranging from 45.4% to 47.4%, suggest uncertainty or inconsistent experiences among respondents. Compensation and recovery procedures were also evaluated cautiously, as only 30.5% agreed that they were compensated or the product was resent in cases of loss or damage, 26.8% stated that they were compensated by the seller or delivery company and 25.6% agreed that the reshipment or compensation process was quick.

Responsibility for delays appears to be attributed more strongly to delivery companies and external pressure than to sellers. Specifically, 47.3% agreed that the delivery company was responsible for delays, while only 11.7% attributed delays to the seller. Moreover, 69.7% agreed that delays were due to the large volume of orders. Finally, most respondents disagreed that their order was never delivered or lost (59.4%), indicating that severe delivery failures were relatively limited.

RQ1: To what extent do logistics service providers (LSPs) in Greece meet e-commerce consumers' expectations across key last-mile delivery service attributes?

The findings are based on the composite satisfaction dimensions derived from the five-point evaluations collected in Section B of the questionnaire (Table 3). All mean satisfaction

scores exceed the midpoint value of 3 on the five-point Likert scale, indicating an overall positive evaluation of service performance. The highest-rated dimensions are tracking information (M = 3.56; 56.8% satisfied), pre-order information (M = 3.53; 55.5%) and service quality (M = 3.50; 53.1%), suggesting that consumers particularly value transparency, timely communication and professionalism during the delivery process. In these dimensions, the largest share of responses falls within the positive categories (“A lot” and “Very much”), reinforcing favorable perceptions of information provision and operational reliability.

Table 2. Consumer perceptions and satisfaction with online last-mile delivery services.

Do You Agree or Disagree with the Following Statement?	Disagree	Neither	Agree
It was easy to place the order online	4.6%	23.3%	72.1%
The salesperson informed me of the order fulfillment time	17.3%	37.9%	44.8%
The order fulfillment schedule was adhered to	14.9%	41.7%	43.5%
I knew which company would deliver the order	12.5%	29.8%	57.7%
I was informed in a timely manner of the order’s tracking number	7.7%	26.3%	66.0%
I contacted the delivery company by phone to check on the order’s progress	33.2%	37.3%	29.5%
I searched online for information from the delivery company about the order’s progress	17.7%	35.2%	47.0%
I was informed that my order had arrived and was ready for delivery	9.0%	26.5%	64.5%
I contacted the delivery company by phone to inquire about the delay in my order	27.8%	36.9%	35.3%
It was easy to contact the delivery company by phone	19.3%	46.1%	34.6%
I was satisfied with the information I received from the delivery company about the delay	24.3%	45.8%	29.9%
I searched for information about the delay of my order online, on the delivery company’s website	19.5%	42.9%	37.6%
I was satisfied with the information I received from the delivery company’s website about the delay	22.6%	46.0%	31.4%
I contacted the seller by phone about the delay in my order	27.9%	41.9%	30.2%
I was satisfied with the information I received from the seller about the delay	25.5%	47.4%	27.2%
I searched for information about the delay of the order on the seller’s website	25.6%	40.9%	33.5%
I was satisfied with the information provided on the seller’s website about the delay	27.0%	45.4%	27.6%
I had to pick up the order in person from the store	32.6%	34.7%	32.7%
The necessary time and care was taken during delivery	14.3%	48.0%	37.7%
The behavior of the delivery company’s employees was professional	10.6%	41.3%	48.1%
The packaging of the order was in good condition on the outside	7.1%	31.9%	60.9%
The order was never delivered, it was lost	59.4%	25.3%	15.3%
The product was (in good condition/damaged)	14.2%	42.5%	43.3%
In case of loss or damage (I was compensated/it was reshipped)	18.7%	50.8%	30.5%
I was compensated by (the seller/delivery company)	24.4%	48.7%	26.8%
The reshipment or compensation process was quick	21.4%	53.0%	25.6%
I believe the seller is responsible for the delays	49.8%	38.4%	11.7%
I believe the delivery company is responsible for the delays	15.3%	37.5%	47.3%
I believe the large volume of orders is responsible for the delays	5.4%	24.8%	69.7%
I will continue to use the internet for shopping	6.5%	28.2%	65.3%
The delivery company is important to me	14.4%	37.8%	47.8%
I would also use the delivery company for my own shipments	12.7%	44.6%	42.7%

Table 3. Satisfaction across all eight last-mile service attributes.

Satisfaction Factor	Not at All	A Little	Neither	A Lot	Very Much	Mean	% with Score ≥ 4 (“Satisfied”)
Tracking information	2.6%	9.7%	30.9%	42.7%	14.1%	3.56	56.8%
Pre-order information	1.8%	9.9%	32.7%	44.9%	10.6%	3.53	55.5%
Service quality	2.1%	10.0%	34.8%	42.4%	10.7%	3.50	53.1%
Hygiene/Safety	3.7%	12.4%	31.9%	37.5%	14.6%	3.47	52.1%
Service characteristics	3.9%	3.9%	3.9%	3.9%	3.9%	3.42	46.3%
After-sales service	4.7%	13.3%	36.8%	35.1%	10.1%	3.33	45.2%
Service cost	2.9%	13.6%	42.1%	32.1%	9.3%	3.32	41.5%
Delivery time	5.8%	14.3%	41.4%	30.5%	8.1%	3.21	38.6%

In addition, hygiene and safety (M = 3.47; 52.1% satisfied) and service characteristics (M = 3.42; 46.3% satisfied) also receive relatively positive evaluations, although the notable

proportion of neutral responses suggests some variation in service experiences. After-sales service ($M = 3.33$; 45.2%) and service cost ($M = 3.32$; 41.5%) show comparatively lower, but still positive, evaluations, indicating that post-purchase support and perceived value remain acceptable but could be improved. Delivery time emerges as the weakest evaluated attribute ($M = 3.21$; 38.6% satisfied), accompanied by a high proportion of neutral responses (41.4%), highlighting timeliness and delivery consistency as the primary areas requiring improvement. Overall, the findings reveal a clear hierarchy among service attributes: communication-related and service-quality dimensions are evaluated most positively, whereas time- and cost-related aspects receive comparatively lower ratings. Therefore, Greek LSPs appear to satisfy consumer expectations effectively in terms of transparency and service quality, but improvements in delivery punctuality and consistency would further enhance overall customer satisfaction.

3.2. Inferential Findings

For the analysis of RQ2, RQ3 and RQ4, two composite indices were constructed from the questionnaire items. The Overall Satisfaction Index was calculated as the arithmetic mean of the eight items included in Section B, which assessed respondents' evaluations of key online shopping and delivery-related factors, including availability, price, delivery cost, delivery time, user experience and safety/health aspects. The Customer Experience Index was calculated as the arithmetic mean of the service-experience items included in Section C, covering perceptions of ordering convenience, tracking information, communication quality, delivery execution, professionalism of delivery personnel, packaging condition, delay management, compensation procedures and responsibility attribution. The item "I will continue to use the internet for shopping" was excluded from the index construction because it served as the dependent variable representing future online shopping intention (RQ4). Items in Section B were coded on a five-point scale ranging from 1 = Not at all to 5 = Very much, while Section C items were coded from 1 = Disagree to 3 = Agree. All items were coded so that higher values represented more positive evaluations, and no reverse coding was required because all statements were phrased in the same direction. Composite scores were calculated using arithmetic means rather than summated scores because averaging preserves the original measurement metric, facilitates interpretation and allows direct comparison across constructs comprising different numbers of items. This approach is widely adopted in survey-based studies using Likert-type measures of customer satisfaction and service quality.

RQ2: Are there significant differences in overall satisfaction between Gen Z and Millennials?

The findings relating to RQ2 indicate that there is no statistically significant difference in overall satisfaction between Gen Z and Millennials regarding last-mile delivery services. Descriptive statistics show that Gen Z reported a mean satisfaction score of 3.423 ($SD = 0.672$), while Millennials reported a very similar mean of 3.402 ($SD = 0.724$), suggesting nearly identical evaluations of delivery performance.

Normality checks using the Shapiro–Wilk test indicated statistically significant deviations from normality for both groups (Gen Z: $W = 0.983$, $p < 0.001$; Millennials: $W = 0.987$, $p < 0.001$). However, given the large sample size and low skewness values, parametric testing remained appropriate. To ensure robustness, both Welch's t -test and a Mann–Whitney U test were performed. These methods were specifically selected because they provide reliable estimates when groups differ in size and when normality assumptions are not fully satisfied. Both analyses confirmed the absence of significant differences, with the Welch t -test showing $t(981.44) = 0.515$, $p = 0.607$ and the Mann–Whitney U test yielding $U = 190,452.5$, $p = 0.517$.

Effect size analysis further supports this conclusion, as both Hedges's g ($g = 0.03$) and the rank-biserial correlation (≈ -0.02) indicate a negligible practical difference between the two groups. Overall, the results suggest that both younger generations evaluate the quality of last-mile delivery services in a highly similar manner, indicating that generational differences do not significantly influence satisfaction levels.

RQ3: How do delivery factors affect overall satisfaction?

To address RQ3, a multiple regression analysis was conducted to examine how delivery-related factors influence overall satisfaction. To avoid circularity, the satisfaction items used to construct the dependent variable were excluded from the predictors. Instead, the model included three composite delivery-performance dimensions (communication/information quality, delivery execution quality and problem resolution) along with delivery lead time.

The overall regression model was statistically significant ($F(4, 1247) = 137.4, p < 0.001$) and explained 30.6% of the variance in overall satisfaction ($R^2 = 0.306$; Adjusted $R^2 = 0.304$), indicating a substantial explanatory power for behavioral research. Among the predictors, communication and information quality emerged as one of the strongest positive determinants of satisfaction ($B = 0.363, \beta = 0.243, p < 0.001$). This suggests that customers who receive timely, accurate and clear information about their orders tend to report higher satisfaction levels. Similarly, delivery execution quality showed an equally strong positive effect ($B = 0.360, \beta = 0.243, p < 0.001$), indicating that adherence to delivery schedules, professional behavior of delivery staff and careful handling of parcels significantly enhance consumer satisfaction.

Problem resolution quality also had a significant positive effect ($B = 0.239, \beta = 0.178, p < 0.001$), highlighting the importance of effective communication and support during delays, damages, or delivery complications. This finding suggests that service recovery mechanisms play a meaningful role in shaping customer evaluations. In contrast, lead time had a statistically significant negative effect ($B = -0.053, \beta = -0.078, p = 0.003$), indicating that longer delivery times reduce overall satisfaction. Although the effect is weaker compared to the other predictors, it confirms that delivery speed remains an important determinant of customer experience.

Diagnostic tests indicated that the regression model satisfied the main assumptions of multiple linear regression. Multicollinearity was low ($VIF = 1.02\text{--}1.56$), suggesting that the predictors were not highly correlated. Residual independence was acceptable (Durbin–Watson statistic = 1.86). Visual inspection of residual-versus-fitted and Q-Q plots indicated approximate linearity and acceptable residual normality. The Breusch–Pagan test revealed heteroscedasticity ($p < 0.001$); therefore, heteroscedasticity-consistent HC3 robust standard errors were employed to ensure reliable coefficient estimates. Standardized residual analysis showed that the vast majority of observations fell within the acceptable range of ± 2 and no severe outliers ($| \text{standardized residual} | > 3$) were identified. Furthermore, Cook's distance and leverage statistics indicated that no single observation exerted undue influence on the regression estimates. Overall, the diagnostic procedures suggest that the regression results are robust and suitable for interpretation.

RQ4: Does customer experience affect future intention to continue online shopping?

The findings addressing RQ4 indicate that customer experience has a strong and statistically significant influence on consumers' future intention to continue shopping online. First, Spearman's rank correlation coefficient analysis revealed a moderate positive relationship between customer experience and future intention ($\rho = 0.347, p < 0.001$). This indicates that better delivery experiences are associated with stronger intentions to continue using online shopping channels. To further examine this relationship, an ordinal logistic regression was conducted, using future intention as the dependent variable. The results

showed that customer experience significantly predicts future online shopping intention ($B = 2.296$, $SE = 0.197$, $z = 11.675$, $p < 0.001$).

The corresponding odds ratio ($OR = 9.94$) indicates a very strong effect: for each unit increase in the customer experience index, the odds of being in a higher category of future intention increase by nearly ten times. The 95% confidence interval for the odds ratio (6.76–14.61) further confirms the strength and reliability of this effect.

The model's McFadden pseudo-R-squared value (0.074) suggests a modest but meaningful explanatory contribution, which is typical for behavioral intention models. Overall, these findings demonstrate that positive customer experiences during the delivery process substantially increase consumers' willingness to continue shopping online in the future. This highlights the strategic importance of improving last-mile delivery experiences, not only for immediate satisfaction but also for fostering long-term customer retention in the e-commerce sector.

4. Discussion and Conclusions

The present study examined consumer satisfaction with last-mile delivery services in the Greece e-commerce market, focusing on younger consumer groups, namely Millennials and Generation Z. The Greek logistics market possesses several unique characteristics, including strong urban concentration, extensive insularity, seasonal demand fluctuations due to tourism and varying transport accessibility across regions. These characteristics distinguish Greece from many European markets and should be considered when interpreting customer perceptions of last-mile delivery performance. In particular, geographical fragmentation and significant differences between metropolitan and island regions may influence delivery lead times, service availability and consumer expectations regarding logistics service quality. The findings provide important insights into how consumers evaluate the performance of third-party logistics (3PL) providers and which service dimensions most strongly influence their satisfaction and future behavioral intentions.

Overall, the results indicate that Greek logistics service providers generally meet consumer expectations at a moderate-to-high level across the main dimensions of last-mile delivery service quality. Satisfaction levels were strongest in tracking information, pre-order information and service quality, suggesting that consumers place particular importance on transparency, timely updates and professionalism during the delivery process. The strong evaluation of tracking information and communication may reflect consumers' increasing need for transparency and control during the delivery process. Real-time information reduces uncertainty and perceived risk and enhances consumers' sense of involvement in the transaction, particularly among digitally native generations who are accustomed to immediate access to information. These findings are consistent with previous research demonstrating that logistics service quality significantly affects customer satisfaction and loyalty in e-commerce environments, as transparency and information accuracy are central elements of perceived service value (Akil & Ungan, 2022). Similarly, the broader importance of last-mile delivery performance as a determinant of customer satisfaction has been emphasized by Liu et al. (2017), who identify delivery reliability and communication as core drivers of positive customer experiences.

An additional factor that may influence customer expectations is the relatively low average value of online purchases reported by the respondents. The mean monthly online expenditure was €73.42, suggesting that a substantial proportion of purchases involve relatively low-value products. This purchasing pattern may partly reflect the disposable income characteristics of the sample and could influence service expectations. Consumers purchasing lower-value products may be more tolerant of longer delivery times, communication shortcomings or minor service failures compared to consumers purchasing

higher-value goods, who typically place greater emphasis on speed, reliability and compensation mechanisms. Future research could further investigate the relationship between purchase value and logistics service quality expectations.

At the same time, the findings highlight that delivery time remains the weakest evaluated service dimension, indicating that speed and punctuality continue to represent major operational challenges for logistics providers. This finding may reflect a growing gap between consumer expectations and operational reality. The rapid expansion of global e-commerce has accustomed consumers to increasingly shorter delivery windows and continuous service availability. By contrast, Greek logistics providers operate within a fragmented transport network characterized by urban congestion, geographical dispersion and extensive insularity, making consistently fast deliveries more difficult to achieve. Consequently, dissatisfaction with delivery time may reflect rising customer expectations as much as actual operational performance. However, delivery delays may also stem from external factors beyond the direct control of logistics service providers, including urban congestion, limited parking availability, insufficient unloading infrastructure, island geography and transportation network limitations. Such structural constraints are particularly relevant in the Greek context, where geographical fragmentation and urban traffic conditions may adversely affect delivery efficiency. Consequently, customer perceptions of delays should not necessarily be interpreted as reflecting deficiencies in logistics providers' operational performance alone, but rather as the outcome of broader systemic and infrastructural challenges.

In addition, communication during delays and service disruptions emerged as one of the weakest areas, with relatively low satisfaction levels and high neutrality rates. This suggests inconsistency in how logistics providers and sellers communicate with consumers during problematic delivery situations. Compensation and service recovery procedures were also evaluated cautiously, indicating room for improvement in post-failure service handling. One possible explanation is that routine deliveries have become increasingly automated through tracking applications and standardized notification systems, whereas communication during service failures often still depends on manual intervention and coordination between retailers and logistics providers. Similarly, compensation procedures typically require clear attribution of responsibility between the seller and the logistics provider, which may prolong resolution and create uncertainty for consumers. As a result, customers may perceive service recovery as inconsistent even when the original delivery problem is relatively minor.

These findings align with the service recovery literature, which emphasizes that effective problem resolution and timely communication are essential for maintaining customer trust and satisfaction after service failures. From a policy perspective, Greece has implemented consumer protection mechanisms for e-commerce transactions through national legislation aligned with European Union directives, including withdrawal rights, complaint procedures and alternative dispute resolution mechanisms. Furthermore, the General Consumer Secretariat and the Consumer Ombudsman provide formal channels for addressing disputes between consumers and online retailers. Such institutional mechanisms may influence consumer expectations regarding compensation, transparency and service recovery following delivery failures. Consequently, logistics providers and online retailers should align their service recovery practices with both regulatory requirements and increasing consumer expectations regarding accountability and customer support.

Contrary to expectations based on the generational e-commerce literature, the comparative analysis between Millennials and Generation Z revealed no statistically significant differences in overall satisfaction levels. Both generations reported very similar evaluations of last-mile delivery performance, suggesting that younger consumer groups in Greece

share common expectations and service quality perceptions. This finding implies that generational differences may be less influential than operational performance factors when explaining consumer satisfaction in e-commerce logistics. A plausible explanation is that the rapid diffusion of digital commerce has reduced behavioral differences between these two cohorts. Although Millennials experienced the transition from traditional retailing to online shopping whereas Generation Z are digital natives, both groups now purchase online frequently, use similar digital platforms and are exposed to comparable delivery standards. Consequently, expectations regarding delivery speed, transparency and service quality appear to have converged, making operational service performance a stronger determinant of satisfaction than generational membership itself.

The absence of significant differences between Millennials and Generation Z may indicate that both cohorts have largely converged in their expectations regarding e-commerce logistics services. Despite age differences, both generations are highly familiar with digital technologies, frequently engage in online shopping and have developed similar expectations concerning convenience, transparency and delivery reliability. Consequently, the findings suggest that operational characteristics of delivery services, such as communication quality, delivery reliability and problem resolution, exert a stronger influence on customer satisfaction than generational membership itself. Rather than weakening the contribution of the study, the absence of significant generational differences indicates that these digitally active cohorts have largely converged in their expectations of last-mile delivery services.

Then, the regression analysis further demonstrated that communication quality, delivery execution reliability and problem-resolution effectiveness are the strongest positive predictors of overall satisfaction, while longer lead times negatively affect satisfaction. These findings reinforce the idea that customer satisfaction is shaped not only by the physical delivery itself, but also by the informational and relational aspects of the service. This result is in line with [Hui et al. \(2025\)](#), who found that logistics service quality dimensions significantly influence both satisfaction and repurchase intentions, particularly when communication and reliability are effectively managed.

Finally, the findings show that customer experience has a strong and statistically significant effect on future online shopping intention. Consumers reporting better delivery experiences were substantially more likely to express stronger intentions to continue using online shopping channels. This highlights the strategic importance of last-mile delivery as not merely an operational function but a key mechanism for strengthening customer retention and loyalty. This conclusion is consistent with [Rajendran and Wahab \(2022\)](#), who demonstrated that positive last-mile delivery experiences significantly increase repurchase intention and reinforce long-term engagement with online retail platforms.

From a managerial perspective, the study suggests that logistics service providers in Greece should prioritize improvements in delivery punctuality, delay communication and service recovery mechanisms, while maintaining high standards in tracking transparency and customer information. The regression analysis suggests that investments in proactive communication and effective service recovery may generate greater improvements in customer satisfaction than focusing exclusively on reducing delivery lead times. Although delivery speed remains important, timely information and efficient problem resolution can partially offset the negative effects of unavoidable delays, particularly in geographically challenging logistics environments such as Greece. As e-commerce continues to grow, the ability of logistics providers to deliver reliable, transparent and responsive last-mile services will increasingly determine their competitive advantage.

The use of convenience sampling represents an important limitation of the study, as participation was based on respondents' availability and willingness to participate. Conse-

quently, the sample may be affected by self-selection bias and may overrepresent consumers who are more digitally active or more engaged with online shopping. Furthermore, the geographical concentration of the sample in Athens and Thessaloniki restricts broader national representation and may not fully capture the perceptions of consumers living in other regions of Greece. Therefore, the findings cannot be generalized to the entire population of Greek consumers and should be interpreted as indicative of the surveyed sample. Future research should employ probability-based or stratified sampling methods and include a more geographically diverse sample to improve representativeness and external validity. Although these cities account for a large proportion of Greece's population and e-commerce activity, the exclusion of island and rural regions limits the generalizability of the findings. Delivery conditions in insular and remote areas are often characterized by longer lead times, higher transportation costs and lower delivery frequency. Future studies should incorporate geographically dispersed regions to examine potential differences in service quality perceptions and expectations. Moreover, the questionnaire did not distinguish between domestic and international purchases, nor between standard and express delivery services. Consequently, the reported 3–5 day delivery period should be interpreted as an overall consumer experience rather than as a performance measure of a specific logistics service category. An additional limitation concerns the use of a three-point Likert scale for the measurement of customer perceptions. Although this format simplified the questionnaire and facilitated respondent completion, it may have reduced measurement sensitivity and restricted response variability compared with five- or seven-point scales. Consequently, subtle differences in attitudes and satisfaction levels may not have been fully captured, potentially attenuating the magnitude of observed relationships. Future studies could employ scales with a greater number of response categories to achieve finer discrimination and increased analytical precision.

Furthermore, because the study relied exclusively on self-reported data, the findings may be affected by recall errors and social desirability bias, as respondents' reported experiences and evaluations may not perfectly reflect their actual behaviors and perceptions. In addition, the cross-sectional design of the study limits the ability to establish causal relationships between customer experience, satisfaction and future online shopping intentions, and the observed associations should therefore be interpreted as correlational. Finally, because all variables were collected from the same respondents using a single questionnaire administered at one point in time, the study may be susceptible to common method variance. Although respondent anonymity was assured and different question formats were used to reduce response bias, the potential influence of common method bias cannot be entirely excluded.

Future research could expand the sample to include additional geographical regions and age groups, allowing for broader comparisons across demographic segments. Furthermore, future studies could examine specific logistics providers, product categories, or delivery models, while longitudinal approaches could provide deeper insights into how consumer expectations and satisfaction evolve over time in the rapidly changing e-commerce landscape.

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