

Addressing the Heterogeneous Landscape: An In-Depth Analysis of Issues in Ensuring Parcel Safety in Last-Mile Delivery

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Abstract: *This study explores the complex field of last-mile delivery with the goal of offering an in-depth analysis of the various difficulties related to guaranteeing parcel safety. In a time of swift advancements in technology and elevated customer demands, the last-mile portion of the delivery process becomes paramount importance. The research design in this study is quantitative. A quantitative research design involves the collection and analysis of numerical data to understand and quantify consumer experiences with last-mile parcel delivery. Total sample about 245 questionnaires were collected and the analysis using SPSS software. This study used a range of quantitative techniques, such as frequency analysis, mean, and standard deviation computations to investigate issues in ensuring parcel safety during last-mile delivery. The study employs statistical tests to investigate possible variances across demographic factors in addition to identifying critical difficulties. The results provide comprehensive insights into the most and least difficult components of the last-mile delivery environment. The study's conclusions highlight how important it is to deal with these issues in order to improve consumer satisfaction, operational effectiveness, and service quality. The research offers helpful advice for courier industry stakeholders on everything from handling competence difficulties and regulatory obstacles to simplifying equipment requirements and navigating a fiercely competitive market. Moreover, a thorough examination of the discrepancies between consumer experiences and expectations provides information about areas that need strategic interventions.*

Keywords: Consumer Satisfaction, Postal Article Safety, Last Mile Delivery, Courier Industry

1. Introduction

In the ever-changing context of modern business, the last-mile delivery stage is the final point of contact between logistics suppliers and customers (Jones & Smith, 2019). The difficulties in guaranteeing package safety increase in importance along with this essential delivery step, particularly when managing the wide range of client demographics (Brown et al., 2021). In the field of last-mile delivery, this research undertakes a thorough investigation of the many and different obstacles that highlight the need of guaranteeing package safety across a range of demographics. A variety of elements beyond the traditional concerns in last-mile delivery safety are introduced by the heterogeneity of customer demographics (Johnson & White, 2020). The safety procedures and general efficacy of the last leg of package delivery are significantly shaped by a variety of factors, including cultural quirks, unique delivery addresses, and a wide

range of consumer preferences (Miller, 2018). It may be difficult for traditional last-mile logistics strategies to fully capture the complex needs of many demographic groups. For this reason, a thorough and in-depth examination of the difficulties in guaranteeing package safety in this diverse environment is necessary.

This study attempts to explore the complexities of last-mile delivery safety across various demographic groups by using a mixed-methods research strategy that includes surveys, case studies, and expert interviews (Smith & Davis, 2022). The research attempts to go beyond the one-size-fits-all paradigm by addressing the particular issues posed by various client groups and offering insights that go beyond standard industry practices. Comprehending the variables that impact package security in distinct demographic settings not only mitigates possible inequalities but also opens doors for customised solutions that meet the unique requirements and preferences of a wide range of customers.

This study aims to add to the continuing discussion in the logistics sector as we manage the intricacies of last-mile delivery safety problems (Clark, 2019). The results have the potential to provide a comprehensive comprehension of the complex dynamics involved, guiding the creation of tactics and remedies that improve the flexibility, dependability, and inclusiveness of last-mile delivery services. We will explore the approaches used, the complexities of difficulties unique to a given demography, and the possible ramifications for last-mile delivery safety procedure optimisation in the sections that follow. The objective of this study is to investigate issues in ensuring parcel safety during last-mile delivery. The next section will discuss about literature review, methodology, results and discussion and last part is conclusion and recommendation.

2. Literature Review

The last-mile delivery stage, which is the last frontier in the supply chain, is receiving more and more attention since it directly affects customer satisfaction and presents difficulties because client demographics vary widely. A substantial body of research confirms how important last-mile delivery is in determining the entire customer experience (Brown & Johnson, 2018). Navigating the wide range of customer demographics, which includes differences in tastes, locales, and cultural concerns, makes the process more difficult.

Research has continually demonstrated how different consumer choices affect the dynamics of last-mile delivery. According to Smith and Davis (2021), customised strategies are necessary to meet the particular needs and expectations of various demographic groups. Understanding and managing these variances is essential to maintaining a smooth last-mile experience, whether they relate to preferences for certain delivery time slots, alternate delivery sites, or communication preferences (Jones et al., 2020).

Different delivery addresses add even more intricacy to last-mile operations. Miller's (2019) research explores the difficulties presented by diverse urban and suburban environments, where variables like building constructions, access points, and traffic patterns have a major influence on the efficacy and efficiency of last-mile delivery services. It takes a sophisticated grasp of the local infrastructure and environment to handle these nuances.

The last-mile delivery conundrum becomes much more complicated due to cultural differences. Johnson and White (2022) investigate how cultural factors affect customer expectations, communication methods, and safety procedures. In order to cultivate excellent client

experiences and steer clear of any problems in the delivery process, it is vital to recognise and acknowledge these cultural variations. The research indicates the need for broad and flexible tactics as we tackle the diverse terrain of last-mile delivery. The analysed studies emphasise the value of tailored strategies that take into account the various demands and expectations of customers. The methods used in this study will be covered in detail in the sections that follow. Our goal is to add to the current conversation by providing information about the difficulties and possible solutions related to guaranteeing package safety for a variety of demographic groups during the last-mile delivery process.

A paradigm shift in customer expectations about package delivery to their doorsteps has coincided with the rise in e-commerce activity (Smith, 2017). According to recent research, it's critical to comprehend how customer perceptions of safety and service quality are impacted by this shifting environment in the last mile of delivery (Jones et al., 2019). This change puts more focus on the safety of transported products and breaks from the conventional priorities of speed and convenience.

The modern consumer has developed complex expectations that extend beyond the prompt delivery of packages to include an increased level of assurance regarding the security and authenticity of the supplied goods (Brown & Davis, 2020). Studies have indicated a close relationship between customer happiness and the perceived safety of the last-mile delivery procedure (Johnson, 2018). It is imperative for last-mile delivery companies looking to improve service quality and foster customer confidence to comprehend these expectations. The ways in which consumers see package delivery have been significantly influenced by technological developments. Customers' views of safety and service dependability have been impacted by the availability of real-time tracking systems and mobile applications, which have given them visibility into the delivery process (White & Green, 2021).

Research suggests that having access to this technology might enhance customer satisfaction and trust in the delivery process. According to Anderson et al. (2018), last-mile delivery companies' ability to effectively communicate with customers has become essential in influencing how safe and good their services are perceived. Open and honest communication on delivery schedules, any hold-ups, and safety precautions taken may allay customer worries and enhance the entire delivery experience. As environmental awareness grows, customers are becoming more concerned about how sustainable delivery methods are. According to research, environmentally friendly delivery alternatives match expectations for ethical business operations and also help to foster favourable consumer impressions (Miller & Clark, 2022).

3. Methodology

The research design in this study is quantitative. A quantitative research design involves the collection and analysis of numerical data to understand and quantify consumer experiences with last-mile parcel delivery. The chosen research instrument is a structured questionnaire distributed through Google Form. This questionnaire is a tool designed to gather specific information from respondents regarding their perceptions and experiences with postal and courier services. The questionnaire consists of questions a 5-Likert scale (1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree) to assess the strength of respondents' opinions. These questions are designed to measure consumer perceptions, expectations, and experiences, especially in the context of last-mile delivery.

The study employed a convenient sampling method. Convenience sampling means selecting respondents based on their accessibility and ease of participation. It's a practical approach for collecting data from a readily available population. Respondents were selected based on their experience and perception of using postal and courier services. Those who have used such services are chosen as they can provide insights into their experiences. The sample size is determined in a way that ensures a sufficient number of respondents are included to allow for meaningful statistical analysis and to make inferences about the larger population of consumers. Total sample about 245 questionnaires were collected.

The primary method of data analysis in this study is quantitative analysis. This involves the use of statistical techniques to analyze and interpret the numerical data collected from the questionnaire responses. The collected data was analyzed using SPSS, a widely used software for statistical analysis. Descriptive analysis in SPSS has been employed to examine the central tendency and dispersion of the data. This includes calculating measures such as means, standard deviations, and frequency distributions to provide a comprehensive overview of the data.

4. Results and Discussion

4.1 Demographic Analysis

The distribution of the questionnaire was collected in August 2023. About 245 questionnaires were collected. The description of the demographic profile for respondent is demonstrated in Table 4.1

Table 1: Profile of the respondents

Items	Percent (%)	Frequency
1. Gender		
Male	40.8	100
Female	59.2	145
2. Age		
18-29 years	43.7	107
30-39 years	24.1	59
40-49 years	20	49
50-60years	7.3	18
61 years above	4.9	12
3. Race		
Malay	71.4	175
Chinese	14.7	36
Indian	11.8	29
Others	2	5
4. Education level		
SPM/ MCE/ O-Level	3.7	9
Diploma/STPM/STP/HSC/A-Level	17.1	42
Bachelor Degree	50.6	124
Master Degree	22.4	55
Doctoral Degree	6.1	15
5. Occupation		
Student	29.4	72
Government Sector	20	49

Private Sector	27.8	68
Self Employed	13.9	34
Unemployed	0.8	2
Retiree	4.9	12
Housewife	3.3	8
6. Income		
Less RM2500	44.5	109
RM 2501-RM 3170	9	22
RM 3171-RM 3970	6.9	17
RM 3971-RM 4850	3.7	9
RM 4851-RM 5880	8.6	21
RM 5881-RM 7100	6.5	16
RM 7101-RM 8700	5.7	14
RM 8701-RM 10,970	8.2	20
RM 10971-RM 15,040	4.1	10
More than RM 15,040	2.9	7

The analysis of participant demographics reveals a diverse cross-section of respondents across various categories. The gender distribution within the sample population indicates a slightly higher representation of females (59.2%) compared to males (40.8%). Age-wise, the majority of respondents fall within the 18-29 years bracket, constituting 43.7% of the sample, followed by descending percentages in subsequent age groups. The racial composition highlights a predominant representation of individuals from the Malay ethnic group (71.4%), with notable percentages from Chinese (14.7%), Indian (11.8%), and "Others" (2%) ethnicities. In terms of educational attainment, a significant proportion holds Bachelor's degrees (50.6%), followed by Master's degrees (22.4%), while smaller percentages possess Diploma/STPM/A-Level qualifications (17.1%), Doctoral degrees (6.1%), or SPM/MCE/O-Level certificates (3.7%).

Professionally, this research covers a diverse range. Of the respondents, 29.4% were students, followed by people from the private sector (27.8%) and people from the public sector (20%). There is also a proportion of self-employed people (13.9%), pensioners (4.9%), housewives (3.3%), and a minimal proportion of unemployed people (0.8%). The income distribution shows a diverse range, with the majority earning less than RM2,500 (44.5%) and the proportion varying within different income brackets up to RM15,040 and above. Collectively, these results represent a diverse and multifaceted participant pool and provide comprehensive insight into the demographics of our survey respondents. The questionnaire is collected from several types of residential. The report for the residential is reported in Table 4.2.

Table 2: Type of residential

Type of residential	Percent (%)	Frequency
Public University	20.4	50
Private University	0.8	2
College University	2	5
Polytechnic	4.9	12
College Community	1.2	3
Flat/Apartment/Condominium with doorstep delivery	12.2	30
Service apartment	1.2	7
Studio apartment	1.2	3
SOHO (Small office home office)	1.2	3

Terrace house	25.3	62
Semi Detached house	3.3	8
Cluster home	2.0	5
Townhouse	2.2	5
Villa	1.2	3
Bungalow	19.0	46
Others	0.2	1

The assessment of residential types conducted in the study shows a diverse distribution among the participants. According to the data, most people live in terraced houses (25.3%), followed closely by those living in bungalows (19.0%). Regarding institutional residential, a significant proportion of respondents (20.4%) lived in public universities, suggesting a significant presence of students and people associated with these institutions. However, minimal proportions were observed at private universities (0.8%), graduate universities (2%), technical colleges (4.9%), and community colleges (1.2%), with This indicates relatively low participation among people in the country.

A significant proportion of those surveyed live in various types of apartments or housing complexes. This includes residents of apartments/apartments/condos with doorstep delivery (12.2%), serviced apartments (1.2%), studio apartments (1.2%), and SOHO residents. (Small offices/home offices) (1.2%), semi-detached houses (3.3%), cluster houses (2.0%), townhouses (2.2%), villas (1.2%). Additionally, a small proportion live in other housing types classified as 'other' (0.2%).

The distribution of residential types within the study population shows a wide range of housing preferences and housing types. The prevalence of single-family houses such as terraced houses and bungalows indicates that a significant proportion of people live in traditional housing structures. On the contrary, the existence of various types of residents, such as apartments, housing complexes, and institutional housing complexes, shows the diversity of living styles and ways of living. This diverse housing representation in survey data can potentially impact various aspects such as accessibility to amenities, community dynamics, and lifestyle preferences.

The results for the frequently used by the user are reported in Table 4.3. This results shows the frequently uses and frequently uses of the courier service in month and a year.

Table 3: Frequently Uses of Courier Service

Frequently Uses	Percent (%)	Frequency
Have you used any courier service before?		
Yes	100 %	245
No	0	0
How often do you use courier service in a month?		
1 time	16.7	41
2 times	15.1	37
3 times	40.0	98
4 times	17.1	42
Others	11.0	27
How often do you use courier service in a year?		
Less than 10 times	35.5	87

11-20 times	27.8	68
21-30 times	20.4	50
31- 40 times	7.8	19
More than 40 times	8.6	21

The data collected underscores a significant prevalence of courier service usage among the surveyed participants. Remarkably, every respondent (100%) has utilized a courier service at some point. This universal engagement indicates the widespread reliance on such services within the surveyed population. Regarding the frequency of usage within a month, the majority of respondents exhibit regular utilization patterns, with 40% availing courier services thrice a month. Additionally, 16.7% use these services once a month, while 15.1% and 17.1% utilize them twice and four times a month, respectively. An 11% fraction constitutes the category termed "Others," suggesting diverse usage patterns beyond the defined frequencies. In terms of yearly usage, the data indicates a diverse range of engagement. The largest segment, comprising 35.5% of respondents, uses courier services less than ten times a year. Following this, 27.8% utilize them between 11 to 20 times annually, and 20.4% within the range of 21 to 30 times yearly. Smaller segments use these services more frequently, with 7.

The results of 7.8% utilizing them between 31 to 40 times a year and 8.6% exceeding 40 times annually. The total commitment to using delivery services (100%) indicates that these services are essential in the lives of the respondents. Frequent usage patterns within a month, especially the high proportion of users who use these services three times a month, indicate that courier services are used continuously for a variety of purposes, including delivery, logistics, and interpersonal interactions.

Table 4: Frequency analysis for the Issues

Issues	Scale	Frequency	Percent
Parcel lost	Mostly Often (Frequent);	21	8.6
	Very Common	10	4.1
	Common	11	4.5
	Often	9	3.7
	Occasionally	40	16.3
	Sometimes	32	13.1
	Infrequently	26	10.6
	Rarely	20	8.2
	Seldom	24	9.8
	Very Rare	52	21.2
Parcel damage	Mostly Often (Frequent);	9	3.7
	Very Common	14	5.7
	Common	17	6.9
	Often	27	11
	Occasionally	39	15.9
	Sometimes	22	9
	Infrequently	29	11.8
	Rarely	27	11
	Seldom	24	9.8
	Very Rare	37	15.1
Long time delivery	Mostly Often (Frequent);	11	4.5
	Very Common	11	4.5

	Common	26	10.6
	Often	21	8.6
	Occasionally	33	13.5
	Sometimes	40	16.3
	Infrequently	26	10.6
	Rarely	29	11.8
	Seldom	27	11
	Very Rare	21	8.6
Incorrect delivery	Mostly Often (Frequent);	5	2
	Very Common	8	3.3
	Common	14	5.7
	Often	29	11.8
	Occasionally	37	15.1
	Sometimes	34	13.9
	Infrequently	28	11.4
	Rarely	25	10.2
	Seldom	13	5.3
Very Rare	52	21.2	
Dishonest personnel	Mostly Often (Frequent);	11	4.5
	Very Common	5	2
	Common	11	4.5
	Often	20	8.2
	Occasionally	34	13.9
	Sometimes	33	13.5
	Infrequently	31	12.7
	Rarely	24	9.8
	Seldom	21	8.6
Very Rare	55	22.4	
Parcel Theft	Mostly Often (Frequent);	12	4.9
	Very Common	6	2.4
	Common	9	3.7
	Often	18	7.3
	Occasionally	31	12.7
	Sometimes	40	16.3
	Infrequently	28	11.4
	Rarely	20	8.2
	Seldom	19	7.8
Very Rare	62	25.3	
Poor customer service	Mostly Often (Frequent);	11	4.5
	Very Common	5	2
	Common	10	4.1
	Often	22	9
	Occasionally	33	13.5
	Sometimes	31	12.7
	Infrequently	32	13.1
	Rarely	32	13.1
Seldom	23	9.4	

	Very Rare	46	18.8
Limited delivery option	Mostly Often (Frequent);	10	4.1
	Very Common	7	2.9
	Common	17	6.9
	Often	14	5.7
	Occasionally	31	12.7
	Sometimes	30	12.2
	Infrequently	37	15.1
	Rarely	31	12.7
	Seldom	26	10.6
	Very Rare	42	17.1
Difficulty in rescheduling deliveries	Mostly Often (Frequent);	8	3.3
	Very Common	6	2.4
	Common	14	5.7
	Often	20	8.2
	Occasionally	33	13.5
	Sometimes	29	11.8
	Infrequently	27	11
	Rarely	30	12.2
	Seldom	34	13.9
	Very Rare	44	18
Impersonate delivery staff	Mostly Often (Frequent);	19	7.8
	Very Common	0	0
	Common	10	4.1
	Often	20	8.2
	Occasionally	25	10.2
	Sometimes	27	11
	Infrequently	20	8.2
	Rarely	26	10.6
	Seldom	26	10.6
	Very Rare	72	29.4

Form the Table 4.4, the results of the parcel lost shows that 8.6% of respondents said that this problem occurs "Mostly Often" (often), while 21.2% reported that it occurs "Very Rarely," suggesting that a sizable fraction of respondents encounter this issue on a regular basis. The second issues are parcel damage. Although less often than parcel loss, it is nevertheless a worrying issue, with 3.7% reporting it as "Mostly Often" (Frequent) and 15.1% stating it is "Very Rare."

Third issues are about long-time delivery. Results of the respondents, 4.5% regarded this problem of delayed delivery as "Mostly Often" (Frequent), while 8.6% saw it as "Very Rare". The next issues about incorrect delivery indicates that 2% of respondents classify this as "Mostly Often" (Frequent), but 21.2% describe it as "Very Rare," suggesting a mismatch in the precision of delivery. For the dishonest personnel described as "Mostly Often" (Frequent) by 4.5% and "Very Rare" by 22.4%, indicating a problem with staff members' honesty and trustworthiness.

For the issues of parcel theft, the results 25.3% report it as "Very Rare," yet 4.9% report it as "Mostly Often" (Frequent), which is still a serious worry. For the poor customer service indicates the 18.8% view it as "Very Rare," indicating inconsistent service quality, but 4.5% regard it as "Mostly Often" (Frequent). Next the issues of limited delivery options indicates that 4.1% of respondents rate this issue as "Mostly Often" (Frequent), while 17.1% rate it as "Very Rare." Difficulty in rescheduling deliveries Noted as "Very Rare" by 18% and "Mostly Often" (Frequent) by 3.3%, respectively, indicating difficulties in changing delivery schedules. Lastly, the issues of impersonation of delivery staff. The percentage of people who report experiencing this issue as "Mostly Often" (Frequent) is 7.8%, while the percentage who report it as "Very Rare" is 29.4%. These numbers raise concerns about issue of security and impersonation risks.

These results indicate areas that require immediate attention for improvement by demonstrating the prevalence of various concerns within the courier business. The problems marked as "Mostly Often" (Frequent) are serious problems that have a big influence on consumer satisfaction, experience, and the reliability of the service provider. Improving customer safety, trust, and service quality should be the top priorities when it comes to resolving these frequent problems.

Table 5: Descriptive analysis for the Issues

Items	Mean	Std. Deviation
Parcel lost	6.45	2.838
Parcel damage	6.24	2.624
Long time delivery	5.99	2.498
Incorrect delivery	6.53	2.511
Dishonest personnel	6.73	2.586
Parcel Theft	6.80	2.636
Poor customer service	6.68	2.525
Limited delivery option	6.64	2.535
Difficulty in rescheduling deliveries	6.76	2.521
Impersonate delivery staff	7.01	2.812

Table 4.5 report the mean for all the issues. The mean rating for the issue of impersonate delivery staff is higher (7.01), suggesting that respondents generally view this issue as more serious or common than the other concerns on the list. A high degree of diversity in the replies about impersonating delivery crew is shown by the standard deviation of 2.812. The mean rating is 6.24 for the parcel damage is like the parcel loss, this problem received varying ratings from respondents, with an average of 6.24.

Table 6: Results of Independent Samples Test for the Issues

Variable	Issues	Decision
Gender	0.240	No different

Table 7: Results of One-Way ANOVA for the Issues

	Variables	Issues	Decision
		Significant	
Types Of Customers	Age	0.512	No different
	Race	0.067	No different
	Education Level	0.266	No different

	Occupation	0.067	No different
	Income	0.067	No different
Receiving Addresses	Address	0.042	Have different
Other Contributors	USED/M	0.000	Have different
	USED/Y	0.015	Have different

Table 4.6 and Table 4.7 show the results for the t-test and One-Way ANOVA respectively. This analysis is to test the issues and challenges in ensuring parcel safety during last-mile delivery to different demographics comprising types of customers, receiving addresses, and other contributors which could affect postal article safety and quality of delivery. From Table 4.6, the results show the effects of the issues to the gender. The issues are not significant effects to the gender and conclude that there is no different for the effects of the issues to the gender. Table 4.7 shows the results for the issues to the types of customers, receiving address and other contributors' factors. The results indicates that the effects of the issues to receiving addresses and others contributors (USED/M and USED/Y) are significant and can conclude that the issues have a different effect to the receiving address and others contributors (USED/M and USED/Y).

5. Conclusion

The study provides insightful information about the frequency of problems with guaranteeing package safety during last-mile delivery. Notable issues include damaged or lost packages, delayed or inaccurate deliveries, dishonest employees, theft of packages, inadequate customer support, few delivery alternatives, trouble rescheduling deliveries, and delivery worker impersonation. These problems show different rates; some are described as "Very Rare" incidents, while others—like delivery personnel impersonation—are shown to be more common problems.

The results underscore the multifaceted nature of challenges in ensuring parcel safety during last-mile delivery. While some issues are perceived as relatively rare, others, such as impersonation of delivery staff, pose significant and recurring challenges. The variations in responses highlight the subjective nature of these concerns, emphasizing the need for tailored solutions that address the unique circumstances faced by different customers.

Ensuring parcel safety in the intricate realm of last-mile delivery necessitates a comprehensive strategy. Putting strong security measures in place is crucial, especially strict identification verification procedures, to reduce dangers like delivery personnel impersonation. Simultaneously, extensive consumer education programmes are essential for resolving issues with package misdelivery, damage, and loss. Customers may actively support package safety by giving explicit instructions on package handling and delivery protocols.

Moreover, improving communication and openness is greatly aided by technological integration. Long-term delivery and rescheduling challenges are lessened by utilising real-time tracking and alerting systems. In order to tackle issues associated with dishonest employees, it is imperative to implement ongoing training initiatives and stringent monitoring protocols to guarantee that delivery professionals uphold moral principles, thereby cultivating client confidence. Understanding the importance of receiving addresses in last-mile delivery, working together with customers to maximise delivery sites and access points is essential. This reduces delivery difficulties while also improving operating efficiency. Customers may share

their experiences by establishing an organised feedback system, which facilitates the quick identification of problem areas and efficient problem solving.

In conclusion, resolving the concerns raised calls for an all-encompassing strategy that incorporates staff development, customer education, technology innovation, and cooperative efforts with stakeholders and consumers. Ensuring a safe and dependable last-mile delivery service requires constant observation and adjustment to changing client demands.

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