



## The Impact of Logistics Service Quality in Online Food Delivery Applications (OFDAs) on the Satisfaction of Student Consumers in Ho Chi Minh City

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### Keywords:

### ABSTRACT

Logistics service quality  
Online food delivery applications  
Satisfaction  
Student consumers

The paper investigates the factors constituting logistics services quality in Online food delivery applications and the satisfaction of student consumers in Ho Chi Minh City, Vietnam in order to pinpoint areas for improvement and allocate resources effectively. Particularly, the factors Discrepancy Handling, Delivery Cost, Information Quality, Delivery Time, Delivery Reliability and Personnel Contact are identified as components of logistics service. The final results demonstrate that all six variables are significant antecedents to Customer Satisfaction.

### 1. Introduction

The online food delivery system in Vietnam, led by applications such as Shopee Food, Grab Food, and Go Food, has developed particularly strongly during the COVID-19 lockdown period. Industry revenue is projected to reach USD 3.7 billion by 2028, with an expected annual growth rate (CAGR 2024-2028) of 11.78% [1], indicating that the growth trend will continue even in the post-pandemic era with new entrants like Xanh SM Ngon. With this potential, logistics services have become an important area of research, playing a key role in influencing customer satisfaction. However, current theories often focus on abstract factors such as perceived value or trust, without fully reflecting the impact of logistics services. Meanwhile, the quality of logistics services plays a crucial role as a tangible factor directly affecting the consumer experience from ordering to receiving food.

Recent studies in neighboring countries have explored aspects of online-food-delivery services. In Thailand, [2] found that logistics service quality,

including timeliness, delivery operations, and information accuracy, had a direct positive effect on customer satisfaction and loyalty in food delivery applications. Similarly, in Malaysia, [3] found that perceived usefulness and ease of use significantly affect students' satisfaction with online food delivery. However, few studies in Vietnam have focused on the logistics service component itself, particularly in the post-pandemic context where delivery speed, reliability, and tracking accuracy have become key determinants of customer satisfaction.

This study aims to examine specific aspects of logistics services that affect the satisfaction of students, the primary customer group of online food delivery applications, thanks to their preference for technology and utility apps. By exploring in depth their preferences and needs, businesses can improve services and thereby create competitive advantages, especially in Ho Chi Minh City, where a large number of students are concentrated. In addition, the study contributes to the body of knowledge on e-

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commerce and customer satisfaction, providing valuable insights into this market segment.

## 2. Literature review

### 2.1. Online Food Delivery Application (OFDA)

[4] Had identified two types of Online Food Delivery Services, dubbed as “single two-sided” and “dyadic two-sided”. In the former, businesses directly prepare the meal and deliver to customers, whereas in the latter, the platform serves as a mediator between businesses and crowd-sourced shippers, and businesses and customers. Online Food Delivery platforms provide services regarding restaurant hygiene monitoring, real-time order tracking, and payment, rather than making and shipping food using in-house operations [5]. Given that smartphone software almost exclusively acts as the interface between the platform and consumers, the service has largely become known as “Online Food Delivery Applications”.

It is undeniable that logistics also plays an underlying role in connecting stakeholders and satisfying the distribution of orders [6]. OFDA logistics are the last-mile logistics managing the life cycle of a food order. As [7] highlight, the core functionality includes multiple operational processes that ensure orders are received, processed, and delivered from restaurants to customers efficiently and reliably. [8] Further emphasize the need for effective coordination among consumers, food service providers, and delivery personnel, ensuring a seamless transition from order placement to delivery.

### 2.2. Logistics service quality

The use of logistics services within OFDAs is a pivotal element that has revolutionized how consumers engage with food services. [9] Has found that logistics services in OFDAs form the essential infrastructure, facilitating a variety of processes that extend from the point of order reception to the final delivery. Logistics services are confined to not only transportation but also sophisticated management tools to guarantee that food is delivered on time, efficiently and securely.

It is notable that quality is a fundamental component of logistics services. [10] Highlights the importance of logistics service quality in meeting and surpassing customer expectations and adhering to the standards of delivery. Talking about specific aspects of logistics quality, [11] define several critical dimensions that impact customer's experiences significantly. These encompass the food's consistency and condition upon delivery, the

precision and punctuality of the service, cost-effectiveness, and the availability of proficient customer support, including feedback and refund processes.

According to [12], the responsibilities of logistics within OFDAs are comprehensive. These services not only ensure the delivery of food but are also linked to customer contentment and loyalty. And as a result, they play a determinative role in shaping a restaurant's reputation within a market that is becoming increasingly competitive.

### 2.3. Customer Satisfaction

Customer happiness has consistently been one of the leading measures for a flourishing company, and there are several ways to define it [13]. According to [14], customer satisfaction evaluates the whole purchasing and using experience of a particular product or service over a period of time. Customer satisfaction is how customers rate continuing productivity and effectiveness of businesses [15].

[16] Showed that client satisfaction is directly correlated with service quality. [17] Also documented that service quality and customer satisfaction are closely linked. Increased service quality may elicit an increased level of customer satisfaction [18]. Previous studies have commonly measured Customer Satisfaction using the National Customer Satisfaction Index and Service Quality (SERVQUAL) methods [19]. These factors involve expectations of performance, actual perceived performance, and the perceived value of the services. The outcomes of customer satisfaction are often reflected in their behaviors like loyalty or their feedback [20]. Although SERVQUAL is one of the most widely used methods, it is not a universal measure and must be tailored to adapt to the service context [21], especially the logistics aspect.

### 2.4. Customer Satisfaction in OFDAs

In terms of OFDAs, Customer Satisfaction is the whole experience of a customer, depending on several elements, including Food availability, Ratings, Payment options, and Human interaction [22]. According to [23], to survive in the increasingly competitive OFD services market, organizations must prioritize customer happiness and rank key criteria that impact it. There are multiple criteria determining customer satisfaction in OFDAs. [24] showed that Reliability, Maintenance of meal quality and hygiene, Assurance, Security, and System operation can affect customer satisfaction. Moreover,

customer service also has a strong influence on the satisfaction of customers [25].

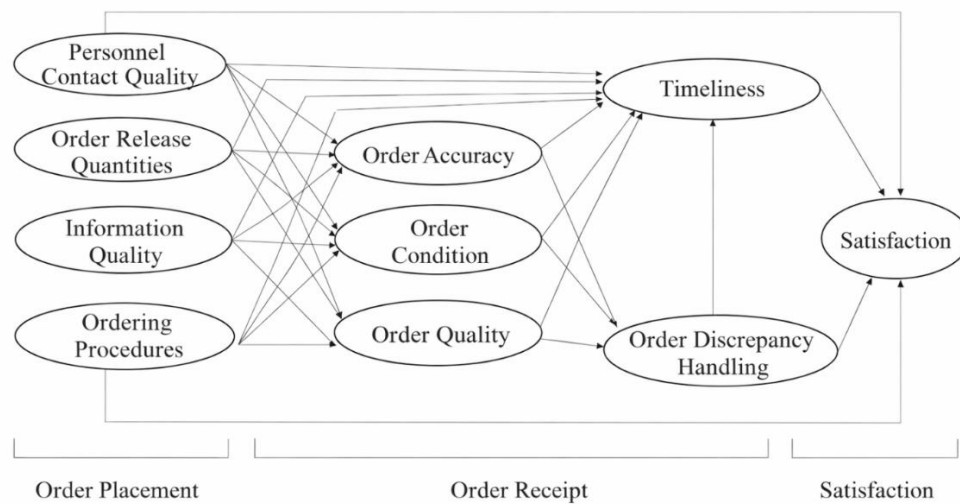
## 2.5. Theoretical framework

Based on previous models, logistics service quality has been broken down into several key variables:

The measurement of logistics service quality in past models has shown in widely recognized theoretical frameworks including the SERVQUAL model [26] and the LSQ model by [27]. The SERVQUAL model provides a good foundation for assessing service quality across many industries. It puts a focus mostly on 5 primary dimensions: tangibles, reliability, responsiveness, assurance, and

empathy [26]. Although this model was at first designed for general service industries, its scope on Total quality management principles has allowed many researchers to adapt it to logistics.

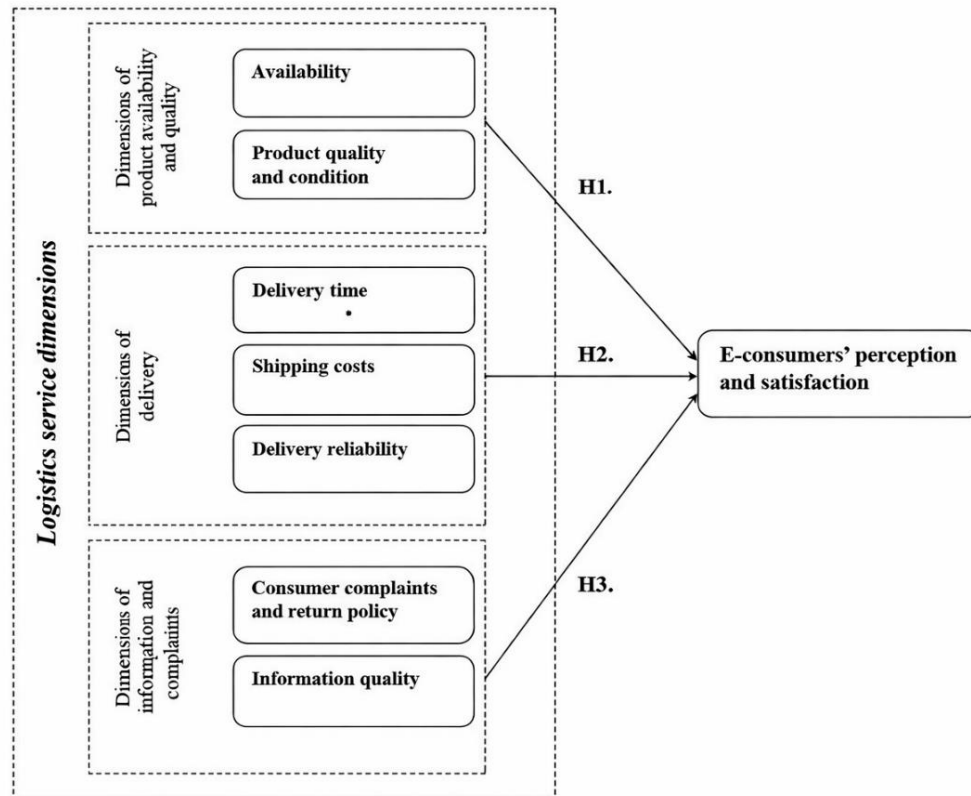
The logistics service quality model (LSQ) which was proposed by [27] customized service quality evaluation specifically to logistic services (Figure 1). On the one hand, SERVQUAL is broadly functional and customer-centric while on the other hand, the LSQ model emphasizes operational aspects of logistics service quality by focusing on dimensions like timeliness, order accuracy, Information Quality and personnel availability as well. Together, these dimensions make the LSQ model a more specialized tool for measuring logistics service quality.



**Figure 1.** The LSQ model.

Empirical research has also refined the components of LSQ for specific markets. [28] identified additional factors such as shipping costs, reverse logistics, payment method and product condition. Similarly, [29] identified the components of quality logistics services including (i) Product availability and quality, (ii) Delivery, (iii) Information

and complaints (Figure 2). [9] Integrated the previously studied models of LSQ and SERVQUAL, with the distinctive considerations of online platforms and fresh food e-commerce. The outcome is a comprehensive evaluation system of five key dimensions: Personnel Contact, Delivery, Information, Timeliness, and Empathy.



**Figure 2.** Research framework of [29].

Despite the extensive body of research on logistics service quality, there are still significant gaps remaining in the measurement and perception of logistics service quality, especially in sectors like e-commerce and fresh food:

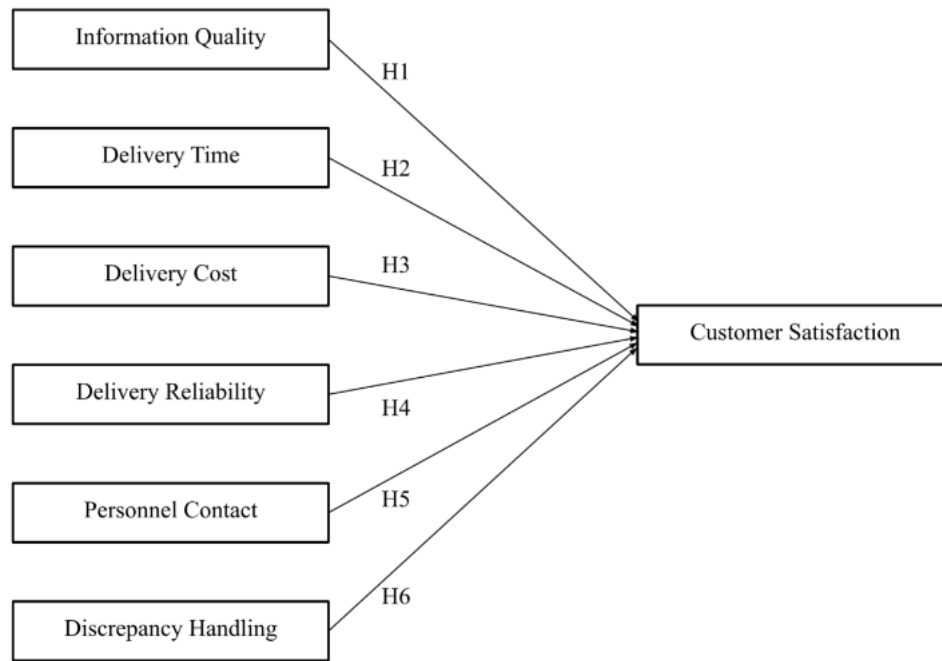
Firstly, earlier studies have predominantly focused on general logistics service quality within broader industries, such as manufacturing and e-commerce, without paying adequate attention to sector-specific challenges like the OFDA domain still being underexplored. While models like SERVQUAL and LSQ have provided robust foundations, their lack of customization for specific markets and consumer behaviors, such as those seen in OFDAs in developing regions like Vietnam, limits their applicability in these contexts like Vietnam.

Another major gap lies in the lack of empirical exploration of emerging logistics service variables that are increasingly critical in modern days. On one hand, traditional frameworks emphasize operational

factors like timeliness and order accuracy and on the other hand we have newer studies such as [28], have begun to explore additional facets like reverse logistics and payment method diversity, especially in the e-commerce industry. However, these insights remain fragmented and are rarely integrated into a linked framework tailored to sectors with high complexity in logistics such as OFDAs. Additionally, factors like Discrepancy Handling and Personnel Contact still remain under-researched in empirical studies.

## 2.6. Research hypotheses

Referencing the research on customer satisfaction done by [9], [28], [29] and the theoretical models of SERVQUAL and LSQ, this study aims to construct a scale and framework of customer satisfaction with logistics services in OFDAs (Figure 3).



**Figure 3.** Proposed research framework

#### 2.6.1. Information Quality

Information Quality refers to the perceived value that information provided brings to customers, which has been regularly identified as an important antecedent of customer satisfaction [9], [27], [28], [29]. Access to information regarding food features, price, and reviews enables customers to compare products before purchasing [30]. This appears to also hold true for the student demographic, whose purchasing choice is largely dictated by price [31]. In prior research on e-service, information provision was typically measured through content and content quality [32]. Hence, the authors proposed:

*H1: There is a positive relationship between Information Quality and Customer Satisfaction.*

#### 2.6.2. Delivery Time

Delivery Time refers to the period of time joining order placement and receipt [33]. Previous research has highlighted Delivery Time as a meaningful antecedent to customer satisfaction [9], [25], [27], [28], [29]. In contrast, a delay in delivery could negatively affect customer perception of reliability and thereby diminish demand [34] and incentivize switching platforms [35]. Hence, the authors proposed:

*H2: There is a positive relationship between the Delivery Time and Customer Satisfaction.*

#### 2.6.3. Delivery Cost

Delivery Cost is one of the main aspects in online retail for consumers and sellers. Delivery Cost

structures affect the frequency and scale of consumer purchases, which in turn affects customer acquisition and retention [36]. Previous studies have also demonstrated that fast-food service pricing holds substantial importance, sometimes even more so than the quality of the services provided [28], [29]. For students, the “free shipping” program may eliminate financial obligations associated with tuition. Building on the findings of [37], the study suggests that various incentives like free shipping, tiered discounts, and vouchers can significantly influence customer behaviors. Hence, the authors proposed:

*H3: There is a positive relationship between the Delivery Cost and Customer Satisfaction.*

#### 2.6.4. Delivery Reliability

Delivery Reliability is one of key factors driving customer satisfaction in the realm of OFDAs [9], [29]. This involves the condition, taste, and accuracy of orders [24], [38], [39]. [29] Also emphasized that delivering products without damage is crucial to avoiding negative customer reactions. In the context of Vietnam, [40] in Ho Chi Minh City identified food quality and order accuracy as primary factors for student satisfaction, while [25] added that well-preserved items upon delivery significantly elevate customer satisfaction and perception in Southern Vietnam. Hence, the authors proposed:

*H4: There is a positive relationship between Delivery Reliability and Customer Satisfaction.*

#### 2.6.5. Personnel Contact

Personnel Contact refers to engagement with couriers upon delivery of products, or meals in the OFDA context, playing a crucial part in producing customer satisfaction [9], [27]. Customers are more likely to view the OFDA service provider favorably when deliverymen can behave respectfully and offer a pleasant attitude [41]. In contrast, an unprofessional manner could lead to customer dissatisfaction, and discourage them from continuing using the service [42]. In the context of Vietnam, OFDA enterprises should put an emphasis on developing their systems of delivery courier services to ensure customer satisfaction [40]. Hence, the authors proposed:

*H5: There is a positive relationship between Personnel Contact and Customer Satisfaction.*

#### 2.6.6. Discrepancy Handling

Discrepancy Handling refers to the customer service process of claims handling and adjustments [27], [29]. Since customers may face various issues pre- and post-purchase, they require that support be timely and helpful. On e-commerce platforms, these claims are often handled through a reverse logistics process, traditionally measured via ease-of-use and performance of service [28], [43]. In the context of Vietnam, when food orders are inaccurately prepared, the customers are empowered to submit complaints and negotiate compensation with the seller e.g. refund, discount. Hence, the authors proposed:

*H6: There is a positive relationship between Discrepancy Handling and Customer Satisfaction.*

### 3. Research methodology

#### 3.1. Research process

In the first step of the research process, the topic, aims, objects, and scope of the study are determined. In order to measure the impact of logistics service quality on customer satisfaction towards OFDA services, the authors employed the quantitative research method, conducting multiple linear regression (MLR) analysis. To design the questionnaire and measurement scale, the authors used a qualitative research method combining literature review and focus group to tailor questionnaire items to the research subjects. The resultant questionnaire is subsequently distributed to gather primary data for in-depth analysis using the IBM SPSS 27.0 software.

#### 3.2. Measurement scale

The authors conducted a thorough literature review of prior literature's measurement scales [9], [28], [29], [35], [43]. In particular, recurring themes and items were identified, with the specific requirement of possessing a Cronbach's Alpha index >0,8 to ensure their validity.

In addition, a focus group was held comprising 10 participants from the research subject demographic, who were second-and-third-year university undergraduate students in HCMC who had experience using OFDAs of >1 time per month. The purpose of the focus group is to explore themes and adapt the set of variables. The use of focus groups in guiding generation of questionnaire items has long been supported by previous research [44], and the reliability of identified constructs shall be tested in the data analysis phase. The authors employed open and exploratory questions to gauge the factors which customers are seeking for in their choice of OFDA. The questions and insights from the focus group session are summarized in Table 1 below.

**Table 1.** Qualitative research questions and derived insights.

| No. | Exploratory questions                                                                                                        | Key insights                                                                                                                                                                                                             |
|-----|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | When using OFDA, what kind of information do you usually check or expect to receive?                                         | Students are a technologically literate demographic and are aware of the information sources available to them. Participants reported reviews, pictures and ingredient information are crucial in their decision making. |
| 2   | How important is delivery speed to you as a student? Has there been any situation where delivery time made you dissatisfied? | Students face restricted time budgets and some often have to commute several times throughout the day, requiring accurate time estimates and appropriate delivery speed to meet the tight time windows.                  |
| 3   | How does cost influence your usage of OFDA as a student?<br>When using OFDA, what aspects of cost do you look for?           | Cost is consistently considered one of the most pivotal elements for participants satisfaction. When using OFDA, they tend to seek promotions and combo deals to reduce the price.                                       |

|   |                                                                                                                                   |                                                                                                                                                                                                                                                                                     |
|---|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                                                                                                                                   | Especially, as students tend to order in groups to save costs, it is crucial that additional charges are not incurred with additional quantities.<br>Moreover, having automatically refreshed coupons or discounts without having to spend effort drives satisfaction towards cost. |
| 4 | Have you ever experienced loss of integrity of the delivered order?<br>How important is it that orders maintain their conditions? | Participants regarded reliability highly. As students, they operate on limited time and financial budget, thus restoring food to original condition (e.g. reheating, recooking) or replacing the order are impractical options.                                                     |
| 5 | How important is the interaction with delivery personnel to your satisfaction as a student?                                       | Some student participants who travel several times in a day require fast contact with delivery staff for unique circumstances (e.g., ensuring time-sensitive deliveries between classes or updating delivery instructions).                                                         |
| 6 | Have you ever experienced a wrongly delivered order?<br>How do you expect the OFDA company to deal with it?                       | Participants reported encountering discrepancy in approximately $\frac{1}{8}$ of all orders. Unless an apt solution is promptly provided, their enjoyment plummets significantly.                                                                                                   |

After discussing the focus group's outcomes, the authors have decided on the final set of variables, adapting certain new items to more accurately reflect student customer preferences. For Information Quality, the chosen variables reflect a need for complete and credible information of the tech-savvy and skeptical student consumers. Next, Delivery Time and Delivery Cost items focus on the time-saving and cost-saving aspects of OFDAs, with particular attention to the technological interfaces that students are more adept at navigating, eg. order time estimates, discount coupons, charge breakdowns. Delivery Reliability emphasizes the maintenance of original condition to avoid reorders. Moreover, Personnel Contact items underlies a

smooth customer experience, especially regarding communication with delivery personnel. Finally, Discrepancy Handling focuses on restoring customer satisfaction or stemming dissatisfaction through due to mistakes and errors that purportedly happens relatively often.

The above decisions are reflected in the final variable set, viewable in Table 2. Questionnaire items are rated on a 5-point Likert scale. The options included for selection are arranged as follows: 1 – Strongly disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly agree. “\*” denotes inverse questions used for attention check in each independent variable group.

**Table 2.** Measurement scale of logistics service quality and customer satisfaction.

| Code | Item                                                                              | Reference              |
|------|-----------------------------------------------------------------------------------|------------------------|
| IQ   | Information Quality                                                               |                        |
| IQ1  | I can easily find information about the food                                      |                        |
| IQ2  | I am provided with full information about the food                                |                        |
| IQ3  | I can effortlessly find reviews on the food quality from past customers.          | [9], [28], [29],       |
| IQ4  | I am provided with suggestions about similar food when my options are unavailable | [43]                   |
| *    | I find it difficult to find information about the food                            |                        |
| DT   | Delivery Time                                                                     |                        |
| DT1  | The delivery time after placing the order is short                                |                        |
| DT2  | The delivery time is as expected on the app.                                      | [9], [28], [29],       |
| DT3  | I can receive my order at the earliest time in case the delivery is delayed       | [35], [43]             |
| DT4  | I can save time by ordering food online                                           |                        |
| *    | The order is delivered later than the expected time on the app                    |                        |
| DC   | Delivery Cost                                                                     |                        |
| DC1  | I am not charged of additional hidden costs (e.g. parking or insurance fee)       | [28], [29]             |
| DC2  | I am not charged of increasing costs when increasing order quantities             | Authors self-developed |
| DC3  | I am provided with codes and vouchers of satisfactory discounts                   | [28], [43]             |

|     |                                                                                                                                                                             |                          |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| DC4 | My discount codes and vouchers are automatically updated                                                                                                                    | Authors self-developed   |
| *   | I have to pay supplementary fees for large order sizes                                                                                                                      |                          |
| DR  | Delivery Reliability                                                                                                                                                        |                          |
| DR1 | The delivered food is provided with adequate protection                                                                                                                     | [28], [29], [35]         |
| DR2 | The delivered food is seldom damaged (e.g. spilled or overflown)                                                                                                            |                          |
| DR3 | The delivered food maintains its original quality (e.g. temperature or freshness)                                                                                           | Authors adapted from [9] |
| DR4 | The food is delivered to the correct selected location                                                                                                                      | [9]                      |
| *   | The delivered food often loses heat and/or receives damage                                                                                                                  |                          |
| PC  | Personnel Contact                                                                                                                                                           |                          |
| PC1 | The delivery staff interacts with me in a polite and respectful manner.                                                                                                     |                          |
| PC2 | The delivery staff is attentive to my service requirements (e.g. door-to-door delivery requirements)                                                                        | [9], [28], [43]          |
| PC3 | I can directly contact the delivery staff through multiple methods                                                                                                          | Authors self-developed   |
| PC4 | I receive quick response from the delivery staff                                                                                                                            |                          |
| *   | The delivery staff has a poor customer service attitude                                                                                                                     |                          |
| DH  | Discrepancy Handling                                                                                                                                                        |                          |
| DH1 | I can easily report it in case the delivered food does not meet the specified ordering criteria                                                                             |                          |
| DH2 | I am quickly provided with solutions in case the delivered food does not meet the specified ordering criteria                                                               | [9], [28], [35], [43]    |
| DH3 | The service provider expends effort to offer me solutions in case a problem arises                                                                                          |                          |
| DH4 | I am provided with satisfactory solutions in case the delivered food does not meet the specified ordering criteria (e.g. refunding or offering vouchers for the next order) |                          |
| *   | I am not offered adequate solutions in the case of mismatched orders                                                                                                        |                          |
| CS  | Customer Satisfaction                                                                                                                                                       |                          |
| CS1 | I enjoy online ordering through this app                                                                                                                                    |                          |
| CS2 | This app completely meets my expectations                                                                                                                                   |                          |
| CS3 | I am impressed with the services provided by this app                                                                                                                       | [9], [28], [29], [35]    |
| CS4 | I believe that this app provides services in accordance with promised conditions                                                                                            |                          |
| CS5 | I would recommend this app to other consumers                                                                                                                               |                          |
| CS6 | I would like other apps to match the quality of the one I am using                                                                                                          |                          |

The added items (specifically under Delivery Cost, Delivery Reliability and Personnel Contact) were to fill critical gaps identified in existing literature and the qualitative focus group and to ensure the research framework's applicability to the unique context of OFDAs in HCMC.

#### (i) Delivery Cost

The item DC2 "I am not charged of increasing costs when increasing order quantities" was introduced to address a cost-related nuance pertinent to students' consumption behaviors. Students often have a highly price-sensitive financial profile, and an unexpected increase in delivery fees for larger orders could deter loyal usage of the platform [45]. While existing research acknowledges Delivery Cost as a factor of satisfaction, this specific variable fills a gap in contextualizing how cost

structures directly influence students, particularly those ordering in groups or for family consumption.

Similarly, DC4 "My codes and vouchers are automatically updated" was added due to convenience-related needs unique to app-based interactions. Delivery platforms in developing regions are heavily reliant on promotions, and consumers tend to favor services that streamline the application of discounts without manual intervention [46].

#### (ii) Delivery Reliability

The variable DR3 "The delivered food maintains its original quality (e.g. temperature or freshness)" was adapted from [9], but its addition was necessitated due to evolving consumer demands concerning the quality of perishable goods such as food items. In HCMC's high-temperature climate, maintaining food freshness and proper temperature



during delivery is particularly critical for satisfaction [25].

(iii) Personnel Contact

The variable PC3 "I can directly contact the delivery staff through multiple methods" fills a critical gap in understanding engagement touchpoints between consumers and personnel. Given the widespread usage of multi-channel communication tools like Zalo and Facebook in Vietnam, enabling direct contact avenues has become a key satisfaction driver. This variable extends beyond traditional measures of politeness and responsiveness to encapsulate how accessible and adaptive Personnel Contact can support consumer satisfaction.

Additionally, PC4 ("I receive quick response from the delivery staff") emphasizes the real-time nature of interaction, which is particularly relevant in instances where dynamic adjustments (e.g., changing the delivery location due to campus-specific nuances) can significantly enhance user experience for students [47]. This variable emerged as a direct reflection of regional-specific expectations regarding immediate feedback loops and agile personnel interaction.

### 3.3. Primary data collection

The questionnaire was constructed for the purpose of primary data collection. Each questionnaire item was first adapted with exemplification for ease of understanding in English, then translated succinctly into Vietnamese, the birth language of the research subjects, without distorting the meaning. In total, the questionnaire is composed of 3 sections:

(i) Filtering question: designed to ensure the correct subject is being surveyed;

(ii) Demographic questions: designed to capture details regarding the personal characteristics of each respondent;

(iii) Research questions: designed to measure the impact of logistics service quality of OFDAs on the satisfaction of Ho Chi Minh City students.

To ensure better data quality, inverse questions were added to each surveyed variables as attention checks to identify inconsistent patterns in sampled answers. Conflicting responses therefore will be removed from the final dataset.

The online questionnaire is distributed via e-mail and Facebook groups following the convenience

sampling method to suit the resource and time constraint. To ensure the representativeness of the data, the authors will conduct descriptive statistics of the demographic data and cross-reference publicized statistics. To meet the statistical requirements, [48] proposed that the minimum sample size for a 5-point Likert scale with 30 observed variables, the appropriate sample size would be calculated as:

$$n = 5 \times m = 5 \times 30 = 150 \quad (1)$$

- n: minimum sample size;
- m: number of observed variables.

### 3.4. Data analysis

In this study, the data analysis process shall use IBM SPSS 27.0 as the primary tool for processing, examining and analyzing the collected data. SPSS is renowned for its robustness in handling large datasets and performing a variety of statistical tests.

First and foremost, descriptive statistics will provide a summary of the data, shedding light on the central tendencies, variability, and distribution across the six hypothesized variables. Descriptive statistics also help in identifying outliers and trends that may impact the overall satisfaction of the customer base towards OFDAs [49].

Second, to ensure that the measurement scales are reliable, a Cronbach's Alpha test is conducted to measure the internal consistency of survey items, a Cronbach's Alpha value of 0,6 or higher is generally considered acceptable, indicating good internal consistency of the scale [50].

Third, Exploratory factor analysis (EFA) will elucidate the interrelationships between variables from all factors in order to aggregate convergent variables and separate misaligned ones. As per [48], EFA shall be conducted separately for independent items and dependent items. EFA entails:

(i) The Kaiser-Meyer-Olkin (KMO) index  $\geq 0,5$  indicates the appropriateness of the dataset for factor analysis [48];

(ii) Bartlett's test of Sphericity with Sig.  $< 0,05$  indicates the statistical significance of the existence of correlation between observed variables [48];

(iii) Factors with observed Eigenvalue  $> 1$  shall be considered significant and maintained [48];

(iv) The Total Variance Explained  $\geq 50\%$  indicates the EFA model as suitable [51];

(v) The Factor Loading coefficient  $\geq 0,5$  ensures discriminant and convergent qualities [48].

Fourth, the correlation between the collected variables is inspected using the Pearson Correlation method to ascertain whether the variables exhibit a linear relationship [52]. The tabulated Pearson Correlation matrix is shall be appraised as follows:

(i) Between the dependent and independent variables: Sig.  $< 0,05$  between each pair denotes the existence of a linear relationship, whereas the Pearson coefficient indicates the magnitude of correlation [52];

(ii) Between the independent variables themselves: Sig.  $> 0,05$  between each pair preferably indicates no linear relationship should exist. However, in the inverse case, Pearson Correlation  $< 0,7$  still indicates a low probability of the multicollinearity phenomenon in the MLR [53].

Fifth, the impact of each of the independent variables on the dependent variable is estimated via Multiple linear regression (MLR). The authors apply the Ordinary Least Squares method to conduct MLR, the resulting estimation are inspected as follows:

(i) F-test Sig.  $< 0,05$  implies appropriateness of MLR model [54];

(ii) Adjusted-R<sup>2</sup> value  $\geq 0,5$  indicates a significant degree of variance in the dependent variable can be explained by the independent variables [54];

(iii) The Variance Inflation Factor  $< 2$  indicates a low probability of multicollinearity among the independent variables [55];

(iv) Sig.  $< 0,05$  implies statistical significance and the standardized regression coefficient  $\beta$  indicates the degree of variance in the dependent variable explained [56].

Sixth, the results will be checked for violation of linear regression assumptions to assess their validity. The procedure is as follows:

(i) Independence assumption: Durbin-Watson index range between 1,5-2,5 [57];

(ii) Homoscedasticity assumption: Scatter plot of standardized residuals against standardized predicted value with scatters forming parallel lines concentrating around 0 of the predicted values [58];

(iii) Normality assumption: Histogram of the residuals displaying a bell-shaped distribution curve with the mean approximating 0, and Normal P-P plot

with the scatters of the residuals aligning in approximation to the normal curve [59];

(iv) Linearity assumption: Already tested via Pearson Correlation matrix.

## 4. Research findings

### 4.1. Descriptive statistics

After a 1-month period of gathering data from late January to late February 2024, a total of 278 responses were collected, with 232 considered valid and usable. Following this, the data was processed and inputted into SPSS 27.0 for in-depth analysis.

**Table 3.** Descriptive statistics by demographic characteristics.

| Characteristic       |                       | Percentage |
|----------------------|-----------------------|------------|
| Gender               | Male                  | 46,6%      |
|                      | Female                | 53,4%      |
| Year at University   | First year            | 21,1%      |
|                      | Second year           | 31,5%      |
|                      | Third year            | 24,6%      |
|                      | Fourth year+          | 22,8%      |
| OFDA Usage Frequency | Once per week         | 11,2%      |
|                      | A few times per week  | 41,4%      |
|                      | Once per month        | 9,5%       |
|                      | A few times per month | 26,3%      |
|                      | A few times per year  | 11,6%      |
| Favorite OFDA        | Grab Food             | 41,4%      |
|                      | Shopee Food           | 37,5%      |
|                      | Be Food               | 8,6%       |
|                      | Go Food               | 11,2%      |
|                      | Lo Ship               | 1,3%       |

The collected data demonstrate female customers account for over half of the samples, in particular 53,4%, which parallels the available statistics provided by the [60], in which women constituted 51,3% of Ho Chi Minh City's population and 50,1% of the entire Vietnamese population. In addition, market data also shows women to be the dominant group of OFDA users [1]. By far, Grab Food and Shopee Food are the most popular among survey participants, respectively constituting 41,4% and 37,5% of all samples.

### 4.2. Cronbach's Alpha test

The outcomes of the Cronbach's Alpha reliability test yielded alpha coefficients all exceeding 0,7 and the Corrected Item-Total Correlation indices for all observed items exceeding 0,4, indicating that all items are reliable for the ensuing analysis.

**Table 4.** Cronbach's Alpha reliability test results.

| Item                                                    | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---------------------------------------------------------|----------------------------|--------------------------------|----------------------------------|----------------------------------|
| <b>Information Quality (Cronbach's Alpha = 0,714)</b>   |                            |                                |                                  |                                  |
| IQ1                                                     | 11,47                      | 3,411                          | <b>0,589</b>                     | 0,603                            |
| IQ2                                                     | 11,85                      | 3,433                          | <b>0,530</b>                     | 0,635                            |
| IQ3                                                     | 11,73                      | 3,340                          | <b>0,456</b>                     | 0,685                            |
| IQ4                                                     | 11,79                      | 3,587                          | <b>0,445</b>                     | 0,685                            |
| <b>Delivery Time (Cronbach's Alpha = 0,800)</b>         |                            |                                |                                  |                                  |
| DT1                                                     | 11,58                      | 4,634                          | <b>0,718</b>                     | 0,697                            |
| DT2                                                     | 11,38                      | 4,757                          | <b>0,655</b>                     | 0,728                            |
| DT3                                                     | 11,61                      | 4,836                          | <b>0,639</b>                     | 0,736                            |
| DT4                                                     | 11,17                      | 5,303                          | <b>0,453</b>                     | 0,827                            |
| <b>Delivery Cost (Cronbach's Alpha = 0,777)</b>         |                            |                                |                                  |                                  |
| DC1                                                     | 11,16                      | 4,648                          | <b>0,580</b>                     | 0,724                            |
| DC2                                                     | 11,12                      | 4,952                          | <b>0,545</b>                     | 0,741                            |
| DC3                                                     | 11,26                      | 4,781                          | <b>0,650</b>                     | 0,690                            |
| DC4                                                     | 11,34                      | 4,755                          | <b>0,554</b>                     | 0,737                            |
| <b>Delivery Reliability (Cronbach's Alpha = 0,844)</b>  |                            |                                |                                  |                                  |
| DR1                                                     | 11,37                      | 4,406                          | <b>0,756</b>                     | 0,769                            |
| DR2                                                     | 11,53                      | 4,449                          | <b>0,714</b>                     | 0,787                            |
| DR3                                                     | 11,73                      | 4,606                          | <b>0,640</b>                     | 0,819                            |
| DR4                                                     | 11,14                      | 4,596                          | <b>0,613</b>                     | 0,831                            |
| <b>Personnel Contact (Cronbach's Alpha = 0,793)</b>     |                            |                                |                                  |                                  |
| PC1                                                     | 11,47                      | 4,137                          | <b>0,580</b>                     | 0,754                            |
| PC2                                                     | 11,55                      | 3,954                          | <b>0,628</b>                     | 0,730                            |
| PC3                                                     | 11,51                      | 3,965                          | <b>0,603</b>                     | 0,742                            |
| PC4                                                     | 11,65                      | 3,865                          | <b>0,603</b>                     | 0,743                            |
| <b>Discrepancy Handling (Cronbach's Alpha = 0,827)</b>  |                            |                                |                                  |                                  |
| DH1                                                     | 10,62                      | 4,289                          | <b>0,590</b>                     | 0,809                            |
| DH2                                                     | 10,80                      | 4,292                          | <b>0,604</b>                     | 0,803                            |
| DH3                                                     | 10,81                      | 3,681                          | <b>0,732</b>                     | 0,744                            |
| DH4                                                     | 10,74                      | 3,978                          | <b>0,689</b>                     | 0,765                            |
| <b>Customer Satisfaction (Cronbach's Alpha = 0,882)</b> |                            |                                |                                  |                                  |
| CS1                                                     | 19,00                      | 8,797                          | <b>0,712</b>                     | 0,859                            |
| CS2                                                     | 19,08                      | 8,626                          | <b>0,705</b>                     | 0,860                            |
| CS3                                                     | 19,23                      | 8,748                          | <b>0,710</b>                     | 0,859                            |
| CS4                                                     | 19,11                      | 9,136                          | <b>0,641</b>                     | 0,870                            |
| CS5                                                     | 19,10                      | 8,327                          | <b>0,693</b>                     | 0,863                            |
| CS6                                                     | 19,05                      | 8,361                          | <b>0,704</b>                     | 0,860                            |

#### 4.3. Exploratory Factor Analysis

The remaining items from the Cronbach's Alpha stage are subsequently analyzed through EFA analysis using the Principal components extraction method and the Varimax rotation method with Kaiser normalization in order to reveal any underlying relationships between the measurement

items. The minimum Factor Loading coefficient is opted to be 0,5 to ensure the reliability of the resulting factors. The independent and dependent items are analyzed separately following the procedure outlined in Chapter 3.

- **Dependent variable (CS)**

Hair et al. (2010) asserts that EFA should not be conducted for both dependent and independent variables in a single factor analysis as the dependent relationship has already been presupposed. Accordingly, EFA is conducted separately for the dependent variable CS with the same extraction and rotation methods and the same indices to examine validity, the results of which are:

**Table 5.** KMO and Bartlett's Test for Dependent variable CS.

|                                         |      |                  |
|-----------------------------------------|------|------------------|
| <b>KMO Measure of Sampling Adequacy</b> |      | <b>0,891</b>     |
| Approx. Chi-Square                      |      | 650,368          |
| <b>Bartlett's Test of Sphericity</b>    | df   | 15               |
|                                         | Sig. | <b>&lt;0,001</b> |

**Table 6.** Component matrix for Dependent variable CS.

| Items | Components |
|-------|------------|
|       | 1          |
| CS1   | 0,809      |
| CS3   | 0,809      |
| CS6   | 0,803      |
| CS2   | 0,802      |
| CS5   | 0,793      |
| CS4   | 0,751      |

Table 5 shows a Kaiser-Meyer-Olkin index of 0,891 ( $>0,5$ ) and Sig. value for the Bartlett's test of Sphericity of  $<0,001$  ( $<0,05$ ), signifying that EFA is compatible with the research dataset. Afterwards, only 1 component is extracted with an Eigenvalue of 3,791 ( $>1$ ) and Total Variance Explained index of 63,718% ( $>50\%$ ). All of these indicators signaled the appropriateness and validity of the EFA. Given that only one component was extracted, the matrix is unable to be rotated.

The Factor Loading coefficient of all items in Table 6 are observed to exceed 0,5, implying a strong internal relationship. The items are then collected into the dependent variable CS.

- **Independent variables (IQ, DT, DC, DR, PC, DH)**

**Table 7.** KMO and Bartlett's Test for Independent variables.

|                                         |  |              |
|-----------------------------------------|--|--------------|
| <b>KMO Measure of Sampling Adequacy</b> |  | <b>0,843</b> |
| Approx. Chi-Square                      |  | 2301,194     |

|                                      |      |              |
|--------------------------------------|------|--------------|
| <b>Bartlett's Test of Sphericity</b> | df   | 276          |
|                                      | Sig. | <b>0,000</b> |

**Table 8.** Rotated component matrix for Independent variables.

| Items | Components |       |       |       |       |       |
|-------|------------|-------|-------|-------|-------|-------|
|       | 1          | 2     | 3     | 4     | 5     | 6     |
| DT1   | 0,856      |       |       |       |       |       |
| DT2   | 0,787      |       |       |       |       |       |
| DT3   | 0,780      |       |       |       |       |       |
| DT4   | 0,591      |       |       |       |       |       |
| DR1   |            | 0,805 |       |       |       |       |
| DR2   |            | 0,790 |       |       |       |       |
| DR4   |            | 0,774 |       |       |       |       |
| DR3   |            | 0,691 |       |       |       |       |
| DH3   |            |       | 0,781 |       |       |       |
| DH2   |            |       | 0,768 |       |       |       |
| DH4   |            |       | 0,753 |       |       |       |
| DH1   |            |       | 0,687 |       |       |       |
| PC1   |            |       |       | 0,759 |       |       |
| PC2   |            |       |       | 0,743 |       |       |
| PC3   |            |       |       | 0,730 |       |       |
| PC4   |            |       |       | 0,721 |       |       |
| DC1   |            |       |       |       | 0,744 |       |
| DC2   |            |       |       |       | 0,737 |       |
| DC4   |            |       |       |       | 0,729 |       |
| DC3   |            |       |       |       | 0,729 |       |
| IQ1   |            |       |       |       |       | 0,788 |
| IQ2   |            |       |       |       |       | 0,711 |
| IQ4   |            |       |       |       |       | 0,658 |
| IQ3   |            |       |       |       |       | 0,613 |

As shown in Table 7, The KMO index is valued at 0,843 ( $>0,5$ ), while Bartlett's test of Sphericity yields a Sig. value of 0,000 ( $<0,05$ ) which means items within a factor exhibit correlation. In addition, six total factors are extracted with Eigenvalues of 1,289 ( $>1$ ) and Total Variance Explained of 63,909% ( $>50\%$ ). Therefore, it can be concluded that conducting EFA is appropriate for the available data.

The items are rotated into six components (visible in Table 8) with no item displaying a high Factor Loading coefficient for more than one component, meaning both convergent and discriminant qualities can be observed. Furthermore, the rotated components also identically conform with the six independent variables previously proposed in the research model without any reshuffling.

Consequently, the observed items for the proposed independent variables are maintained and are collected into their corresponding components: DT, DR, DH, PC, DC, IQ, in preparation for the next step in the process.

#### 4.4. Pearson Correlation

The variables are input into a Pearson Correlation matrix (Table 9). The Sig. values between all independent variables and the dependent variable CS are all <0,05, which indicate a linear relationship between each of the pairings. All independent variables report strong and positive correlation with the dependent variable as the corresponding Pearson Correlation values all >0,500, with DH-CS pair being the strongest (0,627). Between independent variables, the Sig. values (<0,05) are also indicators of linear relationships underlying all variables, with average-level Pearson Correlation values ranging between 0,210 and 0,445. Regardless, the multicollinearity phenomenon has a low probability of occurring as the Pearson Correlation values for all pairings are all <0,7. Therefore, the independent variables can be included in MLR.

**Table 9.** Pearson Correlation Matrix.

|    | CS   | IQ   | DT   | DC   | PC   | DR   | DH   |
|----|------|------|------|------|------|------|------|
| CS | 1    | ,546 | ,500 | ,532 | ,532 | ,558 | ,627 |
| IQ | ,546 | 1    | ,210 | ,305 | ,302 | ,382 | ,445 |
| DT | ,500 | ,210 | 1    | ,265 | ,342 | ,284 | ,369 |
| DC | ,532 | ,305 | ,265 | 1    | ,342 | ,372 | ,319 |
| PC | ,532 | ,302 | ,342 | ,342 | 1    | ,434 | ,395 |
| DR | ,558 | ,382 | ,284 | ,372 | ,434 | 1    | ,387 |
| DH | ,627 | ,445 | ,369 | ,319 | ,395 | ,387 | 1    |

#### 4.5. Multiple Linear Regression

The impact of the collected independent variables on the dependent variable is estimated via MLR. First, the F-test result demonstrates a Sig. value <0,001 (<0,05) and Adjusted-R2 = 0,662, suggesting that 66,2% of changes in the dependent variable can be explained by the independent variables, which is strongly significant.

**Table 10.** ANOVA.

|   | Model      | Sum of Squares | df  | Mean Square | F      | Sig.   |
|---|------------|----------------|-----|-------------|--------|--------|
|   | Regression | 52,511         | 6   | 8,752       | 76,565 | <0,001 |
| 1 | Residual   | 25,719         | 225 | 0,114       |        |        |
|   | Total      | 78,230         | 231 |             |        |        |

**Table 11.** MLR Model Summary.

| Model | R     | R <sup>2</sup> | Adjusted R <sup>2</sup> | Std. Error of the Estimate | Durbin-Watson |
|-------|-------|----------------|-------------------------|----------------------------|---------------|
| 1     | 0,819 | 0,671          | 0,662                   | 0,33809                    | 1,976         |

The outcomes of the model can be viewed in Table 12. All of the variables also exhibit Sig. values <0,05, implying statistical significance and that an influential relationship is existent. The degree of impact from each independent variable on Customer Satisfaction is reflected through the standardized  $\beta$  coefficient, all of which are positive values. It can be concluded that all six of the proposed variables can induce a positive impact on Customer Satisfaction.

**Table 12.** MLR Coefficients.

| Model      | Unstandardized |            | Standardized |  | Sig.   |
|------------|----------------|------------|--------------|--|--------|
|            | B              | Std. Error | $\beta$      |  |        |
| (Constant) | -0,195         | 0,194      |              |  | 0,317  |
| IQ         | 0,206          | 0,044      | 0,209        |  | <0,001 |
| DT         | 0,164          | 0,035      | 0,201        |  | <0,001 |
| DC         | 0,179          | 0,036      | 0,216        |  | <0,001 |
| DR         | 0,147          | 0,039      | 0,174        |  | <0,001 |
| PC         | 0,132          | 0,041      | 0,146        |  | 0,002  |
| DH         | 0,237          | 0,042      | 0,266        |  | <0,001 |

In descending order of magnitude of impact are Discrepancy Handling (0,266), Delivery Cost (0,216), Information Quality (0,209), Delivery Time (0,201), Delivery Reliability (0,174) and Personnel Contact (0,146). While all factors possess capability to affect Customer Satisfaction, Discrepancy Handling and Delivery Cost harbor the greatest impact. The MLR results are tested for the assumption compliance, returning positive results (Appendix 1).

The results of testing the proposed hypotheses have been finalized and presented in Table 13 below. The observed significance values during MLR are less than 0,05 for all independent variables and their  $\beta$  coefficients are positive, which means all of the hypotheses previously developed in Chapter 2 are supported by the collected data.

**Table 13.** Hypotheses acceptance.

| Code | Hypothesis                                                                               | Result   |
|------|------------------------------------------------------------------------------------------|----------|
| H1   | There is a positive relationship between Information Quality and Customer Satisfaction.  | Accepted |
| H2   | There is a positive relationship between Delivery Time and Customer Satisfaction.        | Accepted |
| H3   | There is a positive relationship between delivery cost and Customer Satisfaction.        | Accepted |
| H4   | There is a positive relationship between Delivery Reliability and Customer Satisfaction. | Accepted |
| H5   | There is a positive relationship between Personnel Contact and Customer Satisfaction.    | Accepted |
| H6   | There is a positive relationship between Discrepancy Handling and Customer Satisfaction. | Accepted |

Therefore, the standardized regression equation can be written as:

$$CS = 0,209IQ + 0,201DT + 0,216DC + 0,174DR + 0,146PC + 0,266DH + \varepsilon \quad (2)$$

- $\varepsilon$ : the residual (random error).

## 5. Discussion

The research undertaken to test “The Impact of the Quality of Logistics Services in Online Food Delivery Applications (OFDAs) on the Satisfaction of Student Consumers in Ho Chi Minh City” yielded affirmations for all six hypotheses proposed. Foremost, this study confirmed the positive relationship between Information Quality, Delivery Time, Delivery Cost, Delivery Reliability, Personnel Contact, and Discrepancy Handling and Customer Satisfaction, resonating with findings from various scholars in the literature review.

The factor of Discrepancy Handling is of paramount importance, underscoring its critical role of customer service in the online food delivery sector. The validated relationship between Discrepancy Handling and Customer Satisfaction echoes the discussions by [29] and [35], underscoring the importance of efficient claim and adjustment processes. Students value the ability of service providers to swiftly and effectively resolve issues, such as order mistakes or delivery grievances. A conceivable explanation for its top rank is the direct impact such experiences have on trust and loyalty, highlighting a pivotal leverage point for service improvement.

Delivery Cost emerging as the second most influential factor emphasizes the price sensitivity among student users. The affirmation of this impact supports [43] highlighting the importance of transparent and incentive pricing strategies in enhancing customer satisfaction. This suggests that competitive pricing strategies and transparent disclosure of fees are essential for attracting and retaining the student demographic. Providers might explore loyalty schemes or discounts for frequent customers to enhance perceived value. While the cost dimension typically plays a mediation role in prior studies, the findings of this research suggest Delivery cost to be a major determinant, particularly influential to the student demographic.

The significance of Information Quality comes third, reflecting the need for accurate, comprehensive, and timely information about food options, prices, and restaurant profiles. The significance of Information Quality on customer satisfaction aligns with the propositions of [28], underscoring the value of accessible and comprehensive information for consumers. Students' satisfaction is markedly influenced by the ease with which they can make informed decisions. This underscores the necessity for apps to maintain up-to-date and detailed information, ensuring a seamless decision-making process for users.

Delivery Time being ranked fourth indicates its relevance but also balances with other factors considered more crucial by students. While prompt delivery remains important, it suggests that students are willing to compromise on speed if their priority needs, such as Discrepancy Handling and cost-effectiveness, are met. Similar agreement is seen in this variable, where our findings parallel the assertions by [28] about timely delivery being a crucial key to customer satisfaction.

The fifth position of Delivery Reliability reveals that consistent and dependable delivery is expected but possibly overshadowed by the more pressing concerns like cost and discrepancy management. It implies a baseline expectation which, if not met, could deter customer satisfaction, but its enhancement does not proportionally skyrocket satisfaction levels as the other factors might. The positive correlation between Delivery Reliability and customer satisfaction mirrors the findings by [29] emphasizing the critical role of maintaining food quality and accuracy in delivery.

The final dimension – Personnel Contact – being rated as the least impactful does not diminish its value but indicates that aspects like human

interaction during delivery rank lower in priority for students compared to operational effectiveness and service attributes. In the digital age, efficiency and reliability might overshadow the traditional value of direct customer service interactions. Our confirmation of the importance of Personnel Contact is akin to the findings of [25], which noted the positive effect of courteous and responsive delivery personnel on customer contentment.

The similarity shared across our findings and the existing literature is an acknowledgment of the multifaceted nature of logistics service quality and its integral role in shaping customer satisfaction within OFDAs. The similarity could largely stem from a universal expectation amongst online consumers for high-quality, reliable, and responsive service deliveries. On the other hand, the differences in the ranking of importance might be influenced by localized consumer behaviors and preferences, suggesting that while the comprehensive themes of logistics service quality remain constant, their impact level can vary based on the specificities of the local market environment and cultural norms.

Consequently, the findings of this study contribute to the body of literature regarding LSQ theories: first, by reconfirming the determinative nature of the factors on customer satisfaction from previous studies, and second, revealing a new arrangement of concrete LSQ dimensions specifically in the context of OFDA and student consumers. Discrepancy Handling, a post-transaction dimension, trumps other operational dimensions like Delivery Reliability or Delivery Time as the strongest factor, highlighting the need in the student generation for instantaneous resolutions for errors, which are commonplace in logistics services. Delivery cost, often sidelined as a mediating variable, is found to have a considerable impact on student customer satisfaction. These findings highlight the necessity to adapt research dimensions in LSQ to the particular characteristics of distinct demographic groups to customize improvement strategy rather than solely using blanket population findings. Moreover, this study also introduced newly original measurement items such as automatic coupon update, prompt personnel communication, and size-dependent fees that allow more comprehensive measurement of LSQ Delivery cost, Delivery Reliability and Personnel handling dimensions, which could be adapted to future research for analyzing concrete service dimensions.

## **6. Conclusion**

Based on the analysis results, the authors recommend certain measures to enhance each aspect of the logistics service quality in order to bolster customer satisfaction. The following suggestions are listed based on level of priority, measured by magnitude of impact.

The most important factor influencing consumer satisfaction is Discrepancy Handling (0,266). For the student demographic in Ho Chi Minh City, OFDA service providers should prioritize the development of multi-channel support mechanisms that are compatible with students' mobile-first lifestyles. Since the majority of students communicate through digital messages daily, a built-in chatbot or real-time message feature would be more accessible than hotlines. This low-cost approach only requires 1-2 IT staff member to configure API connection to common social platforms (Facebook, Zalo) and employ chatbot scripts, which can be further upgraded with AI response, rather than constructing a new messaging channel from zero. Many apps currently also lack a dedicated interface between the customer and the food vendor, which lengthens the process of Discrepancy Handling. This could be alleviated by implementing a chatbox with limited time window between these two parties to expedite claims settlement, with longer period being conducted through a reporting feature.

Furthermore, to enhance problem-supporting service quality, customer service personnel should undergo employee training in communication and problem-solving abilities like empathy, active listening, and negotiation, enabling them to handle common situations effectively. This recommendation can be carried out by means of training workshop from internal or external trainers, meaning the implementation requires low level of resources and faces few obstacles.

As the cost of OFDA services (0,216) is undoubtedly important to student consumers, OFDA service providers could offer discounted delivery fees for customers under 22 years old or for orders delivered to university campuses in Ho Chi Minh City. When combined with discounted monthly subscription options, the satisfaction of this high-volume customer segment could be further enhanced, and the resultant volume increase can make up for sales discount provisions. From a technical standpoint, back-end automation based on customer data and a university verification system are requisite to implement this approach, which

requires IT and legal consultation on the overall feasibility.

The speed at which food may be delivered (0,201) could also be augmented to enhance consumer satisfaction. To ensure timely delivery during peak study hours, providers should optimize AI-based route planning systems to suggest restaurants near the university zone, thereby improving efficiency and reducing waiting times while having lower price level of delivery. Rather than costly full-scale deployment, the optimization can be rolled out in phases, focused on major university clusters to manage the medium to high level of IT resources more effectively. In addition, providers should compensate deliverymen who consistently deliver food to customers on time [61], which could be allocated from other incentive programs to avoid overbudgeting and promote quality service.

OFDA service providers should also continuously update their Information Quality (0,209) so that customers can quickly come to a decision. Students' decision-making can be facilitated by more interactive and transparent product displays in the apps. Therefore, food products that have sufficient Information Quality and realistic visualization should be prioritized when considering the recommending sections. Since this is a policy change requiring vendors to upload images of their own products, the platform-side cost is minimal and should only be related to compliance checks, in exchange for higher Information Quality. Moreover, a filtering function for dietary preferences (e.g., vegetarian, budget under 50,000 VND) would align well with students' diverse eating habits and health awareness. These are modest user interface/quality of life adjustments that may suit not only student consumers but also other users with similar preferences.

To maintain Delivery Reliability (0.174), order special notes such as "deliver to gate" or "call before arrival", etc. should be clearly communicated to deliverymen through the app interface like personal message boxes in order to meet the customer's requirements. Deliverymen should also use thermal delivery bags to keep food at the proper temperature, if necessary, especially in the rainy periods, the food should be packaged carefully and protected against the rain water affecting the food through delivery, which directly affects the food quality and students' satisfaction. These are minimal implementation requirements which align with Delivery Reliability's lower level of impact on satisfaction.

The delivery person's attitude toward customers needs to be adequately reinforced (0,146). OFDA

service providers can apply general rules and regulations for delivery personnel. For instance, delivery employees who receive positive performance reviews from customers may be eligible for financial rewards; conversely those who are poorly-rated should be temporarily punished. Similar to Delivery Time's incentive program, resources can be reallocated for this program to maintain steady cost levels.

To maintain competitiveness in the student market, OFDA service providers could develop environmentally conscious initiatives, such as using eco-friendly delivery packaging, which has become widespread since students' growing interest in sustainability nowadays. To approach this, the OFDA platform may deploy a limited-scope pilot to keep costs low while allowing the platform to evaluate feasibility before scaling.

## **7. Limitations and future research directions**

This study focuses simply on identifying aspects of logistics services in OFDAs and the relationships between their quality and overall customer satisfaction. Future researchers should study the variables of perceived value, trust and loyalty, as well as experiential factors such as empathy quality or security. The researchers could explore how these additional factors interact with logistics service quality to impact consumer satisfaction.

Moreover, this study's findings are only subject to the perceptions of student customers in Ho Chi Minh City, requiring further shifting the focus onto inspecting other demographics or expanding the scope of research. The descriptive data is also lacking in information, such as geographical area, income level, and university, which may have a skewing effect on the representativeness of the results. Subsequent studies are motivated to incorporate detailed sampling information with broader sampling strategies to provide a more comprehensive understanding of customer satisfaction in OFDAs.

Next, the research data were obtained via self-reported Likert-scale survey forms, which are subject to pitfalls such as central tendency bias or other personal biases. Future studies should also incorporate more in-depth qualitative research methods such as interviews or focus groups to gain a more holistic understanding of the customer experience and allow researchers to explore the motivations, frustrations, and overall satisfaction with OFDAs in greater detail.

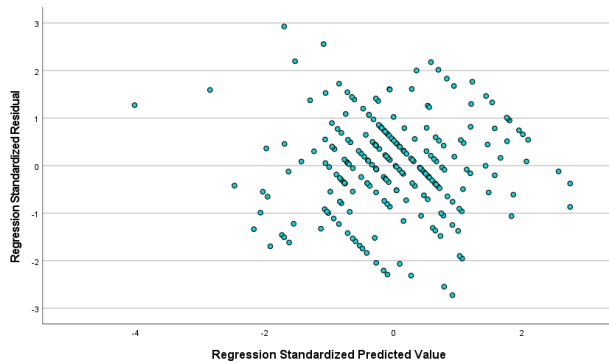


Finally, due to manpower shortage and time constraints, only 232 valid responses were collected. Although 232 is a sufficient sample size to meet the research requirements, future research should aim to collect larger and more diverse samples, including respondents from different regions, universities, or demographic backgrounds. This would enhance the representativeness, reliability, and generalizability of the findings. Researchers could also explore multi-stage or stratified sampling methods to ensure more balanced coverage across key subgroups of the OFDA customer population.

### Appendix 1: MLR Assumption Testing

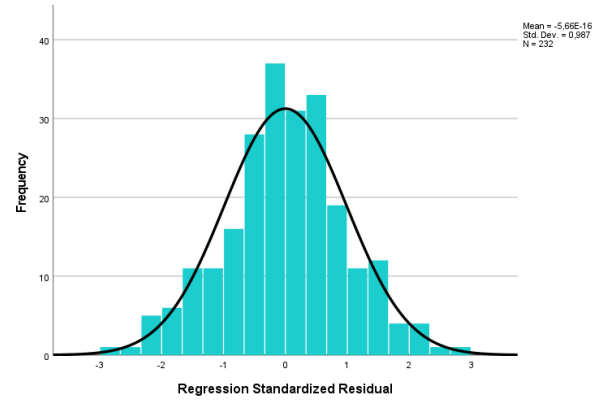
(i) Independence assumption: In the EFA analysis, the autocorrelation phenomenon is considered unlikely to occur within this model as evidenced by the Durbin-Watson value remaining between 1,5 and 2,5 (1,976);

(ii) Homoscedasticity assumption: The scatters of the standardized residuals are distributed around 0 of predicted values, and form visible parallel lines (Figure 4);

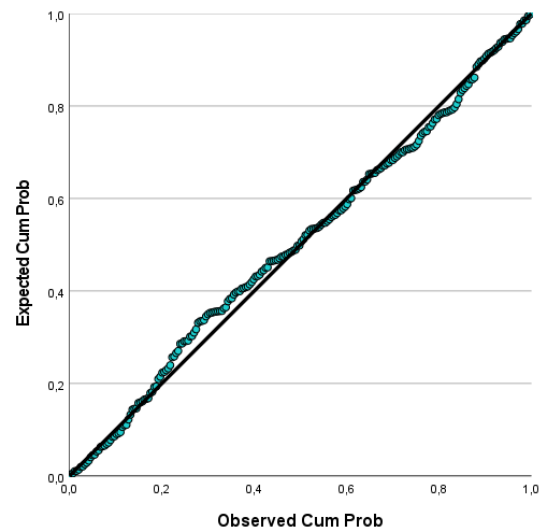


**Figure 4.** Scatter plot of Standardized Residual and Predicted Value.

(iii) Normality assumption: Upon inspection of the histogram in Figure 5, the mean of the Regression Standardized Residual ( $-5,66e-16$ ) approaches 0 while the standard deviation (0,987) approaches 1. In addition, the shape of the normal curve resembles a bell curve and is symmetric about the mean. Besides, the normal P-P plot in Figure 6 displays the scatters of the residuals closely concentrated around the normal distribution line;



**Figure 5.** Histogram of Standardized Residual.



**Figure 6.** Normal P-P Plot of Standardized Residual.

(iv) Linearity assumption: already presumed unviolated as evident by the Pearson Correlation results conducted earlier.

### Limitation

Future studies are encouraged to include more detailed sampling frames by collecting identifiers such as university affiliation, faculty/major, and geographic clusters within Ho Chi Minh City. These additions would allow researchers to evaluate sampling dispersion, compare differences across academic domains or districts, and improve the generalizability of conclusions. Employing stratified or multi-stage sampling designs in subsequent studies may further enhance the robustness and representativeness of the dataset.

### Declaration of competing interest and dedication to copyright

The authors declare the absence of any potential conflicts of interest from this study and affirm that the paper has not been previously published.

## Data available

Data will not be provided upon request.

## Contributions of authors in this article

**Do Doan Binh:** Methodology, Data analysis, Validation, Visualization, Writing – original manuscript. **Huynh Thanh Loc:** Data compilation, Data analysis, Verification, Writing – original manuscript. **Mai Chi Thien:** Methodology, Formal analysis, Investigation, Writing – original manuscript. **Nguyen Huynh Truc Anh:** Data collection, Formal analysis, Investigation, Writing – original manuscript. **Hoang Thi Thanh Tuyen:** Data collection, Formal analysis, Investigation, Writing – original manuscript. **Bui Thi Bich Lien:** Methodology, Supervision, Manuscript Editing.

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