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THE EFFECT OF DELIVERY SERVICE CHARACTERISTICS ON CUSTOMER SATISFACTION THROUGH ELECTRONIC COMMERCE ORDERING IN INDONESIA

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ABSTRACTS

The selection of delivery services plays a crucial role in the logistics operations of e-commerce companies. This study aims to analyze delivery service preferences based on the characteristics of e-commerce users. A survey was conducted with a sample of 102 respondents. The analysis employed a discrete choice model interpreted through a linear regression approach, focusing on key parameters such as shipping cost, delivery time, and destination accuracy. The discrete choice analysis estimates the probability of individuals selecting specific delivery service attributes as a function of their socio-economic characteristics and the perceived attractiveness of each option. The results indicate that delivery destination accuracy is the most influential factor for respondents when choosing a delivery service, both for intra-regional deliveries (< 40 km) and inter-regional deliveries (> 40 km). A higher level of accuracy significantly increases the likelihood of a delivery service being selected. Therefore, e-commerce logistics providers should prioritize delivery accuracy to enhance customer satisfaction and service competitiveness.

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1. INTRODUCTION

The National Maritime Institute recognizes the logistics sector as a crucial contributor to boosting Indonesia's economic recovery in the post-Covid-19 period. According to Fajrin et al. (2021), economic revival can be stimulated through increased demand for goods and services, which in turn drives economic activity, supports industrial performance, and revitalizes micro, small, and medium enterprises (MSMEs). During the pandemic, logistics activities have become increasingly dependent on information and communication technology (ICT), which has significantly contributed to the surge in electronic commerce (e-commerce) transactions. In this context, freight forwarding services have emerged as a critical component of e-commerce logistics.

The quality of logistics services serves as a foundation for logistics companies to enhance their marketing strategies, as service quality directly influences customer satisfaction (Jian et al., 2008). Extensive research has been conducted on delivery services (Thai et al., 2013; Bonang et al., 2017; Irianto, 2017; Nia et al., 2018), with particular attention given to last-mile delivery, which is recognized as a crucial element in the express delivery process (Li et al., 2020). Mentzer et al. (2001) emphasized that customer expectations of logistics service parameters may vary depending on consumer segmentation.

Steven (2014) highlighted that customer satisfaction is strongly and positively correlated with customer loyalty, suggesting that when customers have a favorable service experience, they are more likely to make repeat purchases. In line with this, Kotler and Keller (2009) describe loyalty as a firm psychological commitment to continue purchasing or endorsing a preferred product or service in the future, even when external factors or competing marketing strategies might influence customers to switch to alternatives.

These insights underscore that customers may consider different service attributes when selecting logistics providers. According to a 2021 survey, three key parameters significantly influence the selection of e-commerce delivery services: shipping rates, delivery times, and delivery destination accuracy. These parameters reflect a trade-off that consumers make when choosing a logistics service.

By applying a discrete choice approach, this study seeks to estimate the probability of individuals selecting certain delivery service attributes based on their socio-economic characteristics and the perceived attractiveness of each alternative. The main goal of this study is to construct a mathematical model that determines the critical factors affecting consumers' selection of e-commerce delivery services by applying a discrete choice approach.

2. METHODS

This research involved a survey of 102 respondents who had experience using e-commerce delivery services, both for intra-regional deliveries (distance < 40 km) and inter-regional deliveries (distance > 40 km). As outlined by Tamin (2008), cited in Wulansari (2017), discrete choice models generally represent the probability that an individual selects a particular option based on their socio-economic characteristics and the perceived attractiveness of the available alternatives. To quantify this attractiveness, the concept of utility is employed, which refers to the value an individual seeks to maximize when making a decision. Utility is represented by an individual's response to various delivery service options, described through relevant service attributes. Assuming a linear utility function, the utility difference between

alternatives can be modeled as the difference across several key attributes, formulated mathematically as follows.

$$UM–UTM = \beta0+\beta1.(X1M–X1TM)+ \beta2.(X2M – X2TM) + ... +\beta n.(XnM– XnTM) \quad (1)$$

In this context, UM – UTM represents the difference in individual responses toward various delivery service attributes. The term β_o denotes the constant in the model, while β_1, β_2, ..., β_n are the coefficients corresponding to each influencing factor, estimated through multiple linear regression analysis. Consequently, the probability values under consideration can be expressed as follows.

$$PM = \frac{\exp(UM-UTM)}{1+\exp(UM-UTM)} \quad (2)$$

where PM is the probability of selecting and providing the service. Respondent's choice is obtained by using the point rating presented on a semantic scale (choosing is worth 0.9 and not choosing is worth 0.1). The questionnaire containing scenarios and parameter options is shown in Table 1.

Table 1. Scenarios and parameter options.

	Parameter		
Scenario	**Shipping rates (Rp.)**	**Delivery time (days)**	**Accuracy of delivery destination**
a	8000-15000	1-2	confirmed according to the address
b	8000-15000	3-4	confirmed according to the address
c	8000-15000	1-2	confirmed does not match the address
d	8000-15000	3-4	confirmed does not match the address
e	16000-30000	1-2	confirmed does not match the address
f	16000-30000	3-4	confirmed according to the address
g	16000-30000	3-4	confirmed does not match the address
h	16000-30000	1-2	confirmed according to the address

The semantic scale is then converted into a numerical scale (choosing is worth 2.197, and not choosing is worth -2.197) using the following equation.

$$[PM/(1-PM)]= \beta0+\beta1.(X1M–X1TM)+\beta2.(X2M – X2TM)+...+ \beta n.(XnM – XnTM) \quad (3)$$

In the regression analysis, the numerical scale serves as the dependent variable, whereas the selection parameters act as the independent variables. Once the data transformation is completed, the utility function equation is estimated using the least squares regression method, under the assumption that the utility differences follow a linear relationship. According to Kotler (2006:177), customer satisfaction refers to an individual's emotional

response after evaluating the perceived performance or outcome of a service relative to their initial expectations.

3. RESULTS AND DISCUSSION

3.1. Respondent Characteristics

The characteristics of respondents provided socio-economic information on the respondents who filled out the questionnaire survey, including data on age, place of residence, and shipping services that had been used. In Figure 1 it can be seen that the proportion of respondents aged 18-20 years has a fairly high percentage, namely 76.1% of respondents. This is understandable because this age range is a productive age which usually makes a lot of transactions in online shopping applications.

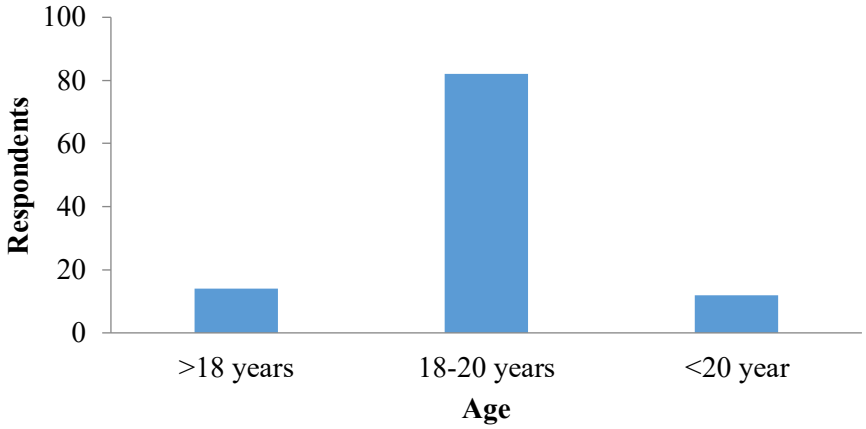

Figure 1. Respondent's age

Figure 2 shows the data on the characteristics of respondents by area of residence in general, dominated by respondents from Bogor Regency at 24.3%, Cilegon at 22.5%, and Bandung at 20.7%.

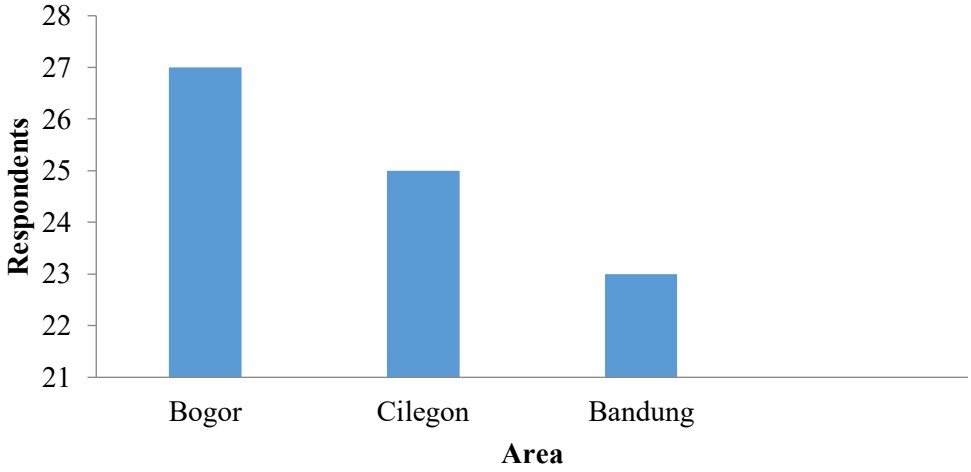

Figure 2. The area where the respondent lives

Based on the data presented in Figure 3, J&T emerged as the most frequently chosen delivery service by respondents when conducting transactions through online shopping platforms, with a preference rate of 65.9%.

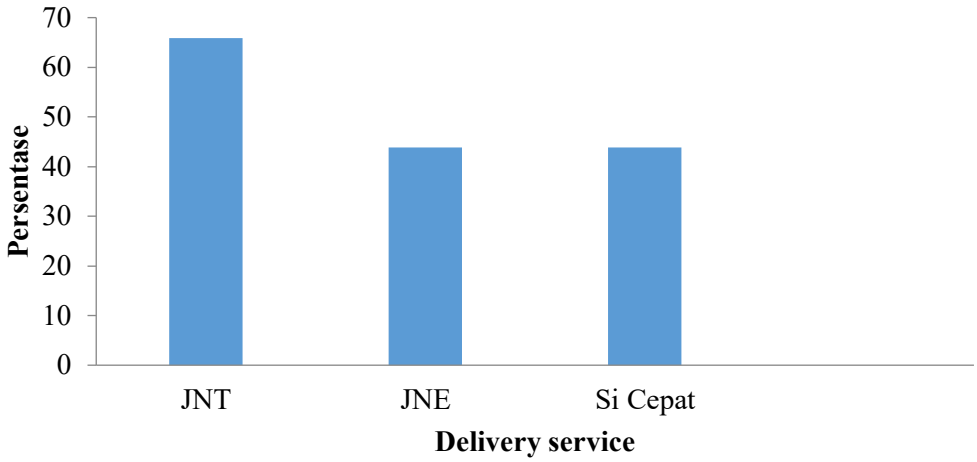

Figure 3. Respondent's preferred delivery service

3.2. Analysis of Delivery Service Parameter Selection

With the discrete selection approach using the linear regression estimation method, the estimated results of the utility function equation are shown in Table 2 and Table 3.

Table 2. Delivery within the region (distance<40 km)

No.	Model Variable	Model Parameter	Coefficient	Standard Error	t-Stat	P-Value
1	Constant	b_0	-5.75	0.34	-17.12	1.80E-56
2	Shipping rates (x1)	b_1	0.96	0.13	7.58	9.53E-14
3	Delivery time (x2)	b_2	0.58	0.13	4.58	5.39E-06
4	Delivery destination accuracy (x3)	b_3	2.08	0.13	16.40	1.47E-52
F stat			115.79			
R^2			0.30			

Table 3. Delivery between regions (distance>40 km)

No.	Model Variable	Model Parameter	Coefficient	Standard Error	t-Stat	P-Value
1	Constant	b_0	-6.07	0.33	-18.37	2.86E-63
2	Shipping rates (x1)	b_1	1.01	0.13	8.87	4.45E-18
3	Delivery time (x2)	b_2	0.57	0.13	4.57	5.74E-06
4	Delivery destination accuracy (x3)	b_3	2.16	0.13	17.32	2.04E-57
F stat			133.16			

No.	Model Variable	Model Parameter	Coefficient	Standard Error	t-Stat	P-Value
R^2			0.33			

Based on the data presented in Table 2 and Table 3, several key findings can be summarized as follows:

1. Examination of the P-values in both tables reveals that the parameters: shipping cost, delivery time, and delivery destination accuracy, each have significance values below the 0.05 threshold. This indicates that these variables are statistically significant and can be accepted as valid predictors within the utility function model for delivery service selection.
2. The F-statistics obtained from both models are greater than the critical F-value of 2.290 (at a significance level of $\alpha = 0.05$ with more than 100 observations), indicating that there is a statistically significant relationship between the independent variables (X) and the dependent variable (Y), which represents the likelihood of selecting a particular delivery service.
3. For intra-regional delivery services (distances < 40 km), the model yields an R^2 value of 0.30. This implies that 30% of the variability in customer utility can be explained by the three selected parameters in the model.
4. For inter-regional delivery services (distances > 40 km), the R^2 value increases slightly to 0.33, indicating that the model accounts for 33% of the variation in utility scores, suggesting a modestly stronger explanatory power compared to the intra-regional model.
5. Based on the regression results, the estimated utility function for inter-regional delivery services is formulated as: $Y = -6.07 + 1.11X_1 + 0.57X_2 + 2.16X_3$, where X_1 represents shipping cost, X_2 represents delivery time, and X_3 denotes delivery accuracy.

3.3. Discussion

The empirical findings of this study provide several important insights into consumer preferences in e-commerce delivery services, especially within the Indonesian context. The results from both intra-regional (<40 km) and inter-regional (>40 km) deliveries consistently show that accuracy of delivery destination is the most influential factor in customer choice. This finding aligns with the increasingly customer-centric orientation of modern logistics systems, where precise and reliable deliveries are seen not just as operational goals, but as determinants of brand reputation and consumer trust.

The high coefficient value of delivery accuracy (2.08 for intra-regional and 2.16 for inter-regional deliveries) indicates that customers strongly favor delivery services that ensure packages arrive exactly at the intended destination. This reflects consumer expectations in the digital age, where real-time tracking, confirmed drop-offs, and minimal delivery errors are becoming standard. Mismatches between the recorded delivery address and the actual delivery location can result in dissatisfaction, lost parcels, and a negative perception of the e-commerce platform itself.

Moreover, the significance of shipping cost (X_1) and delivery time (X_2), while still impactful, is less dominant than accuracy. The coefficient for shipping cost is slightly higher than that for delivery time in both contexts, suggesting that customers are more sensitive to price variations than to minor changes in delivery duration. However, both factors contribute

positively to the utility function, meaning that lower costs and faster deliveries are still appreciated, just not as strongly as accurate deliveries.

This trade-off among the three parameters suggests that consumers are willing to tolerate slightly higher shipping rates or longer delivery times if accuracy is guaranteed. In other words, reliability may trump speed and cost, especially in markets where last-mile infrastructure is still developing. These insights have practical implications for logistics providers: investing in route optimization systems, precise address databases, and robust last-mile delivery verification technologies could yield a competitive advantage in customer retention and satisfaction.

In terms of behavioral modeling, the relatively moderate R^2 values (0.30 and 0.33) suggest that although the three identified parameters explain a significant portion of the variation in customer choices, there are likely other influencing factors not captured in the current model such as courier behavior, tracking transparency, delivery flexibility (e.g., rescheduling or location changes), and brand trust. These could be explored in future studies to enrich the model.

Furthermore, the similarity of parameter influence across intra- and inter-regional delivery indicates that geographical distance does not substantially change consumer priorities, accuracy remains paramount. This consistency across contexts reinforces the universality of accurate delivery expectations in Indonesia's growing e-commerce landscape, where many users, especially in urban and peri-urban areas, rely heavily on precise last-mile fulfillment.

4. CONCLUSION

This study confirms that delivery destination accuracy is the most influential factor in the selection of e-commerce delivery services, regardless of delivery distance—both within regions (<40 km) and between regions (>40 km). The strong positive impact of this parameter highlights that customers place the highest value on the assurance that their packages will arrive precisely at the intended address.

Improving delivery accuracy significantly increases the likelihood of a logistics provider being selected, emphasizing the importance for companies to invest in technologies and operational systems that support precise address verification, real-time tracking, and reliable last-mile fulfillment. As competition in the e-commerce logistics sector intensifies, accuracy in delivery becomes a key differentiator that not only enhances customer satisfaction but also contributes to long-term customer loyalty.

In practical terms, logistics service providers should consider integrating advanced route optimization, geolocation systems, and customer confirmation mechanisms into their operations. Furthermore, this study also indicates that although shipping cost and delivery time remain relevant, consumers are willing to compromise on these aspects when accurate delivery is assured.

These findings provide strategic implications for logistics managers, particularly in emerging markets like Indonesia, where infrastructural and operational variability remains a challenge. Prioritizing delivery accuracy can be a cost-effective way to build customer trust and gain a competitive edge in the rapidly growing e-commerce ecosystem.

Future studies are encouraged to explore additional factors such as courier behavior, customer service responsiveness, and flexibility in delivery time slots, which may further enrich the understanding of customer preferences in last-mile logistics.

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