

Student's Preferences in the Selection of Online Shopping Goods Delivery Services

Munajat Tri Nugroho^{1 a♦}, Purwo Setiawan^{1b}, Octalia Rahmasari^{1c}

Abstract. *The rise of e-commerce or online shops has made the number of shipping service company increase. Delivery service companies need to analyze consumer preferences in selecting delivery services when shopping online so that they can continue to compete. This study aims to analyze the attributes or important factors that influence consumers and how much influence these factors have on consumer preferences. The AHP (Analytical Hierarchy Process) method is used to obtain the important factors and the discrete choice method with the multinomial logit model to analyze the influence of factors on consumer preferences. With the AHP method, three important attributes are obtained including cost with a value of 4.248, insurance with a value of 1.729, and delivery time with a value of 1.471. Judging from the influence on preferences, the cost factor and delivery time have a negative effect, which means that the lower the rate and the faster the time will increase customer satisfaction. While the insurance factor has a positive effect, which means that consumers prefer insurance. The most influential factor is cost with a parameter value of -1.97, then insurance with a parameter value of 1.66, and finally delivery time with a parameter value of -0.564. Based on gender, the results show that women's considerations of the cost attribute are higher than men's considerations. Meanwhile, based on allowance, the higher the allowance, the more important insurance and delivery time are considered.*

Keywords: *AHP; discrete choice; stated preference; multinomial logit; delivery service.*

I. INTRODUCTION

The increasingly rapid development of information technology has changed our lifestyles, making them almost completely practical. The internet is one of the main factors in supporting information technology. With the internet, information can be found easily, safely, and at a low cost. Information can be obtained from all corners of the world regardless of time and geographic boundaries because billions of users are connected via global computer services (Akbar, 2014).

Indonesia is a country where many of its citizens have access to the internet. Based on the Internet World Stats in 2019, Indonesia was fourth place in the world in terms of internet usage.

According to the Indonesian Internet Service Providers Association (APJII) in 2018, a total of 171,176,716.8 people from the total population were internet users and from 2017 to 2018, the growth of Indonesian internet users increased by 27,916,716 or 10.12% (Internet Users in G20 Countries - 2019, 2019)

The impact of the rise of the internet is the appearance of many startups. Startups are companies that are founded because of problems that can be resolved by using the internet (Salamzadeh, 2015). One type of startup that is widely used is e-commerce or online stores. E-commerce is defined as an online (internet-based) platform or application that supports the activity of buying and selling goods or exchanging valuable data (Faraoni et al., 2019).

According to Wicaksono on CNN Indonesia in 2019, as many as 86% of Indonesian internet users shop online via any device (Wicaksono, 2019). Meanwhile, according to the Indonesian Internet Service Providers Association (APJII), it is said that students access the internet very frequently. As many as 92.1% of students are internet users. The results of a study conducted by Kompas showed that in 2012, 19.9% of students had an interest in online shopping (Hasugian, 2005).

¹ Department of Industrial Engineering, Universitas Muhammadiyah Surakarta, Jl. A. Yani, Mendungan, Pabelan, Kec. Kartasura, Kabupaten Sukoharjo, Jawa Tengah 57162, Indonesia

^a email: munajat3n@ums.ac.id

^b email: purwostwn98@gmail.com

^c email: octalia@gmail.com

♦ corresponding author

Submitted: 02-06-2021

Revised: 06-12-2021

Accepted: 20-12-2021

The rise of e-commerce has shown a positive impact on the delivery service business. The process of globalization of markets in the world and the activities of international corporations create conditions for the growing demand for freight services (Popovych et al., 2016). In e-commerce activities, delivery services deliver the goods purchased by customers. Nowadays, many delivery service companies compete with each other to win the hearts of customers. A prediction from the ALFI / ILFA (Asosiasi Logistik dan Forwarder Indonesia / Indonesian Logistics & Forwarders Association) on the website <http://www.ilfa.or.id/> said that the logistics business in 2020 will grow by 30%. This causes customers to choose from a wider selection of delivery services offered when shopping online.

The customer's choice and preference in choosing delivery services are influenced by several factors or attributes. Attributes are everything that has an attachment to a product or service (Sumarwan, 2003). Examples of attributes in a shipping service company are brand, cost, delivery time, packaging, etc. To win the hearts of consumers and have a high chance of being chosen, the company must set a strategy through its attributes. Of course, not all attributes have the same power to attract consumers. To find out what attributes are important in influencing consumer preferences, the Analytical Hierarchy Process (AHP) method is used. AHP is a method used to determine how important something is by giving a value based on importance to each variable using a numerical scale in a pairwise comparison (Saaty, 2008).

To win over the consumers, the company maximizes all its attributes by lowering costs, speeding up delivery times, ensuring the safety of goods, providing the best service, etc. However, if done in an unbalanced way, the company will suffer losses. Companies must be able to analyze consumer preferences to determine the right strategy. To find out consumer preferences, companies can look at the level of utility. The utility is a numerical value used to measure a person's level of preference (Fishburn, 1968). Whereas preference is the choice of whether someone likes or dislikes a product (goods or

services) that is consumed determined by the benefits of the product (Simamora, 2003).

The discrete choice analysis is a method that can be used to measure consumer utility. The concept is that each individual will always choose the option with the highest utility (Louviere et al., 2010). In general, the following utility functions:

$$U_{it} = V_{it} + \varepsilon_{it} \quad (1)$$

where:

U_{it} : the utility value of the alternative i to decision-maker t ,

V_{it} : the part that researchers can observe from the utility,

ε_{it} : the part that is caused by other factors that the researcher cannot explain.

To find out the probability of being selected by consumers, the multinomial logit method is used. Multinomial logit is used to predict consumer choice or company probability determined by the utility value of three or more alternative choices (Williams, 2019). Meanwhile, to estimate the parameter value of each attribute, the maximum likelihood estimation method is used (Louviere et al., 2010).

Several studies have been conducted, such as one by Pramudyo and Aryanto (2019), which examined the selection of delivery service providers at e-commerce companies. PT. Hijup uses the Analytic Network Process (ANP) method with the result that the most influential criterion in PT Hijup is cost control (Pramudyo & Aryanto, 2019). Another research by Wulan and Hendrawan (2018) examined the selection of forwarder services using the analytical hierarchy process (AHP) method at PT. XYZ, with the result that the most important criteria are cost, then quality, then delivery, and finally responsiveness (Wulan & Hendrawan, 2018). Research by Astuti and Fatma (2017) examined the evaluation of the selection of courier service providers based on the analytical hierarchy process (AHP) method, with the results that the main consideration criterion in choosing a courier service is reliability, reliability of courier companies in serving the needs and desires of their customers, followed by cost and comfort (Astuti & Fatma, 2017).

Based on the description of the background and data above, this study will analyze several

important attributes and how much influence these attributes have on impacting consumer preferences when selecting goods delivery services for online shopping with a case study of students of Muhammadiyah University of Surakarta.

II. RESEARCH METHOD

With the background and objectives described in the introductory point, in general, this study uses two methods, namely the Analytical Hierarchy Process (AHP) method and the Discrete Choice method. AHP method is used to find attributes with more importance using specific values, while the discrete choice method is used to analyze preferences based on the estimated parameter values.

The concept of the AHP method is to compare variables in pairs using a numerical scale (Saaty, 1990). The data for pairwise comparisons between variables are obtained through a questionnaire. With these comparisons, the attribute's value of importance is generated.

Several principles must be understood when using the AHP method to solve problems. According to (Kusrini, 2007), these principles include:

- a. Creating a Hierarchy. Breaking complex systems into supporting elements that are easy to understand, arranging elements hierarchically, and combining or synthesizing them.
- b. Assessment of criteria and alternatives. Comparing two criteria or alternatives in pairs. The best scale for expressing opinions on various issues is a scale of 1 to 9 (Saaty, 1990). Table 1 is an analysis table to measure the value and definition of qualitative opinions from the Saaty comparison scale.
- c. Determining priority (Synthesis of priority). Pairwise comparisons are made for each criterion and alternative. The relative comparison values of all the alternative criteria can be adjusted with the predetermined judgment for the weight and priority results. Weights and priorities

Table 1. Saaty Comparison Scale

Intensity of Importance	Explanation
1	Both elements are of equal importance
3	One element is slightly more important than the other
5	One element is more important than the other
7	One element is clearly and absolutely more important than the other
9	One element is absolutely more important than the other
2,4,6,8	The values in between two adjacent considerations
Opposite	If activity i gets a value of one (1) compared to activity j, then j has the opposite value compared to i.

are calculated by manipulating the matrix or by solving mathematical equations.

- d. Logical Consistency. Consistency can have two meanings. First, grouping similar objects according to uniformity and relevance. The second is concerned with the level of relation between objects based on certain criteria.

After obtaining the important attributes, these attributes are then analyzed on how much they influence student preferences in selecting delivery services when shopping online. The discrete choice method is used to determine student preferences. The discrete choice is a method for modeling consumer behavior using the utility theory. Fundamentally, someone will choose something with a high utility value.

$$P(i|C_n) = P(U_{in} \geq U_{jn}, \forall j \in C_n) \quad (2)$$

where

$P(i|C_n)$: opportunity of delivery service i from 1 set of choices

U_{in} : delivery service utility i according to person n

U_{jn} : delivery service utility j according to person n

In the case of choosing a delivery service when shopping online, consumers will be given several alternative shipping services to choose from. If the dependent variable (alternative) contains more than two categories, the qualitative choice model is called a multinomial choice model (Ben-Akiva & Bierlaire, 1999). The Multinomial Logit Model (MNL) mathematical

structure provides the probability of choice for each alternative as a function of the systematic part of the utility of all alternatives (Tamin & Frazila, 2017). The general form for the probability of selecting the alternative 'i' (i = 1,2, ..., j) from a set of alternative j is:

$$Pn(i) = \frac{\exp(V_{in})}{\sum_{j=1}^i \exp(V_{jn})} \tag{3}$$

where

$Pn(i)$: probability of the decision-maker with alternative i (value 0-1)

V_{jn} : the deterministic component of utility for alternative j

V_{in} : the utility of alternative i

The data is collected using a questionnaire where several sets of choices are offered, to be selected according to the preference of the customer. The parameters contained in the utility function are sought out using the maximum

likelihood method. Using the sample data obtained through a questionnaire, the parameter estimate value can be seen (Hasan, 2003).

Data processing is done with the help of the biogeme software. Package 'Biogeme' (biogeme.epfl.ch) is one of the Python programming language modules designed to estimate the parameters of various models using maximum likelihood estimation. Most importantly, the package is designed to make a discrete choice model (Bierlaire, 2016).

III. RESULT AND DISCUSSION

This study uses three alternatives, namely the companies JNE, TIKI, and J&T. However, to avoid familiarity between famous brand names and customers, initials were used in the questionnaire to represent the companies. JNE used the initials

Table 2. Selected Attributes from Previous Studies

No.	Attribute	Description
1	Cost	Money or other forms of value that can be exchanged for a product or service. The cost is one of the determinants of consumers in choosing a product or service
2	Network Range/Breadth	The size of the network in Nunu Kustian's research is mentioned as a service area (Kustian, 2016),
3	Delivery time	Delivery time can be defined as the length of time it takes to move goods from the hand of the sender to the destination.
4	System services or ease of access to information	Is a company's customer service that can be accessed through digital applications or web pages. This service needs to be easy to use, complete with features, and complete with the information required by customers. For example, features of tracking shipped goods, transparency of cost, etc.
5	Packaging	Packaging is the activity of designing and making a package or container for products to ensure product safety (Kotler et al., 2017).
6	Insurance	Insurance will make customers feel comfortable and safe when making deliveries. With insurance, any damage done to goods sent or lost per company procedures will be given compensation (Money Back Guarantee (MBG)) by the company.

Table 3. Pairwise Comparison Matrix

Factors	Cost	Insurance	Ease of Access to Information	Packaging	Delivery Time	Network Range/Breadth
Cost	1	3.168	3.127	1.573	1.398	3.604
Insurance	0.316	1	2.002	1.692	1.359	2.875
Ease of Access to Information	0.320	0.500	1	1.485	0.874	2.898
Packaging	0.636	0.591	0.674	1	1.311	3.386
Delivery time	0.716	0.736	1.145	0.763	1	4.515
Network Range/Breadth	0.278	0.348	0.345	0.295	0.222	1
Total	3.264	6.342	8.292	6.808	6.163	18.277

Tabel 4. Synthesis Matrix

Factors	Cost	Insurance	Ease of Access to Information	Packaging	Delivery time	Network Range/Breadth	Average	Value
Cost	0.306	0.499	0.377	0.231	0.227	0.197	0.306	4.248
Insurance	0.097	0.158	0.241	0.248	0.221	0.157	0.187	1.729
Ease of Access to Information	0.098	0.079	0.121	0.218	0.142	0.159	0.136	0.962
Packaging	0.195	0.093	0.081	0.147	0.213	0.185	0.152	1.157
Delivery time	0.219	0.116	0.138	0.112	0.162	0.247	0.166	1.471
Network Range/Breadth	0.085	0.055	0.042	0.043	0.036	0.055	0.053	0.131

A, TIKI used B, and J&T used C. The primary data collection was carried out twice. The first questionnaire was used to determine the value of the attribute's importance and the second was to determine the effect of attributes on student preferences.

Selection of Attributes

The selection of attributes is carried out in two steps. First, references to previous studies are used, then they are selected again using the AHP method.

Based on Previous Studies

Four previous studies have been used by researchers as references. These studies are

Kustian (2016), Alvionita Andarini (2016), Wasiyanti (2020), and Oktaviani, Merlina, and Nurmalasari (2018). From the four studies, six attributes are often used and mentioned (Kustian, 2016), (Alvionita, 2016), (Wasiyanti & Putri, 2020). The six attributes are described in Table 2.

AHP Analysis

Six attributes obtained from previous studies are then checked for the value of importance using the AHP method. Pairwise comparison data between variables are obtained through a questionnaire. First data collection has been conducted by AHP survey from 67 respondents, and the pairwise comparison matrix was obtained as shown in Table 3. From the paired matrices at Table 3, a synthesis matrix is obtained as shown in Table 4.

According to the AHP calculation at table 4, the attributes used are ones that have high importance as seen from the resulting values. Researchers used three attributes with the highest values. The three attributes include cost with a weight of 4.248, insurance with a weight of 1.729, and delivery time with a weight of 1.471.

Discrete Choice Analysis

After obtaining the attributes from the Analytical Hierarchy Process (AHP) calculation, these attributes are then used to analyze student preferences in selecting delivery services when shopping online using Discrete Choice Analysis. Several steps must be passed in analyzing this consumer choice.

Attributes and Levels

Table 5. Level of Attributes

Alternative	Attribute	Level	Code
JNE (A)	Cost	Rp 13,000.00	1
		Rp 16,000.00	2
		Rp 35,000.00	3
	Delivery time	1 Day	1
		1-2 Days	1.5
		2-3 Days	2.5
	Insurance	Yes	1
		No	2
	TIKI (B)	Cost	Rp 7,000.00
Rp 15,000.00			2
Rp 20,000.00			3
Delivery time		1-2 Days	1.5
		2 Days	2
		4 Days	4
Insurance		Yes	1
		No	2
JNT (C)		Cost	Rp 10,000.00
	Rp 15,000.00		2
	Rp 25,000.00		3
	Delivery time	1-2 Days	1.5
		2-3 Days	2.5
		4 Days	4
	Insurance	Yes	1
		No	2

Table 6. Stimuli Results of Orthogonal Design

No	cost_JNE	ne_JNE	Insurance_JNE	cost_TIKI	time_TIKI	Insurance_TIKI	cost_JNT	time_JNT	Insurance_JNT	CARD
1	Rp 13.000,00	2-3 days	No	Rp 15.000,00	2 days	No	Rp 15.000,00	4 days	No	1
2	Rp 35.000,00	1-2 days	No	Rp 7.000,00	4 days	Yes	Rp 15.000,00	4 days	No	2
3	Rp 16.000,00	1-2 days	No	Rp 15.000,00	4 days	No	Rp 25.000,00	2-3 days	Yes	3
4	Rp 16.000,00	1-2 days	Yes	Rp 20.000,00	2 days	No	Rp 10.000,00	2-3 days	No	4
5	Rp 35.000,00	2-3 days	Yes	Rp 7.000,00	1-2 days	No	Rp 10.000,00	2-3 days	No	5
6	Rp 16.000,00	1 day	Yes	Rp 7.000,00	4 days	No	Rp 25.000,00	4 days	No	6
7	Rp 13.000,00	1 day	Yes	Rp 15.000,00	4 days	Yes	Rp 10.000,00	2-3 days	Yes	7
8	Rp 16.000,00	2-3 days	Yes	Rp 15.000,00	1-2 days	Yes	Rp 15.000,00	1-2 days	No	8
9	Rp 35.000,00	1-2 days	Yes	Rp 15.000,00	2 days	Yes	Rp 25.000,00	4 days	No	9
10	Rp 35.000,00	1 day	No	Rp 15.000,00	1-2 days	No	Rp 10.000,00	1-2 days	No	10
11	Rp 16.000,00	2-3 days	No	Rp 20.000,00	4 days	Yes	Rp 25.000,00	1-2 days	No	11
12	Rp 13.000,00	1-2 days	No	Rp 15.000,00	1-2 days	No	Rp 25.000,00	1-2 days	No	12
13	Rp 13.000,00	1 day	No	Rp 20.000,00	2 days	Yes	Rp 15.000,00	2-3 days	No	13
14	Rp 35.000,00	1 day	No	Rp 7.000,00	2 days	No	Rp 25.000,00	1-2 days	Yes	14
15	Rp 13.000,00	2-3 days	Yes	Rp 20.000,00	1-2 days	No	Rp 25.000,00	4 days	Yes	15
16	Rp 16.000,00	2-3 days	No	Rp 7.000,00	2 days	Yes	Rp 10.000,00	1-2 days	Yes	16
17	Rp 13.000,00	1-2 days	No	Rp 20.000,00	4 days	No	Rp 10.000,00	1-2 days	No	17
18	Rp 13.000,00	2-3 days	No	Rp 7.000,00	4 days	No	Rp 10.000,00	4 days	No	18
19	Rp 35.000,00	2-3 days	No	Rp 15.000,00	4 days	No	Rp 15.000,00	2-3 days	Yes	19
20	Rp 13.000,00	1 day	No	Rp 7.000,00	1-2 days	Yes	Rp 25.000,00	2-3 days	No	20
21	Rp 35.000,00	1-2 days	No	Rp 20.000,00	1-2 days	Yes	Rp 10.000,00	4 days	Yes	21
22	Rp 16.000,00	1 day	No	Rp 15.000,00	2 days	No	Rp 10.000,00	4 days	No	22
23	Rp 13.000,00	1-2 days	Yes	Rp 7.000,00	2 days	No	Rp 15.000,00	1-2 days	Yes	23
24	Rp 35.000,00	1 day	Yes	Rp 20.000,00	4 days	No	Rp 15.000,00	1-2 days	No	24
25	Rp 16.000,00	1 day	No	Rp 20.000,00	1-2 days	No	Rp 15.000,00	4 days	Yes	25
26	Rp 35.000,00	2-3 days	No	Rp 20.000,00	2 days	No	Rp 25.000,00	2-3 days	No	26
27	Rp 16.000,00	1-2 days	No	Rp 7.000,00	1-2 days	No	Rp 15.000,00	2-3 days	No	27

The level is the value assumed for each attribute. Each attribute has several levels that can be combined to form a set of choices or so-called stimuli. The level of each attribute can be seen in Table 5.

Stimuli Design

A stimulus is a set of choices that is obtained from the combination of levels of each attribute and alternative. In compiling a combination of levels for each attribute, the term full-factorial is known in which all pairs of levels for each attribute are used, resulting in many sets of choices. Orthogonal design is used to minimize the number of sets of options. Stimuli simplification with an orthogonal design is done with the help of SPSS software. From the results of the orthogonal design, 27 stimuli are obtained as in Table 6.

The 27 stimuli are used to make 27 multiple-choice questions that must be completed by the respondent. For respondents not to solve too many questions, the 27 questions were divided into three parts so that each respondent only got 9 questions each to solve.

Stated Preference data collection

Data collection has been conducted by online questionnaires. The questionnaires were distributed and 152 respondents were found who filled out the questionnaire correctly. With 152 respondents, 152 x 9 observations were obtained or the same as 1368 observations.

The characteristics of respondents were observed are the respondent's faculty, gender, the respondent's monthly allowance, the intensity of online shopping, and the respondent's favorite shop when shopping online and 9 questions related to the stated preference for choosing the delivery service among the alternatives.

Interpretation of Results

The estimation report contains statistical data from the observation. The estimation report in this study can be seen in Figure 1.

From Figure 1 it can be seen that five parameters are to be estimated, namely ASC_A, ASC_B, Beta_Tarif (Cost), Beta_Asuransi (Insurance), and Beta_Waktu (Time) with a sample of 1368, or 152 respondents who filled out the questionnaire. The exclude observation value is

equal to 0 which means that all samples are included in the processing without exception. Then the pseudo R2 value is 0.377, as explained in Bierlaire's (2018) research, where the value is

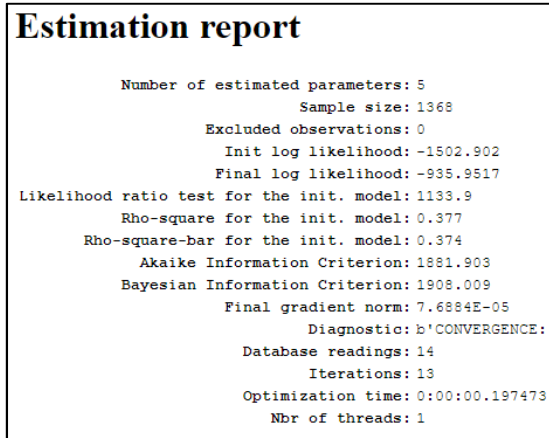


Figure 1. Estimation report

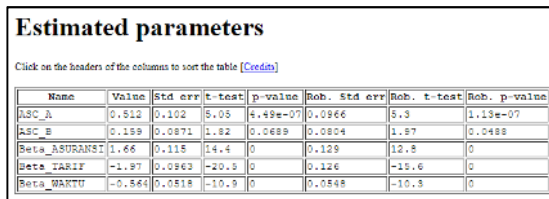


Figure 2. Estimated Parameters

obtained from the equation:

$$\rho^2 = 1 - \frac{\text{Final log likelihood}}{\text{Init log likelihood}} \quad (4)$$

The model can be said to be quite good at describing the actual situation because the pseudo R2 value is between 0.2 and 0.4 (McFadden, 1978).

Estimated parameters is the section that displays the estimated parameters of the utility function, along with its statistical calculations. The estimated parameters in this study can be seen in Figure 2.

From Figure 2 it can be understood the value of ASC. ASC (Alternative Specific Constants) is a value that explains other factors besides insurance, cost, and time for each alternative (Golder, 2007). Not all of the ASC values for the available alternatives can be estimated, as one alternative must be used as a benchmark for another alternative. This study uses the ASC_C parameter as default with a parameter value of 0.

In the output, it can be seen that the ASC_A value is 0.512 and the ASC_B value is 0.159. The ASC_C value is 0 (default), then the highest ASC value is company A, meaning that there are other factors outside of cost, insurance, and delivery time that also contribute to the utility value of these alternatives.

Judging from the effect of attributes on consumer preferences, there are three attribute parameters, namely *Beta_ASURANSI* (Insurance), *Beta_TARIF* (Cost), and *Beta_WAKTU* (Time). From the resulting output, there are positive (+) and negative (-) values. Parameters that are positive means that the higher the attribute value, the higher the utility (level of consumer preference or attribute usefulness). Meanwhile, a negative parameter means that the smaller the attribute value, the higher the level of benefit and consumer preference.

Based on the magnitude of the effect of attributes on consumer utility, the most influential attribute is the cost attribute with a parameter value of -1.97. A negative value means that the lower the cost, the higher the utility. These results are consistent with the research conducted by Pramudyo and Aryanto (2019), where the most influential attribute is cost (Pramudyo & Aryanto, 2019). Then the second most influential attribute is insurance with a parameter value of 1.66. A positive parameter value means that insurance will increase consumer utility. Lastly is the delivery time with the parameter value -0.564. The order of importance of the three attributes is in accordance with Wulan and Hendrawan's research (2018), where it is said 'first is the cost, second is quality (quality assurance or insurance) and the third is delivery (delivery time)' (Wulan & Hendrawan, 2018).

The cost attribute is the attribute with the greatest influence among students because according to a study (Nurhayati, 2017), students shop online because of their consumptive nature. Consumptive is a lifestyle where one fulfills desires beyond needs and sometimes exceeds their own limits. Due to this, students will consider goods or services at a cheap price, but do not really care about delivery times because they do not need the goods urgently.

After evaluated the utility equation for each company is as follows:

$$U(JNE) = 0.512 + 1.66 * Insurance - 1.97 * Cost - 0.567 * Delivery Time \quad (5)$$

$$U(TIKI) = 0.156 + 1.66 * Insurance - 1.97 * Cost - 0.567 * Delivery Time \quad (6)$$

$$U(JNT) = 0 + 1.66 * Insurance - 1.97 * Cost - 0.567 * Delivery Time \quad (7)$$

From the three alternative companies, company A (JNE) has the highest utility because it has an Alternative Specific Constants (ASC) value of 0.512 which is the highest ASC value, meaning that there are other factors outside of cost, insurance, and shipping that also contribute to the utility value from these alternatives. It can be concluded that in general, students prefer the delivery service A.

The cost attribute has the greatest influence on student preferences in selecting delivery services when shopping online. The estimated

value of the cost parameter is -1.97. Then what affects student preferences after the cost is insurance. The estimated value of the insurance parameter is 1.66. Lastly is the delivery time with an estimated parameter of -0.567. With the parameter value closest to 0, it means that the delivery time attribute is less influential when compared to the cost and insurance attributes.

Comparison based on Respondent Characteristics

Figure 3 is a sample comparison based on gender. Based on Figure 3, it is known that 24% of the respondents are men and 76% are women. It can be seen from the results of the parameter estimation, the difference in preferences between men and women is shown in Table 7.

Judging from the pseudo-Rho-square value, both of them have a value greater than 0.3, meaning that the model is good enough to describe reality. Based on the ASC value, alternative A has the highest value among the alternatives, with both men and women, means that there are other factors outside of cost, insurance, and shipping that contribute to the utility value of these alternatives.

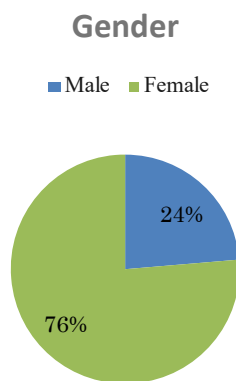


Figure 3. Respondents based on Gender

Table 7. The difference in Parameters based on Gender

Name	Male	Female
Estimation Report		
Number of estimated	5	5
Sample Size	324	1044
pseudo Rho-square	0.352	0.387
Estimated Parameters		
ASC_A	0.35	0.579
ASC_B	-0.008	0.221
ASC_C	0	0
Beta_ASURANSI (Insurance)	1.73	1.65
Beta_TARIF (Cost)	-1.82	-2.03
Beta_WAKTU (Time)	-0.659	-0.537

Table 8. Comparison of Estimated Allowance Parameters per Month

Name	IDR400.000-IDR 999.999	IDR1.000.000- IDR 1.999.999	≥ IDR2.000.000
Estimation Report			
Number of estimated	5	5	5
Sample Size	639	621	108
pseudo Rho-square	0.328	0.452	0.483
Estimated Parameters			
ASC_A	0.689	0.468	-0.0968
ASC_B	0.0912	0.284	-0.0124
ASC_C	0	0	0
Beta_ASURANSI (Insurance)	1.62	1.69	3.3
Beta_TARIF (Cost)	-1.65	-2.64	-2.38
Beta_WAKTU (Time)	-0.417	-0.645	-1.68



Figure 4. Respondents Based on Pocket Money

According to the estimated value of the attribute parameter, women's considerations of cost are higher than men's. This can be seen from the estimation of the Beta_TARIF parameter for women (-2.03) and men (-1.82). As for the attributes of insurance and delivery time, men's considerations are higher than women's. Women are more careful when spending money because a woman tends to think about their future more than what they will face in the short term (Lim & Teo, 1997). According to a study by Koonce et al., (2018), when compared to men, women prefer to save money as an asset (Koonce et al., 2018)

Figure 4 is a sample comparison based on pocket money. Based on pocket money, it was found that 71 respondents had an allowance of IDR 400,000.00 to IDR 999,999.00 each month, 69 respondents had an allowance of IDR 1,000,000.00 to IDR 1,999,999.00, and as many as 12 respondents had an allowance of more than IDR 2,000,000.00. Judging from the results of the parameter estimation, there are differences in

preferences based on pocket money as seen in Table 8.

Judging from the pseudo-Rho-square value, all three have a value greater than 0.3, which means that the model is good enough to describe reality. Judging from the ASC value, alternative A has the highest value for students with an allowance of Rp. 400,000.00 to Rp. 999,999.00 and Rp. 1,000,000.00 to Rp. 1,999,999.00. However, for students with an allowance of more than IDR 2,000,000.00 the highest ASC score is ASC_C. This means that alternative A is the most preferred for students with a lower or average allowance but those who have high allowances tend to prefer alternative C.

Observed from the estimated value of the attribute parameter, the higher the allowance, the higher the importance of the insurance and delivery time attributes. This can be seen from the estimated value of insurance and delivery time parameters which increases with the increase in allowances. However, this does not apply to the cost attribute. Students with low allowance tend to have low consumptive attitudes. When the level of income or allowance is higher, students will have more options when purchasing a product and it will have an impact on the lifestyle they have, meaning that the higher the allowance, the bigger the possibility of choosing a higher level of security/insurance and delivery time (Efita Sari et al., 2020).

IV. CONCLUSION

In this study, the three most important attributes according to consumers were found, namely cost, insurance, and delivery time. There are differences in preferences in the choice of delivery services when shopping online based on gender. Women's considerations of the cost attribute are higher than men's considerations. Meanwhile, in terms of insurance and delivery time, men's considerations tend to be higher than women's.

Based on student allowance per month, the higher the amount, the higher their consideration of delivery speed and insurance. The higher the allowance, the higher the estimated parameter value generated. This is because the higher the allowance a student has, the higher the student's freedom to choose. However, in terms of rates, it cannot be concluded that students with high allowances will prefer more expensive or cheap rates.

Determining a marketing strategy is important for shipping service companies. Companies can look at the important factors to determine the right strategy. The company can also simulate the odds of the strategy being implemented using the equation generated above.

V. ACKNOWLEDGEMENTS

This research was supported by PID Grant from Universitas Muhammadiyah Surakarta. We thank the respondents from Universitas Muhammadiyah Surakarta for their valuable contributions to this research.

REFERENCES

- Akbar, M. J. (2014). Analisis Antecedent Preferensi Pembelian Online di Indonesia (Studi Pada Pembeli Online di Kota Semarang). *Fakultas Ekonomika Dan Bisnis Universitas Diponegoro Semarang*. <http://eprints.undip.ac.id/43837/>
- Alvionita, S. A. (2016). Faktor-Faktor Pelayanan yang Dipertimbangkan Pelanggan Dalam Memilih Jasa Pengiriman Barang Pada JNE Cabang Malang. *Jurnal Ilmiah Mahasiswa FEB*, 3(2). <https://jimfeb.ub.ac.id/index.php/jimfeb/article/view/1841>
- Astuti, J., & Fatma, E. (2017). Jurnal Manajemen Industri dan Logistik EVALUASI PEMILIHAN PENYEDIA JASA KURIR BERDASARKAN METODE ANALYTICAL HIERARCHY PROCESS (AHP). *Jurnal Manajemen Industri Dan Logistik*, 1(1), 14–26. <https://doi.org/10.30988/jmil.v1i1.5>
- Ben-Akiva, M., & Bierlaire, M. (1999). *Discrete Choice Methods and their Applications to Short Term Travel Decisions*. 5–33. https://doi.org/10.1007/978-1-4615-5203-1_2
- Bierlaire, M. (2016). PythonBiogeme: a short introduction. *Transport and Mobility Laboratory School of Architecture, Civil and Environmental Engineering, Report TRANSP-OR 160706*. transp-or.epfl.ch
- Efita Sari, D., Narimo, S., & Cahya Saputra, R. (2020). The Effect Of Financial Literacy And Pocket Money On Consumer Behavior Of Universitas Muhammadiyah Surakarta (Ums) Students. *INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH*, 9, 2. www.ijstr.org
- Faraoni, M., Rialti, R., Zollo, L., & Pellicelli, A. C. (2019). Exploring e-Loyalty Antecedents in B2C e-Commerce: Empirical results from Italian grocery retailers. *British Food Journal*, 121(2), 574–589. <https://doi.org/10.1108/BFJ-04-2018-0216>
- Fishburn, P. C. (1968). Utility Theory. *Management Science*, 14(5), 335–378. <https://doi.org/10.1287/mnsc.14.5.335>
- Golder, M. (2007). Discrete Choice Models I. *Lecture Notes*, 1–35. <https://doi.org/10.1016/j.jue.2007.02.007>
- Hasan, M. I. (2003). *Pokok-pokok materi statistik 2: statistik inferensif* (Vol. 2, Issue 519.5 HAS p). Bumi Aksara.
- Hasugian, J. (2005). Pemanfaatan Internet: Studi kasus tentang Pola, Manfaat dan Tujuan Penggunaan Internet oleh Mahasiswa pada Perpustakaan USU. *Jurnal Studi Perpustakaan Dan Informasi*, 1(1), 7–18. <http://repository.usu.ac.id/handle/123456789/64594>
- Koonce, J. C., Mimura, Y., Mauldin, T., & Rupured, M. (2018). Financial Information: Is It Related to Savings and Investing Knowledge and Financial Behavior of Teenagers? *Journal of Financial Counseling and Planning*, 2(19). <https://ssrn.com/abstract=2226475>
- Kotler, P., Bo, J. T., Makens, J. C., Columbus, B., New, I., San, Y., Upper, F., River, S., Cape, A., Dubai, T., Madrid, L., Munich, M., Montreal, P., Delhi, T., Sao, M. C., Sydney, P., Kong, H., Singapore, S., & Tokyo, T. (2017). *Marketing for Hospitality and Tourism*

- (7th ed.). Pearson Education.
- Kusrini, K. (2007). *Aplikasi Sistem Pendukung Keputusan*. Andi Offset.
- Kustian, N. (2016). Penentuan dalam Pemilihan Jasa Pengiriman Barang Transaksi E-Commerce Online. *Journal of Applied Business and Economics*, 2, 308–314. <https://journal.lppmunindra.ac.id/index.php/JABE/article/view/1523>
- Lim, V. K. G., & Teo, T. S. H. (1997). Sex, money and financial hardship: An empirical study of attitudes towards money among undergraduates in Singapore. *Journal of Economic Psychology*, 18(4), 369–386. [https://doi.org/10.1016/S0167-4870\(97\)00013-5](https://doi.org/10.1016/S0167-4870(97)00013-5)
- Louviere, J. J., Flynn, T. N., & Carson, R. T. (2010). Discrete choice experiments are not conjoint analysis. *Journal of Choice Modelling*, 3(3), 57–72. [https://doi.org/10.1016/S1755-5345\(13\)70014-9](https://doi.org/10.1016/S1755-5345(13)70014-9)
- McFadden, D. (1978). *Quantitative Methods for Analyzing Travel Behaviour on Individuals: Some Recent Developments*. In: Hensher D, Stopher P, eds. *Behavioral Travel Modelling* (D. A. Hensher & P. R. Stopher (Eds.)). Croom Helm. https://elsa.berkeley.edu/reprints/mcfadden/quant_methods.pdf
- Nurhayati. (2017). Belanja "Online" sebagai Cara Belanja di Kalangan Mahasiswa. In *Aceh Anthropological Journal* (Vol. 1, Issue 2). <https://doi.org/10.29103/aaj.v1i2.1140>
- Popovych, P., Shyriaieva, S., & Selivanova, N. (2016). Analysis of the interaction of participants freight forwarding system. *Journal of Sustainable Development of Transport and Logistics*, 1(1), 16–22. <https://doi.org/10.14254/jsdtl.2016.1-1.3>
- Pramudyo, C. S., & Aryanto, A. (2019). Pemodelan Pemilihan Penyedia Jasa Pengiriman Barang pada Perusahaan E-commerce (Studi Kasus di PT. Hijup). *CIEHIS Prosiding*, 1(1), 200–207. <http://ejournal.uin-suka.ac.id/saintek/ciehis/article/view/1511>
- Saaty, T. L. (1990). An Exposition of the AHP in Reply to the Paper "Remarks on the Analytic Hierarchy Process." *Management Science*, 36(3), 259–268. <https://doi.org/10.1287/mnsc.36.3.259>
- Saaty, T. L. (2008). Decision making with the analytic hierarchy process - International Journal of Services Sciences - Volume 1, Number 1/2008 - Inderscience Publishers. *International Journal of Services Sciences*, 1(1), 83–98. <https://doi.org/10.1504/IJSSci.2008.01759>
- Salamzadeh, A. (2015). Startup Companies- Life Cycle and Challenges Startup Companies. *4th International Conference on Employment, Education and Entrepreneurship (EEE)*, August. <https://doi.org/10.13140/RG.2.1.3624.8167>
- Simamora, B. (2003). *Membongkar kotak hitam konsumen*. Gramedia Pustaka Utama. https://books.google.co.id/books/about/Membongkar_kotak_hitam_konsumen.html?id=hPzWNwAACA&redir_esc=y
- Sumarwan, U. (2003). *Perilaku Konsumen* (2nd ed.). Ghalia Indonesia.
- Tamin, O. Z., & Frazila, R. B. (2017). Penerapan Konsep Interaksi Tata Guna Lahan-Sistem Transportasi Dalam Perencanaan Sistem Jaringan Transportasi. In *Journal of Regional and City Planning* (Vol. 8, Issue 3, pp. 34–48). <http://journals.itb.ac.id/index.php/jpwk/article/view/4380>
- Wasiyanti, S., & Putri, A. (2020). Pemilihan Jasa Pengiriman Barang Menggunakan Metode Simple Additive Weighting (SAW). *SATIN - Sains Dan Teknologi Informasi*, 6(1), 10–19. <https://doi.org/10.33372/stn.v6i1.577>
- Wicaksono, A. (2019). *Netizen Indonesia Paling Gemar Belanja Online*. CNN Indonesia. <https://www.cnnindonesia.com/teknologi/20190201173813-185-365769/netizen-indonesia-paling-gemar-belanja-online>
- Williams, R. (2019). Multinomial Logit Models. In *University of Notre Dame* (Vol. 7). <https://www3.nd.edu/~rwilliam/>
- Wulan, A., & Hendrawan, B. (2018). Analisis Pemilihan Jasa Forwarder dengan Menggunakan Metode Analytical Hierarchy Process (AHP) di PT. XYZ. *Journal of Applied Business Administration*, 2 (2), 294–306. <https://doi.org/10.30871/jaba.v2i2.1126>