

The Influence of E-Commerce Consumer Intention Factors in Choosing & Willingness to Pay for Eco-Friendly shipping on Last-Mile Delivery

Afriandi Ginting, Farizal
Department of Industrial Engineering
University of Indonesia
Salemba, Jakarta, Indonesia
afriandi.ginting@ui.ac.id, farizal@eng.ui.ac.id

Abstract

The objective of this paper is to explore the influence of e-commerce consumer's intention in choosing & willingness to pay for eco-friendly shipping on last mile delivery. This model is based on the theory of planned behavior plus the influence of government policies as well as insight into the current state of the environment and explains the relationship between consumer attitudes, perceived behavioral control and subjective norms on intention and willingness to pay for Eco-friendly on Last-Mile Delivery. Data from the survey of Indonesian consumers were analyzed with structural equation modelling used for data analysis purposes. The results showed that influencing factors such as attitudes and perceived behavioral control positively had a relationship with consumer intentions and willingness to pay to use Eco-Friendly Shipping on Last-Mile Delivery, beliefs about eco-friendly shipping costs had a negative effect, while environmental concern was not found to have a significant effect. The results also provide evidence regarding high levels of consumer intentions to choosing and use for eco-friendly shipping and ultimately their positive association with WTP.

Keywords

Consumer's intention, Eco-friendly shipping, Willingness to pay, Theory of planned behavior, Structure equation modeling

1. Introduction

Indonesia is a market with attractive e-commerce growth from year to year. Census data from BPS Indonesia (Indonesian Central Bureau of Statistics) states that the e-commerce industry in Indonesia grew by around 17 percent of the total number of e-commerce companies in the last decade, reaching 26.2 million units. This figure is expected to increase in the future (BPS Economic Census Data, 2016).

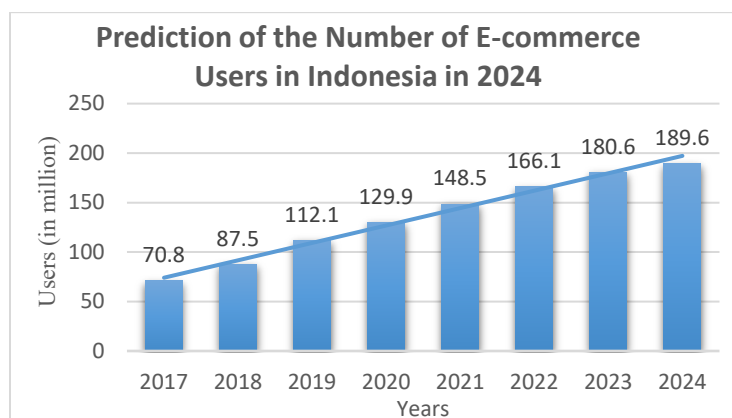


Figure 1. Prediction of the Number of E-Commerce Users in Indonesia

According to Hootsuite (2021) states that the number of consumers who have purchased goods through e-commerce in 2020 is approximately 3.47 billion people or equivalent to about 44.5% of the global population. During the Covid-19 pandemic, in 2020, the total value of the global B2C e-commerce market was approximately US\$2.44 trillion (Hootsuite, 2021). Specifically, in Indonesia, Bank of Indonesia noted that the number of e-commerce transactions had almost doubled in the midst of the COVID-19 pandemic, from 80 million transactions in 2019 to 140 million transactions until August 2020. What is more, the COVID-19 pandemic additionally contributed to the dynamic expansion of e-commerce (Clement, 2021). With the increase in B2C E-commerce worldwide, the use of land transportation for product distribution is also increasing (Huang et al., 2018).

In the last two decades, the increasing number of online transactions has an impact on the volume of product packages transported by delivery services to buyers' homes (Weltevreden & Rotem-Mindali, 2009). As a result, the shift in people's shopping behavior patterns from traditional to online shopping has an impact on the number of trips made by expeditions to deliver goods to online shoppers. A goods delivery journey is the journey of goods at the end of the supply chain, specifically the path of goods from the last retailer to the consumer, also known as the last mile delivery. Last mile delivery trip is a trip taken by the delivery officer to deliver the product to the consumer's home or residence in online purchasing activities. According to Bates *et al.* (2018) describe last mile as the final journey made by a parcel between the local depot and the end recipient in the urban logistics network. These trips contribute directly to the transportation problems experienced by big cities in Indonesia, such as traffic congestion and pollution.

According to the International Energy Agency (2019), transportation is one of the main contributors to global carbon dioxide (CO²) emissions, accounting for 25% of total global emissions (the second largest share of GHG emissions in 2017). Of that total, 74% of emissions are related to road transport (IEA, 2019). In big cities in Indonesia, the proportion of motor vehicle exhaust emissions as a source of air pollution reaches 60–70% (Ministry of Environment, 2011). DKI Jakarta, as the capital city of Indonesia, is one of the largest cities in the country, contributing significantly to the country's exhaust gas emissions. According to Environmental Services and Cleanliness DKI Jakarta data (2019), the transportation sector contributed 40% of the sources of air quality pollution in 2015.

As a way out in dealing with congestion and pollution problems that arise, several studies have discussed new approaches to delivery methods that are more environmentally friendly for last mile delivery such as the use of Electric Vehicles (Subramaniam & Dhinakaran, 2021), Drones (Murray and Chu, 2015) and the use of Bicycles (Caggiani *et al.*, 2020) in carrying out last mile delivery to consumers for short distance delivery urban areas.

However, one aspect that seems to be neglected so far both in research and in practice is the customer perspective on eco-friendly shipping, namely the influence of e-commerce consumer intention factors in choosing & willingness to pay in using eco-friendly shipping on last-mile delivery.

1.1 Objectives

This study aims to describe the intention of e-commerce consumer choosing & willingness to pay in using eco-friendly shipping on last-mile delivery. To describe this intention, a discussion of information gaps in the literature was carried out, identifying the main drivers of behavior, linking the direct and indirect relationships between factors that influence in terms of intention in choosing & willingness to pay in using eco-friendly shipping on last-mile delivery. The Theory of planned behavior (TPB) framework is used and expanded by identifying and prioritizing the main constructs that influence community intentions and behavior through semi-structured interviews followed by qualitative analysis and quantitative modeling after conducting literature studies.

2. Literature Review

2.1 Eco-friendly shipping

Eco-friendly shipping is defined as shipping that reduces the environmental impact of current logistical procedures. This concept encompasses pollution caused by the supply chain, such as trash disposal, packaging, recycling, and energy conservation. As consumers' awareness of environmental issues has grown, an increasing number of businesses are offering eco-friendly goals in an effort to maintain the environment as green as possible.

The green supply chain includes first, middle, and last mile logistics (last mile delivery). The process of becoming more environmentally friendly is most simply achieved through the digitization process for every and every stage of logistical operations. Through the use of alternative fuels and better efficiency, digitization may be leveraged to remove paper footprints and minimize energy usage. Transportation solutions must include attempts to reduce emissions in order for the logistics process to be considered ecologically friendly.

Why is this such a high priority for the industry today because the transportation industry has such a large impact on greenhouse gas emissions, this is the case. According to Mangiaracina, *et al.* (2015) there is a lack of environmental implications of B2C e-commerce from a logistics perspective. Transportation is the single largest source of greenhouse

gas emissions in the United States, accounting for roughly 28% of total emissions. According to the World Economic Forum (2020), this number is predicted to rise by up to 30% due to an increase in online purchasing and increased last-mile deliveries. The retail supply chain is the industry's top emitter, accounting for more than half of all emissions. This is unsurprising, particularly in light of the COVID-19 pandemic. Many people are turning to online shopping, and package volumes are increasing, far outpacing the capacity of many logistics providers. While this is concerning, it also highlights the need of adopting eco-friendly shipping tactics and practices in supply chains for all players in the logistics operations game, including retailers, carriers, and consumers.

There are numerous techniques for obtaining knowledge about what needs to be done to achieve environmentally friendly shipping from a variety of sources, including:

1. Using an electric vehicle (EV)

One of the most exciting trends in adopting green logistics in supply chains is the use of electric vehicles (EVs) for last-mile delivery. Instead of internal-combustion engines that generate power by burning a mixture of fuel and gases, these electric cars use electric motors. In order to solve the issues of rising pollution, global warming, and decreasing natural resources, EVs are considered as an effective solution for fuel-intensive automobiles. Electric vehicles, in addition to being environmentally benign, provide supply chain businesses with a slew of other advantages.

2. Delivery Drones

Drone technology is evolving at a fast pace and has increasing potential to compete with more traditional alternatives in a number of sectors beyond retail and delivery. Drone technology has uncertain potential for reducing greenhouse gas emissions from e-commerce and the logistics industry and concerns over increased noise pollution. On an environmental level, autonomous drones can significantly reduce the number of delivery trucks and vans on the road. And because they're fully-electric, they have the potential to be powered by renewable energy – creating 100% emission-free deliveries. In logistics services, the use of drones as delivery vehicles has been considered as a promising response to increasing road traffic and the incremental demand for transportation particularly growing last-mile delivery (Shavarani *et al.*, 2018)

3. Use of bicycles for local / short distance and urban deliveries

The use of bicycles is one of the most environmentally friendly modes of delivery. Delivery by bicycle, specifically in urban areas and close to warehouses or sellers, is one way to keep on-demand deliveries environmentally friendly, starting with local deliveries by bicycle or on foot. According Naomanov *et al.*, (2020) developed a web planning tool that supports the application of cargo bikes as a solution approach for city distribution. Bicycles may not be the right choice for all products, but they can be the perfect solution for small orders in urban areas. No gas, no emissions caused by this vehicle.

2.2 Theory of Planned Behavior

Theory of planned behavior (TPB) is a theory developed by Ajzen (1991) which is a refinement of the theory of reason action proposed by Fishbein and Ajzen norm (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The main focus of the theory of planned behavior is the same as the theory of reason action (TRA), namely the intention of individuals to carry out certain behaviors. Intention is considered to see motivational factors that influence behavior. Intention is an indication of how hard people want to try and how much effort an individual will make to carry out a behavior. TPB has 3 construct factors, namely attitude, subjective norms, and perceived behavioral control. Attitudes refer to a person's overall evaluation of performing a certain behavior and subjective norm represents one's own perception of how significant social pressure expects them to act regarding the behavior (De Groot & Steg, 2007). However, behavioral intentions are not always under individuals' total volitional control, so Ajzen (1991) developed the TPB, which incorporates perceived behavioral control into TRA. Perceived behavioral control indicates an individual's perception regarding his/ her ability and capability to engage in a specific activity (Ajzen & Fishbein, 2000; Wu, Tsai, & Lee, 2017). The theory is well supported and has been successful in explaining many environmental pollution-reducing behaviors, such as sustainable consumption behavior (Soorani and Ahmadvand, 2019; Vantamay, 2018). The TPB provides a theoretical framework for systematically identifying the factors which influence the separation decision. TPB also allowed individuals who have positive attitudes, and think that there is adequate normative support, and perceive that they can easily engage in the activity, should have strong intentions to perform the behavior (Fielding *et al.*, 2008).

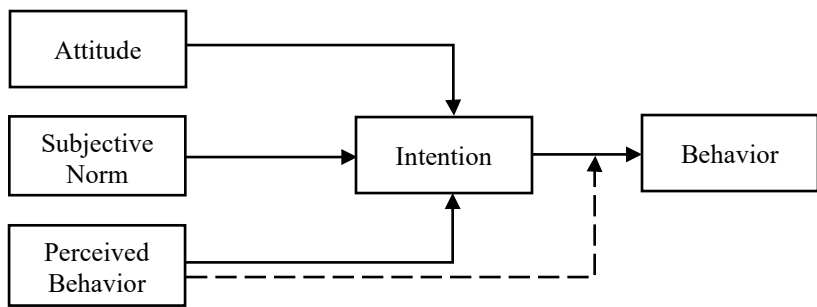


Figure 2. Theory of Planned Behavior

3. Methods

3.1. Instruments and Measurements

This study uses a questionnaire-based survey to collect the data. The questionnaire is divided into two main sections. The first section of the questionnaire aims to collect demographic data from the respondents, such as age, gender, education, and income. The second section aims to measure the response of the respondents according to their intention factors in choosing & willingness to pay for eco-Friendly shipping on last-mile delivery measures by 5 indicators. All the indicators are measured by using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

3.2 Sampling Design and Data Collection

Structured questionnaires were distributed to respondents all over Jakarta, Bogor, Depok, Tangerang and Bekasi city which is where these cities become economic centers and have a high number of online shopping transactions of around 76% which is considered to be very potential for air pollution problems. The questionnaire was distributed directly to the respondent or using an online questionnaire on a Google form. In this case, the convenient random sampling technique was adopted for selecting the potential respondents for one month. For the offline questionnaire, the potential respondents were first approached and asked if they agreed to participate in the survey; then they were asked to fill the questionnaire on the spot or they can send back the questionnaire in one week. Then, for the online questionnaire, the link of the Google form distributed to the potential respondent by email, WhatsApp, and text messages.

3.3. Data Processing Technique

This research used factor analysis for construct validity test, Cronbach’s Alpha scores for reliability test to compute the intention factors in choosing & willingness to pay for eco-Friendly shipping on last-mile delivery among the participants. The number of respondents expected is 208 respondents. Data processing with statistical analysis is used to interpret descriptive data from the questionnaire. After that, to get the value of the degree of relationship between the factors in the conceptual model, PLS-SEM software is used.

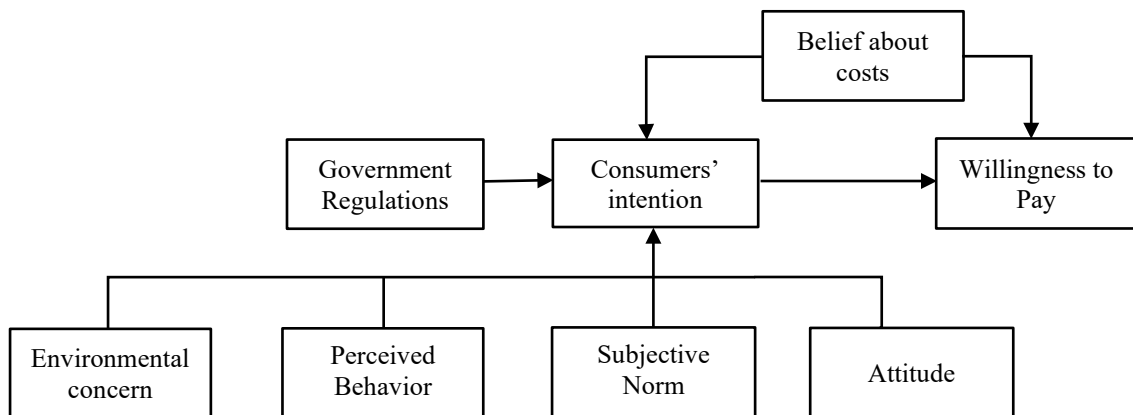


Figure 3. Conceptual Model of Consumers' Intention

4. Data Collection

There were 208 questionnaires sent to the individual respondent during one month and 208 were returned, of which all were valid and can be used for further data processing. As seen in Table 1, out of 208 respondents, the majority was female (62.98%). Most of them were 26 to 36 years old (58.65%). The majority of the respondent (73.56%) had graduates with a bachelor's degree, for marital status, 60.10% are unmarried and from the data obtained, it is also known that as many as 49.52% are workers in private companies and 47.12% have an income of IDR 5 million - IDR 10 million.

Table 1. Characteristic of the respondents

No.	Variables	Percentage	
1	Gender	Male	37.02 %
		Female	62.98 %
2	Age	Less than 18 years old	0.00 %
		18 – 25 years old	28.37 %
		26 – 36 years old	58.65 %
		More 36 years old	12.50 %
3	Education Level	Junior high school	0.00 %
		Senior high school	13.46 %
		Diploma	5.29 %
		Undergraduate	73.56 %
		Postgraduate	7.69 %
		Doctoral	0.00 %
4	Marital Status	Not married yet	60.10 %
		Married	39.90 %
5	Occupation	Civil Servants/State-Owned Enterprises	15.87 %
		Private Employees	49.52 %
		Lecturers/Teachers	8.17 %
		Entrepreneurs	4.81 %
		Students	16.35 %
		Housewives	2.40 %
		Others	2.88 %
6	Income per month	Less that IDR 2 Million	12.98 %
		IDR 2,000,001- IDR 5,000,000	24.04 %
		IDR 5,000,001- IDR 10,000,000	47.12 %
		IDR 10,000,001- IDR 15,000,000	11.06 %
		More than IDR 15,000,001	4.81 %

5. Results and Discussion

5.1 The Result of Construct Validity and Reliability

This research use factor analysis for construct validity test. There are three new factors that identified from this study: environmental concern, government regulations and belief about cost. From literature review mention separately that these three factors can indirectly influence Consumer's behavior. Most of interviewees generally considered environmental concern can affect consumer behavior to use eco-friendly shipping. The factor of belief about cost of technology that use for eco-friendly vehicle are consideration to implement eco-friendly shipping appropriately. Interviewees also argued that if there are some regulations from government that may indirectly encourage companies to be responsible for eco-friendly shipping.

This research uses Cronbach's Alpha scores to test the reliability of the scales. As seen in Table 2, all of the factors have satisfactory reliability.

Table 2. Reliability measurement

Latent Variable	Indicators	Indicators Reliability	Composite Reliability	AVE
LV.1: Attitude	ATT 2	0,81	0,906	0,62
	ATT 3	0,75		
	ATT 4	0,79		

	ATT 5	0,73		
	ATT 6	0,84		
	ATT 7	0,79		
LV.2: Subjective Norm	SN 2	0,87	0,942	0,73
	SN 3	0,91		
	SN 4	0,82		
	SN 5	0,92		
	SN 6	0,87		
	SN 7	0,72		
LV.3 Perceived Behavior	PBC 1	0,73	0,899	0,641
	PBC 2	0,84		
	PBC 3	0,84		
	PBC 4	0,84		
	PBC 5	0,75		
LV.4 Environmental concern	EC 1	0,86	0,862	0,680
	EC 2	0,81		
	EC 4	0,79		
LV.5 Government Regulations	GR 1	0,87	0,915	0,730
	GR 2	0,89		
	GR 3	0,88		
	GR 4	0,77		
LV.6 Belief about costs	BCI 1	0,89	0,916	0,732
	BCI 2	0,90		
	BCI 3	0,85		
	BCI 4	0,78		
LV.7 Consumers' intention	CI 1	0,82	0,917	0,69
	CI 2	0,88		
	CI 3	0,84		
	CI 4	0,77		
	CI 5	0,85		
LV. 8 Willingness to Pay	WTP 1	0,86	0,934	0,78
	WTP 2	0,89		
	WTP 3	0,91		
	WTP 4	0,88		

The reliability and validity model were ensured as most the indicators' outer loadings were scored between 0.72 and 0.92, which indicates a satisfactory indicator reliability (Table 2). All LVs indicates satisfactory internal consistency reliability as their composite reliability values ranged from 0.86 to 0.94 (Table 2). The convergent validity was satisfactory as AVE values ranged from 0.62 to 0.78. The discriminant validity was also satisfactory as the square root of the AVE value of each LV was greater than its highest correlation with other LVs (Table 3).

Table 3. Fornell-Larcker (discriminant validity) measurement

Variable	LV 1	LV 2	LV 3	LV 4	LV 5	LV 6	LV 7	LV 8
LV 1	0,78							
LV 2	0,44	0,85						
LV 3	0,66	0,43	0,80					
LV 4	0,51	0,30	0,51	0,82				
LV 5	0,45	0,25	0,51	0,50	0,85			
LV 6	0,01	0,06	0,14	0,08	0,16	0,86		
LV 7	0,66	0,42	0,71	0,58	0,58	0,16	0,83	
LV 8	0,50	0,48	0,57	0,43	0,48	0,20	0,72	0,88

5.2 Priorities in Key Categories of Consumers Intention and Correlation Analysis

The R^2 value of 0.62 indicated that 62% of the variance in Consumer’s intention was explained by the independent LVs (Figure 2). Among six proposed constructs, perceived behavior has a significant correlation with intention (p value < 0.05), followed by intentions that have a significant correlation to willingness to pay for eco-friendly shipping. Based on analysis on the model only two constructs show a significant influence on the willingness to pay of eco-friendly shipping from people perspective that used e-commerce in Indonesia. Belief about cost will indirectly be able to influence the consumer intention also the willingness to pay of eco-friendly shipping. Other factors like environmental concern and government regulation were found as a normal effect. Ajzen (2015) suggests that attitudes toward behavior are determined by beliefs about the consequences of a behavior. Beliefs are related to individual subjective judgments of the surrounding world, individual understanding of themselves and their environment, done by connecting between certain behaviors with various benefits or losses that might be obtained if individuals do or do not do it. This belief can strengthen the attitude towards the behavior if based on an evaluation conducted by an individual, data can be obtained that the behavior can provide benefits for them. Several previous studies support the findings of this research, that subjective norm is not a significant variable. The subjective norm seems to be the factor that contributes less to any explanation of the intention (Mannetti *et al*, 2004)

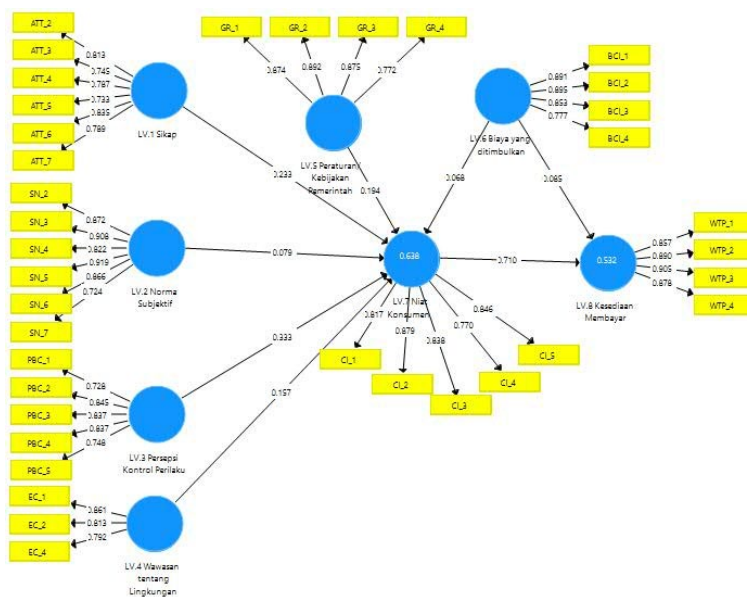


Figure 4. Results of Evaluation of the Eco-Friendly Shipping Structural Intention Model & Willingness to Pay for last mile delivery

6. Conclusion

Our research model is aimed at analyzing the impact of intentions on WTP for a choosing and use eco-friendly shipping. Additionally, we sought to analyze what motivates consumers’ intentions to choosing and use eco-friendly shipping. We expanded the theoretical framework of TPB by including additional vital constructs. Based on a comprehensive literature review, we recognized that factors such as consumer’s attitude, subjective norms, perceived behavioral control, belief about eco-friendly shipping cost, environmental concern and factor of government regulations might influence consumers’ intention and WTP for choosing and use eco-friendly shipping.

In line with the theory of planned behavior, we found that both consumer attitude as well as perceived behavioral control are positively associated with consumer intention to choosing and use eco-friendly shipping. Even after controlling for potential attitude-intention gap problems, we found that consumer attitudes had a particularly strong association with intention, and believe that using environmentally friendly shipping is a wise, beneficial attitude and can reduce environmental degradation.

We also found participants had high values in overall intentions to choosing and use eco-friendly shipping as well as attitude, perceived behavioral control. While eco-friendly shipping is a relatively new concept for consumers, these results suggest an overall positive outlook for consumers using the option of eco-friendly shipping system like electric

vehicle, Drone and bicycles for local / short distance and urban deliveries in order to not only improve environmental performance, but economic performance as well.

Contrary to the theory of planned behavior, we did not find a significant positive association between norm subjective and intention to choosing and use eco-friendly shipping. Underlying this may be an individual's perception that purchasing a choosing and use eco-friendly shipping may not be enough to contribute to greater environmental outcomes. In other side, the belief about eco-friendly cost negatively moderates the relationship between consumers' intention and WTP for choosing and use eco-friendly shipping. Eco friendly shipping are more costly than conventional shipping because of the new technology used (Buldeo Rai, Verlinde & Macharis, 2019). Therefore, additional cost becomes a major obstruction to eco-friendly shipping penetration. Other factors like environmental concern and government regulation were found as a normal effect. The results also show government regulations are expected to set standards, control and be more responsible for regulating the use of environmentally friendly shipping modes to protect the environment in the future.

In order to reduce these problems many countries have set targets for reducing emissions (Nakamura and Hayashi, 2013). Both organizations and government policies can reduce greenhouse gas emissions, specifically through proper use and education of consumers regarding green transportation and energy efficient fuels. Unfortunately, while using green transportation has both local and global benefits including reduction of air pollution (Sperling and Salon, 2002) a lack of consumer knowledge regarding the salient consequences can reduce intentions as well as WTP for eco-friendly shipping method. This study provides evidence regarding high levels of consumer intentions to choosing and use for eco-friendly shipping and ultimately their positive association with WTP.

Suggestions that can be given to further research by adding more latent variables that have a strong influence on behavior such as regulatory variables and delivery speed factor offered for eco-friendly shipping. In addition, adding respondents are also required to obtain more diverse results and accordance with circumstances of the consumer's perspective in Indonesia.

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Biography

Afriandi Ginting is a Master student of Industrial Management, Department of Industrial Engineering, Faculty of Engineering in Universitas Indonesia. He earned Bachelor of Engineering degree in Naval Architecture Engineering from Universitas Diponegoro. He is currently employed as a Project Team Leader in a steel fabricator company in Indonesia

Farizal is a senior lecturer in Management System in the Industrial Engineering Department, Faculty of Engineering Universitas Indonesia. He earned Bachelor of Engineering degree from Universitas Indonesia, Master degree from Oklahoma State University and Doctoral degree in from University of Toledo. His research interest in reliability design optimization, renewable energy, supply chain management and techno-economy.