

Willingness to Pay Carbon Offset Viewed from Individual, Organizational Factors and Public Perception of Carbon Offset: Study of Online Transportation Users in JABODETABEK - Indonesia

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Abstract

To support the reduction of national CO₂ levels, it is crucial to analyze the willingness to pay for carbon offsets as a consideration for carbon market policies in Indonesia. This study explores the willingness to pay for carbon offsets in the online transportation sector (Grab and Gojek) based on three factors (individual, organizational, and public). This study used a pragmatic sequential mixed method with 418 samples taken using a convenience sampling technique. The results are that pro-environmental behavior is a mediator variable between the individual and organizational levels on willingness to pay for carbon offsets. It is hoped that the results of this research can contribute to making policies related to carbon offset tariffs, which will technically be proposed by the Ministry of Environment and Forestry of the Republic of Indonesia, and the Indonesian Ministry of Finance will issue financial policies.

Keywords: willingness to pay; carbon offset; individual level; organizational level; public level; pragmatic sequential mixed method

1 Introduction

The Intergovernmental Panel on Climate Change (IPCC) report states that the issue of climate change, which has an impact on global warming (global warming), has been a world problem topic since 2003 [1]. Based on research conducted by the IPCC, global warming occurs due to increasing concentrations of greenhouse gases (GHG) in the earth's atmosphere. The most common type of GHG human activities produce is carbon dioxide (CO₂), a dangerous pollutant that must be addressed to limit climate change. The availability of a good quality environment is the right of every citizen, especially in Indonesia. This is as stated in the 1945 Constitution article 28 H paragraph 1: "Everyone has the right to live in physical and spiritual prosperity, to have a place to live, and to have a good and healthy living environment and the right to receive health services."

The transportation sector is the most significant contributor to environmental pollution, which causes the earth's temperature to rise. The largest transportation sector is contributed by the land transportation sector, amounting to 73% of total CO₂ emissions. As a result, high concentrations of GHGs cause air pollution, worsening air quality, and increased health risks. The various symptoms of the disease that result are headaches, decreased consciousness, convulsions, visual disturbances, nervous system injuries, and damage to fetal development in pregnant women, even death [2]. To reduce GHG emissions internationally, all countries have agreed to a mechanism for balancing carbon emissions and carbon absorption called Carbon Offset. Carbon offsets are defined as reductions in carbon dioxide or other greenhouse gas emissions or increases in carbon storage to compensate for emissions created elsewhere (GHG Institute, n.d.). In European and American countries, they have implemented policies related to carbon offsets, namely voluntary carbon offsets (VCO) for the aviation industry [3]. The policy regarding VCO allows passengers to use the website to calculate the carbon emissions resulting from their journey. Passengers can then use methods, such as personal payments or redemption of bonus points, to compensate ("offset") the economic costs of carbon dioxide emissions or to donate to tree planting programs or other environmental projects implemented by relevant agencies [3].

Implementing policies related to VCO is in line with programs implemented by online transportation companies in Indonesia, such as Grab and Gojek. Grab and Gojek carry out carbon emission reduction programs through tree planting and other environmental conservation programs. Indonesia carries out market-based implementation to reduce national emissions. The carbon market is a collection of needs/desires for rights to greenhouse gas emissions in ton-CO₂ equivalent units [4]. Based on how the carbon market is formed, there are two types: the Voluntary Carbon Market and the Mandatory Carbon Market. The Voluntary Carbon Market is a market that occurs because of the desire to reduce GHG emissions from an activity carried out and not because of an obligation. At the same time, the Mandatory Carbon Market is a market formed because of a policy that requires reducing and limiting the amount of GHG emissions. Indonesia is still a voluntary carbon market, especially in online transportation. Some examples of online transportation aim to support the reduction of GHG emissions, such as Gojek with the GoGreener application feature and Grab with the Grab for Good application feature (Leave Good Traces for the Earth).

As a result of increasing consumer concern for the environment, today's consumers often make purchasing decisions based on how products meet their needs while minimizing negative impacts on the natural environment [5]. In addition, green consumers are often willing to pay more for environmental characteristics and are part of the primary target market for environmentally friendly products. In this research, willingness to pay is called willingness to pay (WTP). One of the constructs in economics and psychology related to environmental sustainability is willingness to pay (WTP). WTP is consumers' maximum price for a product or service [6]–[9]. According to Zhao & Kling (2004), WTP is the maximum price of a good that consumers want to buy at a particular time. Research on WTP for carbon offsets has also been widely researched in various subjects, for example, airplane passengers such as travelers or passengers who usually use air transportation [3], [11]–[14]. In this research, researchers focused on WTP for carbon offsets in online transportation.

Regarding WTP, researchers found in previous literature, namely Pratiwi & Pratomo (2018) and Vicente et al. (2021), placed PEB as a mediator but did not test it, only directly testing PEB on WTP. Hence, the researchers developed the model by testing PEB as a mediator between individual, organizational, and social factors on WTP.

Individual factors and the Theory of Planned Behavior (TPB) can explore how psychological factors influence the willingness to pay for carbon offsets. Understood as behavioral intention, WTP can also be predicted using the concept developed by Ajzen (1991) in TPB theory (Pouta & Rekola, 2001). TPB theory is also widely used to explain pro-environmental behavior (PEB) and willingness to pay (WTP). This research will discuss each connection path between environmental attitude, environmental subjective norms, perceived behavioral control, and pro-environmental behavioral intentions, which can encourage individuals to be willing to pay for carbon offsets.

According to TPB theory, intention is the only direct determinant of behavior; intention to carry out behavior is a function of attitudes towards behavior, subjective norms, and perceived behavioral control. Attitude toward carbon offset (ACO) has been used to predict PEB in several previous studies by Bidang [17]–[19]. Laroche et al. (2001) also stated that environmental attitudes are the most significant predictor of consumers' willingness to pay more for environmentally friendly products. Apart from attitudes, subjective norms (Subjective Norm/[SN]) are essential in influencing WTP. In this research, expectations from close friends and family regarding willingness to pay for carbon offsets are translated as subjective norms. Perceived behavioral control (PBC) is expected to be a factor that can encourage individuals to have pro-environmental behavioral intentions so that they are willing to pay for carbon offsets. This is in line with the research of Bidang Vicente et al. (2021), which proves that PBC has a direct positive influence on the willingness to pay for environmental quality.

Apart from individual factors, organizational factors might influence WTP, namely company trust (Trust in Company/[TC]). To the researcher's knowledge, the literature regarding TC on WTP still needs to be expanded, and no one has discussed WTP carbon offsets. Trust is a critical factor that may influence pro-environmental behavior and WTP. A level of trust ideally exists between individuals and experts (or institutions and organizations acting as experts). According to Bidang Rousseau et al. (1998), trust is a psychological state of the intention to accept vulnerability based on positive expectations of other people's intentions or behavior. Trust is a multi-dimensional concept involving one entity and various sources [21].

The level of trust can significantly influence the outcome of exchanges in relationships between stakeholders [22], [23].

Apart from organizational factors, namely the level of trust in the company, there is also the extent to which individuals comply with the perceived policies implemented by the government. One factor other than the organizational level is how the public perceives policies related to environmental awareness resulting from online transportation. Therefore, the researcher chose the public perception variable regarding compliance with carbon offset regulations (public perception of regulation carbon offset/[PPRCO]) to find out to what extent the rules can be perceived by the public so that they can encourage people to spend money on environmental awareness.

Public perception is the aggregate view of a group of people (usually a randomly selected sample) who are asked directly what they think about a particular issue or event Bidang [24].

In addition, CE in this research is a predictor variable at the individual, organizational, public, and societal levels. Consumer knowledge has been shown to strongly impact decision-making in various domains and is an essential topic in consumer research [25]. Research conducted by Denton et al. (2020) proved that subjective knowledge and objective knowledge have a positive effect on attitudes toward carbon offset, subjective norms, and perceived behavioral control and found results that the path coefficient for accurate knowledge was higher than personal knowledge when tested against attitude toward carbon offset.

This study also predicted TC by environmental knowledge (EK). EK is considered to influence TC. This is in line with the research of Bidang Denton et al. (2020), which proves that subjective knowledge has a positive and significant effect on company trust in reducing carbon emissions. [27] confirmed that individuals who have personal knowledge about water regulatory institutions can increase their institutional trust. Cook et al. (2010) also say that increasing knowledge positively influences institutional trust.

The urgency of this research is because this research topic has become a global issue since 2003. Judging from the contribution of air pollution in Jakarta from the carbon dioxide transportation sector, the most significant contribution is 93.2% [29]. The environmental damage that occurs can have a substantial impact on individual psychological conditions such as anxiety, depression, and psychosis, which can impact the quality of human life Bidang[30]. Apart from the psychological impact, it also affects physical health, such as diarrhea, dengue fever, and other diseases [31]. Apart from that, previous research emphasized only individual factors such as [3], [13], [16], [32], [33].

This research assesses the WTP for carbon offsets in the transportation sector, especially online transportation (Grab and Gojek). Researchers focus on the millennial generation to Generation Z, who are already familiar with online transit. As the researchers know, this study tests WTP based on three factors (individual, organizational, public, and societal level).

Based on this background, the following hypothesis is formulated:

Hypothesis 1: Pro-environmental behavior plays a significant role in predicting willingness to pay for carbon offsets.

Hypothesis 2: Pro-environmental behavior plays a significant role as a mediator in the relationship between attitude toward carbon offset and willingness to pay for carbon offset.

Hypothesis 3: Pro-environmental behavior plays a significant role as a mediator in the relationship between environmental subjective norms and willingness to pay for carbon offsets.

Hypothesis 4: Pro-environmental behavior plays a significant role as a mediator in the relationship between perceived behavioral control and willingness to pay for carbon offsets.

Hypothesis 5: Pro-environmental behavior plays a significant role as a mediator in the relationship between company trust and willingness to pay for carbon offsets.

Hypothesis 6: Pro-environmental behavior plays a significant role as a mediator in the relationship between public perception of the regulation of carbon offset and willingness to pay for carbon offset.

Hypothesis 7: Environmental knowledge plays a significant role in predicting environmental attitudes, environmental subjective norms, perceived behavioral control, company trust, and public perception of regulation carbon offset.

2 Materials And Method

This research uses the pragmatic sequential mixed method, namely conducting quantitative research first and then exploring the depth of the results obtained from the quantitative using a qualitative approach (Quantitative > Qualitative) and distributing questionnaires with the help of Google Forms to get quantitative data. Semi-structured interviews will be conducted with several Millennial Generation online motorcycle taxi users to obtain qualitative data. This research has received approval from the Research Ethics Commission of the Indonesian Catholic University Atma Jaya that this research does not violate ethics and is permitted to be carried out as stated in the Ethical Clearance Approval number 0002F/III/PPPE.PM.10.05/05/2023 on May 10, 2023.

2.1 Participant

The population of this research is all Millennial and Generation Z online motorcycle taxi users throughout Jabodetabek. The selection of respondents in this study used nonprobability sampling, namely convenience sampling, resulting in a total sample of 418 users of online transportation services. The number of samples was determined using the Slovin formula based on $\alpha=0.05$, so the minimum number of samples was calculated as 400.

2.3 Measurement

Willingness to pay of carbon offset by adapting a measuring tool from Bidang (Bateman et al., 2013; MacKerron et al., 2009), which uses contingent valuation (CV) polytomous choices in determining the size of the offer using the close-ended question method. assuming that an item, in this case, a carbon offset, can be described based on its characteristics, thereby enabling information to be extracted from respondents, such as the economic value of carbon offsets, for example, the item "I plan to contribute funds for carbon offsets regularly." The scale used is a Likert scale with the options of strongly agree, agree, not sure, disagree, and strongly disagree.

Pro-Environmental Behavior adapted a measurement tool from Larson et al. (2015) with a Likert scale and scoring 5-4-3-2-1 (always - often - sometimes - rarely - never) with the example item "using a bicycle as a means of transportation over short distances."

Attitude toward carbon offset adapts a measuring tool from Denton et al. (2020) and Dunlap et al. (2000) with a Likert scale and scoring 5-4-3-2-1 (strongly agree-agree-no opinion-disagree-strongly disagree) with the example item "I like having ideas for offsetting carbon emissions in my daily life."

Environmental subjective norm adapts a measuring tool from Denton et al. (2020), Kashif et al. (2015), and Kashif et al. (2018) with a Likert scale and scoring 5-4-3-2-1 (strongly agree-agree-no opinion-disagree-strongly disagree) with the dimensions of injunctive norms, descriptive

norms, and moral norms with the example item "Friends- My friend thinks that donating to carbon offsets is an obligation."

Perceived behavioral control by adapting the measuring tool from Denton et al. (2020) and Kidwell & Jewell (2003) with a Likert scale and scoring 5-4-3-2-1 (strongly agree-agree-no opinion-disagree-strongly disagree) with an example dimension of the item "I have a role in balancing carbon emissions."

Company trust was prepared by adapting the measuring tool from Denton et al. (2020), Lang & Hallman (2005), Nunkoo et al. (2012), and Hartman et al. (2017) with a Likert scale and scoring 5-4-3-2-1 (strongly agree-agree-no opinion-disagree-strongly disagree) with the example item "I believe Gojek/Grab can manage GO GREENER/GRABFORGOOD in the context of carbon offset well".

Public perception of carbon offset was prepared by adapting a measuring tool from Jafari Shalamzari et al. (2016) and Denton et al. (2020) with a Likert scale and scoring 5-4-3-2-1 (strongly agree-agree-no opinion-disagree-strongly disagree) with the example item "I feel that the regulations regarding carbon offsets implemented by the government are good."

Environmental Knowledge of Carbon Offset by adapting a measuring tool from DeChano (2006) with a multiple-choice scoring method of 1 – 0 (true – false) using the cognitive domain C2 (understanding), which is reviewed through factors such as (1) human activity; (2) Carbon Offset; (3) air pollution.

2.4 Data Analysis

This quantitative data uses Structural Equation Modeling (SEM) data analysis techniques. This is because the number of variables is relatively large (8), and the sample size is quite large. Apart from wanting to see the relationship between variables in the model being studied, the researcher wants to test the final model of the hypothesized variable relationship, which meets the proposed hypothetical model's goodness of fit criteria or parameters.

3 Result And Discussion

Based on the results of CVM analysis with crosstabulation statistical techniques using SPSS ver. 25, it resulted that of the 418 respondents more were willing to pay carbon offsets, namely 329 (with a percentage of 78%), when compared to those who were not willing to pay carbon offsets. The data also reveals that, regardless of income, more people desire to pay for carbon offsets than those who do not. Apart from that, both research samples who earned income < IDR 1,000,000 to > IDR 10,000,000 chose to pay carbon offsets with the lowest rupiah option, < IDR 2,000/Km. Furthermore, most online motorcycle taxi application users in all regions in the JABODETABEK area are willing to pay carbon offsets (a percentage of up to 78.7%). Then, more than half of the sample of online motorcycle taxi users in JABODETABEK chose to be willing to pay < IDR 2,000/Km for carbon offsets.

Next, data analysis was carried out using structural equation modeling (SEM). In the CFA analysis (see Figure 1), the reliability of all constructs was found to be good, with construct reliability (CR) ≥ 0.70 , including good reliability and an AVE value < 0.50, indicating adequate convergence (Hair, 2010). Even though the AVE value is smaller than 0.5, Fornell, C & Larcker (1981) stated that if the AVE value is less than 0.5 but the CR value is more significant than 0.6, this is still acceptable. It can be concluded that all instruments/measuring tools used in this research are valid and reliable. After that, path analysis was carried out, and goodness of fit was looked at to determine the overall suitability of the model using the Lisrel 8.70 application. After that, it turned out that the proposed structural model was not fit, so it was re-specified three times. After respecification three times, the goodness of fit results were obtained: (1) Absolute Fit Measures: Chi-square value, namely 654.00 and $p = 0.0 < 0.05$. The Chi-square value is 654.00, and $p = 0.0 < 0.05$. These results show that the fit is not good; the RMSEA value is 0.077, which means an RMSEA value ≤ 0.05 indicates good model ability in terms of matching/fitting data (good fit) and the 90% confidence interval of RMSEA (0.071; 0.084), which is This means that the RMSEA value is still within the interval range so that RMSEA has good accuracy, and the ECVI model value is 10.65, ECVI saturated 3.74 and ECVI independence 59.47. This value of the ECVI model is closer to ECVI saturated, which means that the overall fit of the model is said to be good (good fit); (2) Incremental Fit Measures: The NFI value is 0.93 which means it ranges between 0 and 1 and the NFI value ≥ 0.9 indicates the model's ability to fit the data (good fit), the NNFI value which is 0.93 means it ranges between 0 and 1 and an NNFI value ≥ 0.9 indicates the model's ability to match the data (good fit), an RFI value of 0.91 means it ranges between 0 and 1 and an RFI value ≥ 0.9 indicates the model's ability to match data (good fit), the IFI value is 0.95, which means it ranges between 0 and 1 and the IFI value ≥ 0.9 indicates the model's ability to match the data (good fit), the CFI value is 0.95, which means it ranges between 0 and 1 and a CFI value ≥ 0.9 indicates the model's ability to fit the data (good fit); (3) Parsimony Fit Measures: AIC model value 786.00, AIC saturated 506.00, and AIC independence 11105.03. This value shows that the AIC model is closer to AIC saturated, which means the overall fit of the model is said to be good (good fit), and the PGFI value of 0.64 states that the overall fit of the model is good (good fit) because it still ranges between 0 and 1, and The PNFI value of 0.75 states that the overall fit of the model is good because it still ranges between 0 and 1. The discussion presented previously shows that only 1 of the 11 GOF measures shows a poor fit, so it can be concluded that the model's overall fit is good (good fit).

Based on the results of path analysis, the results of testing hypothesis 1 obtained $\beta=0.49$, $SE=0.062$, $t=7.94$ ($t\text{-value} > 1.96$), meaning that pro-environmental behavior was proven to play a significant role in predicting willingness to pay carbon. Offset. Hypothesis 3 reveals that $\beta=0.10$, $SE=0.030$, $t=3.48$ ($t\text{-value} > 1.96$) on the environmental subjective norm path in predicting pro-environmental behavior gets significant results, so hypothesis 3 can be proven through the Sobel test. The Sobel test results obtained a result of 3.19 with a p-value of 0.0014, which indicates that it is proven that pro-environmental behavior plays a significant role as a mediator in the relationship between environmental subjective norms and willingness to

pay for carbon offset. Because the direct influence between environmental subjective norms and willingness to pay for carbon offsets is significant ($\beta=0.052$, $SE=0.015$, $t=3.37$ ($t\text{-value} > 1.96$)), pro-environmental behavior has a role as a partial mediator in this relationship.

Hypothesis 4 reveals that $\beta=0.10$, $SE=0.030$, $t=3.48$ ($t\text{-value} > 1.96$) on the path of perceived behavioral control in predicting pro-environmental behavior gets significant results, so hypothesis 4 can be proven through the Sobel test. The results of the Sobel test were 3.19 with a p-value of 0.0014, indicating that pro-environmental behavior was confirmed to play a significant role as a mediator in the relationship between perceived behavioral control and willingness to pay for carbon offset. Because the direct influence between perceived behavioral control and willingness to pay for carbon offset is significant ($\beta=0.052$, $SE=0.015$, $t=3.37$ ($t\text{-value} > 1.96$)), pro-environmental behavior has a role as a partial mediator in this relationship.

Hypothesis 5 gets results $\beta=0.20$, $SE=0.063$, $t=3.18$ ($t\text{-value} > 1.96$) on the company trust path in predicting pro-environmental behavior gets significant results, so hypothesis 5 can be proven through testing Sobel. The Sobel test results obtained a result of 2.95 with a p-value of 0.032, which indicates that pro-environmental behavior has been established to play a significant role as a mediator in the relationship between company trust and willingness to pay for carbon offsets. Because the direct influence between company trusts and willingness to pay for carbon offsets is significant ($\beta=0.098$, $SE=0.032$, $t=3.10$ ($t\text{-value} > 1.96$)), pro-environmental behavior has a role as a partial mediator in this relationship.

In this way, PEB can act as a partial mediator variable between the variable's environmental subjective norm, perceived behavioral control, and company trust in willingness to pay for carbon offset.

The research results on hypothesis 1 reveal that pro-environmental behavior significantly predicts willingness to pay carbon offsets. This is also supported by research that reveals that pro-environmental behavior is one of the factors in predicting an individual's willingness to pay (Trivedi, 2015). Although in research conducted by Trivedi (2015), pro-environmental behavior was one of the factors in predicting willingness to pay for purchasing environmentally friendly products, it turns out in this research that pro-environmental behavior was proven to play a significant role in indicating willingness to pay for environmentally friendly products—Carbon offset. Of course, the significant results of hypothesis 1 are also a way to prove other research hypotheses.

The evidence for this is that the results of hypothesis 2 testing accept H_0 because it cannot be proven that pro-environmental behavior can mediate between environmental attitude and willingness to pay. Of course, this happens because there is an insignificant relationship between environmental attitude and pro-environmental behavior. It turns out that after studying it in more depth, the environmental attitude variable makes the structure of the research model in this study not "fit." This may be because many respondents remain indifferent to the dangers posed by carbon offsets. This problem is supported by the results of qualitative data analysis, which showed that several participants said they did not feel they would lose anything if they did not pay for carbon offsets. In the end, respondents became reluctant to pay for carbon offsets.

The research conducted by Doran et al. (2015) revealed that attitude does not have a significant relationship with willingness to pay to protect the environment. This aligns with the research of Bidang Soeharso et al. (2023), which explains that environmental attitude does not have a significant relationship with pro-environmental behavior. Based on that, the expenditure of the environmental attitude variable in the research model proves that due to the absence of coercion or regulations that require the community to pay for carbon offsets, respondents in this study ignored paying for carbon offsets. Therefore, a policy is needed in society to encourage them to make carbon offset payments.

This study proved that pro-environmental behavior can be a partial mediator variable in the influence of environmental subjective norms on respondents' willingness to pay for carbon offsets. This is proven by the significant direct impact of environmental subjective norms on willingness to pay for carbon offsets. However, the proof that pro-environmental behavior can be a partial mediator variable in the influence of subjective environmental norms on respondents' willingness to pay for carbon offsets is a novelty from this research. This means that whether or not there is a pro-environmental behavior variable, there is still an influence between environmental subjective norms and willingness to pay for carbon offset. Based on this, the intention to pay for reducing carbon emissions for the people of Jabodetabek can be influenced by environmental norms without having good pro-environmental behavior. This is supported by the results of qualitative data analysis in which most research participants revealed that they felt the need to participate in making carbon offset payments because of the motorized vehicles they use daily. Their statements show that

they continue to use motorized vehicles that use oil fuel (not a pro-environmental action). Still, they realize that there are norms that they are violating, namely, destroying the environment by contributing to the addition of carbon in the environment, so they have the intention to make carbon offset payments.

This study proved that pro-environmental behavior can be a partial mediator variable in the influence of perceived behavioral control on respondents' willingness to pay carbon offsets. This is proven by the significant direct influence of perceived behavioral control on willingness to pay carbon offsets. However, the proof that pro-environmental behavior can be a partial mediator variable in the influence of perceived behavioral control on respondents' willingness to pay for carbon offsets is a novelty from this research. This means that whether or not there is a pro-environmental behavior variable, there is still an influence between perceived behavioral control and willingness to pay for carbon offset. Based on this, the intention to pay for reducing carbon emissions for the Jabodetabek community can be influenced by the individual's perceived behavioral control without having good pro-environmental behavior. This is supported by the results of qualitative data analysis in which the majority of research participants revealed that they could feel it directly from their participation in paying carbon offsets to the service provider company, one of which was that when they traveled using the company's services, they got a lift using an electric motorbike. This indicates an excellent public perception towards companies providing carbon offset payment services, namely that the funds used in these payments are used in activities that reduce carbon emissions.

This study proved that pro-environmental behavior can be a partial mediator variable in the influence of company trust on respondents' willingness to pay for carbon offsets. This is proven by the significant direct impact of company trust on willingness to pay for carbon offsets. However, the proof that pro-environmental behavior can be a partial mediator variable in the influence of company trust on respondents' willingness to pay for carbon offsets is a novelty from this research. This means that whether there is a pro-environmental behavior variable, there is still an influence between company trust and the willingness to pay for carbon offsets. Based on this, the intention to pay for reducing carbon emissions for the people of Jabodetabek can be influenced by people's trust in the organizers of carbon offset activities without having good pro-environmental behavior. This is supported by the results of qualitative data analysis in which the majority of research participants revealed that they could feel it directly from their participation in paying carbon offsets to the service provider company, one of which was that when they traveled using the company's services, they got a lift using an electric motorbike. This indicates that participants in the company providing carbon offset payment services feel a sense of trust that the funds used in the payment are used in activities that reduce carbon emissions.

The participants' feelings of excitement towards the use of electric motorbikes to replace oil-fueled motorized vehicles among consumers who pay carbon offsets indicate that this is objective evidence of pro-environmental behavior and can also be a mediator between consumers' feelings of trust in the company and their intention to pay carbon offsets. Therefore, it can be concluded that for the public to participate in the government's program to reduce carbon emissions by donating carbon offsets to companies providing carbon offset services, it is essential to create policies to increase company trust and community pro-environmental behavior. Based on the conclusions that have been presented, a suitable structural model was obtained using the variables willingness to pay of carbon offset, pro-environmental behavior, environmental subjective norms, perceived behavioral control, and company trust obtained from several respecifications up to 3 in finally proven to be "fit" or compatible with research data. This could be because the variables of environmental knowledge, environmental attitude, and public perception of carbon offset regulation among research respondents cannot influence their willingness to pay. The evidence for this is from the results of hypothesis testing, which reveal that hypotheses 2 and 6 accept H0 because it cannot be proven that pro-environmental behavior can act as a mediator variable between environmental attitudes. It is also essential to create policies by authorized institutions such as the Ministry of Environment and Forestry, the Ministry of Finance, and city governments to encourage them to make carbon offset payments.

Based on the research results presented, it was found that the public perception of the regulation carbon offset variable among research respondents was not a factor that could influence their willingness to pay. The evidence for this is from the results of hypothesis testing, which reveal that hypothesis 6 accepts H0 because it cannot be proven that pro-environmental behavior can act as a mediator variable between public perception of regulation carbon offset and willingness to pay. Of course, this happens because there is an insignificant relationship between public perception of carbon offset and pro-environmental behavior. This problem is supported by the results of qualitative data analysis, which showed that several participants

said they did not feel they would lose anything if they did not pay for carbon offsets. In the end, respondents became reluctant to pay for carbon offsets.

Research conducted by Acquah & Onumah (2011) stated that perception and willingness to pay have a negative relationship. This is reinforced by research conducted by Han and Cheng (2020), who found that a person's perception cannot always influence an individual's pro-environmental behavior. Based on that, the expenditure of public perception of regulation carbon offset variables in the research model proves that due to the absence of coercion or regulation requiring the public to pay for carbon offsets, respondents in this study ignored paying for carbon offsets even though they knew the dangers of carbon accumulation in the environment. Therefore, a policy is needed in society to encourage them to make carbon offset payments.

This could be because the environmental knowledge variable in research respondents is not a factor that can influence their willingness to pay. Of course, this happened because knowledge of carbon offsets turned out that after further study, the structure of the research model in this study was not "fit." This may be because many respondents still do not know about carbon offsets or what carbon offsets are but still do not care about the dangers posed by carbon offsets. This problem is supported by the results of qualitative data analysis, which showed that several participants said they did not feel they would lose anything if they did not pay for carbon offsets. In the end, respondents became reluctant to pay for carbon offsets.

Research conducted by Myung (2018) revealed that environmental knowledge also has an insignificant relationship with willingness to pay. Based on that, the exclusion of ecological knowledge variables in the research model proves that the possible consequence of not knowing the dangers of carbon offsets is that respondents in this study ignore paying for carbon offsets. Therefore, it is necessary to circulate or educate the public about the dangers of carbon offsets to encourage them to make carbon offset payments.

Based on the results presented, a suitable structural model was obtained using the variables willingness to pay for carbon offset, pro-environmental behavior, environmental subjective norm, perceived behavioral control, and company trust obtained from several specifications up to 3 and proven to be "fit" or compatible with research data. This research also examines the fee consumers want to pay for carbon offset to service provider companies, namely less than 2000 rupiah/KM. This is supported by qualitative data, which states that participants want to contribute to carbon offsets because one of the prices they are encouraged to donate is a low price that does not burden consumers. Therefore, determining this price is an input for carbon offset service providers in determining carbon offset payment rates. Apart from that, it can also be used as study material regarding carbon offset rates, which will technically be proposed to the Indonesian Ministry of Transportation regarding online transportation rates, the Indonesian Ministry of Environment and Forestry regarding the economic value of carbon, and the Indonesian Ministry of Finance regarding the determination of a carbon tax which could be a plan in the future if wants to decide whether there are regulations that apply to the public in paying carbon offsets.

The research limitations in this study lie in the lack of discussion about carbon offsets either in print media, mass media, or in school environmental lessons, so the level of public knowledge regarding carbon offsets is not very good, making it difficult to carry out research using environmental knowledge variables regarding carbon offsets. Apart from that, the population coverage in this study is only limited to Jabodetabek, so the research results can only discuss people in Jabodetabek. Researchers hope that in future research, the population can be expanded again.

4 Conclusion

PEB, ESN, PBC, and CT influence willingness to pay a certain amount to buy carbon offsets. Individual knowledge and attitudes towards the environment and public perceptions of policies do not significantly influence individual knowledge and attitudes towards the environment. The implication is that more robust policies are needed from the government and law enforcement against people who do not comply with government policies. The structural relationship model formed from the variables willingness to pay for a carbon offset, pro-environmental behavior, environmental subjective norm, perceived behavioral control, and company trust obtained from several specifications up to 3 was ultimately proven to be "fit" or matched the data study.

The pro-environmental behavior of online transportation users is not proven to be a mediator between attitudes toward the environment and their willingness to pay for carbon offsets. Furthermore,

online transportation users' pro-environmental behavior is proven to mediate between subjective environmental norms and their desire to pay for carbon offsets.

The pro-environmental behavior of online transportation users is a mediator between perceived behavioral control and their willingness to pay for carbon offsets. Online transportation users with good environmental knowledge have not been proven to influence their attitudes, subjective norms, perceived behavioral control, trust in companies, and their perceptions of regulations regarding carbon offsets. The implications are that through the Ministry of Transportation, the government can immediately set a carbon offset fee for online transportation of < IDR 2,000 / trip. Apart from that, the government, through the Ministry of Finance of the Republic of Indonesia, can immediately establish regulations regarding carbon tax for business actors whose activities produce several carbon emissions that can disrupt the health quality of online transportation users. Thus, the motivation of online transportation users to pay for carbon offsets can be increased. To increase pro-environmental behavior and willingness to pay carbon offsets for the millennial generation and Generation Z, it can be applied through various activities organized by leaders of organizations, companies, or the government.

To encourage business actors to prevent greenhouse gas emissions, the Ministry of Environment and Forestry can increase supervision over business actors or companies that obtain business permits in forest areas but have not complied with regulations related to reducing carbon emissions. Through efforts to achieve the national contribution target for reducing carbon emissions (NDC = Nationally Determined Contribution), the Ministry of Environment and Forestry as the national focal point in efforts to reduce greenhouse gas emissions can further optimize the role of public consultation centers regarding FOLU NET SINK and the carbon economic value of businesses—non-extractive environmental services.

This research proves that theoretically, modeling at the individual, organizational, and social levels of analysis can be integrated to encourage people to be willing to pay a certain amount for (WTP) towards carbon offsets. In specific cultural contexts, especially in communities that do not yet have a high level of concern for environmental preservation and continuity, which has an impact on the quality of human health, the variables of knowledge and attitude towards the environment need to be studied further whether they are due to minimal cognitive/knowledge factors or due to low willingness or attitude. Because there are no repressive factors from the government that can force people to pay a certain amount of money for carbon offsets.

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