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# The Willingness to Pay for Light Electric Vehicles in the City of Manila, Philippines

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## ABSTRACT

**Purpose:** As the use of electric vehicles (EV) emerges in various countries, governments have been engaged to adopt the alternative vehicle and implemented policies to promote and develop the industry of EV. However, to adopt electric vehicles it is vital to identify the attitudes of consumers towards the new mode of transportation. This study examined the determinants of consumers' willingness to pay for light electric vehicles.

**Methodology:** The study conducted a research survey with 385 respondents in Manila City, using a quantitative research design and partial least squares structural equation modeling (PLS-SEM), to determine their willingness to pay (WTP) for light electric vehicles (LEVs).

**Findings:** The findings of the study indicate that age, educational attainment, income, environmental benefits, cost, safety, speed, and policy do have a positive influence on WTP. Consequently, sex does not have a significant impact on willingness to pay, suggesting that it could be a significant indirect driver relative to other determinants of WTP.

**Unique Contribution to Theory, Practice and Policy:** The study recommends providing a direct form of subsidy, such as fiscal incentives, to support the growing perceived demand for LEV. Moreover, the Philippine government should lift the ban on light electric vehicles on national roads, as this will significantly contribute to the growth of the electric vehicle industry in the Philippines.

**Keywords:** *Willingness to Pay, Electric Vehicles, Policy*

## Introduction

Nations all over the world have engaged to promote the use of electric vehicles (EV), and governments have been committed to implementing them through road policies and development; however, the adoption of alternative vehicles is relatively costly and expensive (Lopez et al., 2021). Aside from promoting and adopting electric vehicles, there is still a lack of research on consumers' attitudes and willingness to pay for these new modes of transportation (Zhu et al., 2019). In order to adopt electric vehicles in a country, one of the many ways is to impose a policy in regard to the use of EVs and according to Liu and Lai (2020) implementing a policy, encourage the consumers to react to a certain legislation. Therefore, to promote the development of electric vehicles in the country, the Philippine government has enacted RA 11697 or "An act of providing for the development of the electric vehicle industry." This legislation aims to support industry growth and promote greener mobility by reducing harmful emissions. It also aims to promote the use of electric vehicles; however, the government's recent regulation such as MMDA regulation no. 24-002 which imposes the banning of light electric vehicles on national roads within Metro Manila. Hence, this study will assume that the growth and development of the light electric vehicle industry have been hindering the aforementioned policy.

As the global market for electric vehicles continues to grow, it is evident that battery electric vehicles are emerging as a viable alternative mode of transportation, especially since they are widely known as eco-friendly vehicles (Ding et al., 2017; Macioszek, 2019). Furthermore, motorcycles or bikes are one of the most convenient modes of transportation, and as environmental issues have been concerning, the use of electric vehicles helps to reduce harmful emissions (Hernandez et al., 2019; Eccarius & Lu, 2020). According to a study by the Philippines Institute for Development Studies (PIDS), electric trikes accounted for 56.76% of all registered electric vehicles in the Philippines, while electric motorcycles accounted for 35.65% from 2010 to 2019. Hence, e-trikes and e-motorcycles have been dominating the EV industry for a decade, and they have been the biggest contributor to avoiding air pollution. (Carranza et al., 2022).

Despite the recent push to use electric vehicles in the country, the literature still lacks information on demand characteristics and preferences for specific types of electric vehicles in the Philippines, particularly light electric vehicles. Therefore, the goal of this study is to determine the factors that influence consumers' willingness to pay (WTP) for light electric vehicles in the city of Manila, Philippines. Specifically, this paper aims to identify the relationship between WTP, and the following explanatory variables: (1) social & economic aspects; and (2) consumer valuation.

This analysis holds relevance for the following reasons: First, the considerations of consumers when buying a specific product or service and their willingness to pay a specific price for light electric motorcycles are relatively important as they can reveal individuals' attitudes and demand patterns for the electric-powered vehicle industry. It is also important to understand consumers' preferences for producers to adjust their strategies in the market to meet the determining factors of the demand for battery electric vehicles (Tuladhar et al., 2023; Lu and Hsee, 2019). Second, the

impact of light electric vehicles has been extremely beneficial for drivers who spend considerable time driving, as they're at high risk of developing respiratory diseases that can transmit from air pollution, and since electric vehicles are ecologically friendly, it helps to reduce harmful emissions (Joya et al., 2020). Additionally, the study's findings on consumers' willingness to pay for light electric vehicles offer valuable insights for policymakers. These insights will enable policymakers to design effective policies that encourage the adoption of electric vehicles. Furthermore, this study can serve as a reference point for future researchers, providing them with parameters to guide their own studies.

## Review of Related Literature

### *2.1 Consumers' Intention to Pay*

An individual's willingness to buy and pay often has the fundamental design of shifting consumer perceptions towards their intention. As per the definition of Lu and Hsee (2019), the WTB is the intention to buy a certain commodity, and the WTP is the ability to purchase a certain economic good at a given price. The application of willingness to buy and pay has been valuable for researchers in various fields, where it can also apply to the growing industry of electric motorcycles. A study by Eccarius and Lu (2019) categorized the theories that could explain the WTP into five groups: (1) the theory of planned behavior; (2) normative theories; (3) theories about symbols, lifestyle, and self-identity; (4) the theory of the diffusion of innovation; and (5) the theory of consumer emotion. As the study assumes, these essentially produce two affecting factors, which are (a) attitudinal factors (technical, cost, and contextual); and (b) social and individual factors (social and individual demographic). As studies further analyze consumers' willingness to pay, it is vital to understand the factors that drive their intention to purchase and capability to pay, specifically in the market for electric motorcycles. The study presented by Zhang et al. (2023) exhibits the responses of individuals in Macau, wherein their WTB and WTP for an electric vehicle were 90% and 57%, respectively. As a result of their study, the environmental benefits of electric motorcycles and their performance correlate to their willingness to buy and pay. Relevant literature has produced varying conclusions about the significance of affecting variables towards the consumer's willingness to pay, such that some have resulted in a positive connection while others have a negative relationship. Ma et al. (2015) explain that true differences in results are brought about less by the expected affecting factors (type, context, consumer profile, and consumption patterns) and more by the related survey administration, design, and model specification. As per the method used by Zhu et al. (2019), where the analysis of the WTP on electric motorcycles yielded a positive relationship between the explanatory variables and the dependent variables, the study thus assumes the likelihood of producing similar results with respect to the adoption of said methods.

### *2.2 Social & Economic Aspects*

The literature on consumers' willingness to pay for an electric vehicle has analyzed several factors affecting the social and economic aspects of individuals. According to Wahab and Jiang (2019), an economic analysis has sought to explain the behavior of buyers based on their characteristics. This study analyzes the relationship between the WTP to the socio-economic factors of consumers such as age, sex, educational attainment, and monthly income.

#### *Consumers' Age on WTP*

Various studies have highlighted age as one of the important factors to consumption decisions of consumers. A study of food purchase decision by Govindasamy et al. (2015), shows that age is a significant factor such that 43% and 49% of Asian Indians and Chinese respectively are aged between 36 and 50, while 49% and 19% for Puerto Ricans and Mexicans respectively are aged between 21-35, highlighting that a significant percentage of those willing to purchase are around the median age, where they are not too young (below 20) and not too old (51-65). Furthermore, a study conducted in Solo, Indonesia, by Guerra (2017), has revealed the relevance of age on consumers' intention to purchase on electric motorcycles as they found that the age groups of 30s and 40s were the least likely to buy electric motorcycles, and individuals in their 20s are considered to be potential buyers for EMs since the young ones are advocating for environmental products and travel more than the middle age groups. An analysis by Shahsavar et al. (2020) in regard to consumption of eco-friendly products in the Czech Republic revealed that age of individual buyers influenced the willingness to pay of consumers, which reinforces that people with specific demographic characteristics are willing to pay more to engage in certain practices such as sustainability. Another study shows the relevance of age and According to Mauracher et al. (2019), their study expected that the younger individuals would have a positive attitude toward sustainable products as they are more aware of environmental problems; however, the results of their study show that the ages 36–50 have a higher WTP than the ages 18–35. In this case, it presented that older age groups have the capability to pay more than younger age groups. However, a similar study was investigated by Khar and Irfan (2021) where they studied the industry of the mobile phone market in Pakistan, in their results, they found an opposite conclusion where age is not a significant determinant of socio-economic on consumers purchase intention. Based on various findings, the study assumes that consumers' age mostly directly affects willingness to pay for light electric vehicles. Hence, this study hypothesized the following:

**H1**: There is a significant relationship between age and willingness to pay for light electric vehicles.

#### *Sex on WTP*

There are various studies where it provides different conclusions on gender as affecting factors on individuals buying intention and its capability to purchase. A study by Khar and Irfan (2021) provides insightful results in regard of the industry of the mobile phone market in Pakistan, where

they found that there's only two socio-economic determinants that have significant impact and one of the factors is the gender as their study assumes that the status of an individual trigger the purchase intent of consumers. Moreover, Chekima et al. (2015) studied the motivational factors which influence the green purchase intention in relation to demographics and the study revealed that gender has a significant effect on the consumer buying behavior, which the result of their study shows that purchasing intention of consumers on green products are more prevalent on females. As for the capability of consumers to buy, a study from India by Jayasingh et el. (2021) discussed the moderating effect of gender on purchasing propensity towards electric motorcycles as they sought to find a better conclusion, they found that females are more inclined to buy EMs than males because of the speed performance of electric motorcycles, where it shows that males prefer high speed electric two wheel vehicles and females prefer lower speed electric vehicles.

An analysis by Bhutto et al. (2021) provides valuable insights for the market of electric vehicles where gender plays a vital role and according to the result of their study, females expressed their concerns on environmental issues more than males. This analysis suggests that females have the strong capability to pay more for eco-friendly products. Consequently, in relation to environmental concerns such as climate change, a study by Rasool and Ogunbode (2015) in Pakistan shows females are more highly rated the impact of the environmental issues compared to males, but interestingly indicated no greater willingness to pay for higher prices to address such concerns than males. A plausible explanation for this would be the cultural norms and personal constraints that hinders females from actively translating their level of environmental concern to pro-environmental actions, where women in Pakistan earn far less in comparison to their male counterparts, and finances are often handled by the males, which would increase both the costs and risks in participating in such movements. This highlights the need for context-specific studies and consideration that not only socio-economic factors themselves can dictate the willingness to pay of consumers. These research findings provide different perspectives on the relationship between gender and the willingness to pay where mostly have an impact. Therefore, this study will hypothesize the following:

**H2**: There is a significant relationship between gender and willingness to pay for light electric vehicles.

***Educational Attainment on WTP***

The literature presents the relevance of education on consumer decision on buying and paying, a study of mobile phone users in Pakistan found that education background of buyers has a significant impact on willingness to pay, the cognitive development of an individual can trigger their purchase intent (Khar & Irfan, 2021). A matter more closely related was also studied, where Chekima et al. (2015) determined the motivational factors which influence green purchase intentions in relation to demographics and the analysis revealed education have a significant moderation effect, which suggests that green purchase intentions are more prevalent among highly educated people with female consumers in particular. Moreover, Yun et al. (2020) studied the

consciousness of the consumers towards healthy products as they found that the buyers who are living in urban areas and have a higher educational background show a positive attitude on health friendly products. In the Republic of Kosovo, Sopi and Skreli (2016) have found that the education level is an important factor to determine the willingness to pay of consumers, as the result of their study shows that the education level has a positive relationship with the willingness to pay. The willingness to pay of Pro-environmentalist in China was investigated by Jin and Li (2020), based on the result of their study that educational attainment has a significant positive impact on the ability to pay consumers and they found that higher educational achievement increases the ability of the consumers to purchase. As it guided by the presented literatures, this study will hypothesize the following:

**H3**: There is a significant relationship between educational attainment and willingness to pay for light electric vehicles.

***Income on WTP***

Studies have shown that income of consumers has a connection with their willingness to pay, Zhang et al. (2023) found that the monthly income of consumers positively correlated with the purchasing propensity and the data showed that it has a 5% significance level. Moreover, Sopi and Skreli (2016) highlighted that the income and higher education of individuals has an impact on their willingness to pay, where they have the knowledge and financial capacity to purchase a certain commodity. Clark et al. (2017) multivariate analysis shows that the income of individuals is the only consistent factor that is significant with the willingness to pay, and it appears that the WTP is increasing with the income of consumers. The study of Khar and Irfan (2021) found an opposite result where income is insignificant on consumers' purchase intention, the high-income earners are indifferent to price fluctuations, while low-income earners are unlikely to spend extra money on mobile services. Shao et al. (2018) investigated the effect of income on residents' willingness to pay for environmental protection, they have found that the WTP does not always rise with the increase of consumers income and the marginal willingness to pay for environmental protection decreases as the income increases. As the findings of the literatures provided various outcomes, this study will hypothesize the following:

**H4**: There is a significant relationship between income and willingness to pay for light electric vehicles.

***2.3 Consumers' Valuation***

The evaluation of the consumers on commodities and its relation to the willingness to pay have been studied in various courses of fields. According to a study of Zhao et al. (2018), buyers' positive expectation on the benefit of the products and services they'll receive has directly influenced their intention to purchase and the effectiveness of the product has also had a direct effect on willingness to pay. As we further study the consumer's willingness to pay, the consumer's knowledge plays a crucial role in an individual's decision making on purchasing and paying for a

certain commodity. According to Chen et al. (2017), familiarity on a product directly affects the consumers' intention to buy. Consequently, a study found in Gujarat, India by Bahtia et al. (2021) concluded that the consumer's knowledge on a product indirectly influences the purchase propensity of a consumer. Furthermore, a study presented by Biao Zhang et al. (2018) shows that the familiarity of a consumer on a certain product was positively related to the consumer's ability to pay. Davvetas et al. (2015) also have similar findings where consumers' awareness of the product produces high WTP.

Certain considerations are made by an individual when discussing their willingness to pay, wherein determinants differ from one person to the other. Besides the evident effect of price itself, the perceptions and behavior of people can, to an extent, push or pull their valuation to and from a product. How well a person identifies to the item in question is oftentimes examined. Consumer affinity has been found to positively affect a person's capability to pay, where past experiences, among others, positively influence the level of affinity (Bernard & Zarrouk-Karoui, 2014). Contextual information in general also plays a part, such that relevant details help develop reference prices which influences the willingness to pay. Though it's been noted that when dealing with the WTP, individuals only considered price-related information and excluded other additional information, essentially disregarding the relationship between price and quality (Valle et al., 2016). Familiarity with the product is often considered as a viable explanatory variable with regards to the topic of willingness to pay. This shows that there are other affecting variables, particularly familiarity, as opposed to solely basing their willingness to pay on price. As evidenced by Rödiger et al. (2016) where consumers' price sensitivity was investigated, where respondents were willing to pay on average 52.7% above store prices, and that in 67% of cases, respondents bought a product despite the store price being higher than their initially stated WTP upon entry to the store. Objective knowledge is also discussed, in that general familiarity of people is explored. As presented by LaRiviere et al. (2014) that objective signals of a person's knowledge increases their WTP. It has been found that the marginal effect of additional knowledge on WTP is significant, which essentially states that well-informed individuals are significantly more willing to pay for goods. Though this is still up for debate, as a different study assumes that general knowledge, particularly of environmental issues, are not significantly related to the paying capacity of consumers. It appears that knowledge itself is insufficient to trigger an intent to act, where one should consider the possibility of mediators between knowledge and action (social and moral norms) to guide consumers, and the presence of differing knowledge types such as action-related knowledge (Harms & Linton, 2015). The aforementioned findings appear to mirror the previously mentioned condition of Rasool and Ogunbode (2015) in Pakistan, where the proposed affecting variables themselves appear to be insufficient when tasked to determine results alone, and that supplementary information and consideration are needed to establish a more coherent picture of prevailing conditions. The features of a product is one of the factors that buyers look for, a study conducted by Dwivedi et al. (2018) states that the uniqueness of the product could encourage consumers to pay for a premium price.

***Environmental Benefits on WTP***

As consumers evaluate the products they will receive, various researches provide conclusions about the benefits they will obtain from the product they possibly purchase, especially on ecological friendly goods. Consumer's knowledge in relation to their intention to purchase a certain product has also been found to be a significant driver in consumption patterns. It's been found that objective and subjective knowledge predict the buying propensity of a consumer at the same level with previous product-related experiences given in Northern Europe, whereas product-related experiences are superior determinants to subjective and objective knowledge in Central Europe (Piha et al., 2018). The ethical nature of consumption also plays a role for some in choosing their purchases, such that attitude and subjective norms are found to influence the aforementioned (Le & Kieu, 2019). Knowledge of the environmental repercussions on using such products are considered and found to have a positive correlation with the likelihood to purchase of consumers (Chekima et al., 2015; Konuk, 2019), where those with pro-environmental beliefs, and interests in contemporary automotive technologies have expressed their intention to acquire more on an alternative fuel vehicle (Kowalska-Pyzalska et al., 2021). According to data from respondents in an Indonesian study, consumers are more likely to purchase an electric vehicle because of its environmental advantages (Murtiningrum et al., 2022). Though in the case of Taiwan, environmental concerns do not positively affect attitudes in electric motorcycle adoption. Although respondents agree on the contribution of electric motorcycles towards environmental protection, they nonetheless maintain their initial behavioral intention, which encapsulates a social dilemma of the tendency to choose self-interested behaviors (Zhang & Chang, 2023). Moreover, individuals who are more concerned about the environment are inclined to willingly pay for an eco-friendly vehicle (Guerra, 2017; Chakraborty & Chakravarty, 2021). A consumer's knowledge about a particular commodity could range anywhere from the features of the subject to the product's application to relevant situations and environment. A study regarding fair trade consumption cited that consciousness for fair consumption, trust towards the label, and environmental concern positively impacts the individual's paying capacity (Konuk, 2019). Trivedi et al. (2015), individuals who are considered as pro-environmentalist expressed their willingness to pay for healthy and safe ecological friendly products. As guided by the literatures, this study hypothesize the following:

**H5**: There is a significant relationship between environmental benefits and willingness to pay for light electric vehicles.

***Cost on WTP***

Various studies have shown different results and conclusions regarding the cost and the decision making of consumers. A study conducted in the northern area of Ghana by Wahab and Jiang (2019), in the industry of electric vehicles, price is an important factor for buyers and it strongly influences the intention to buy of the consumers for an electric motorcycle, where it was noted when consumers consider electric motorcycles having a higher price compared to

combustion engine motorcycles, they are relatively less likely to buy an electric motorcycle, such that other variables are constant the probability of EM adoption decreased by 18.2%. Yuniaristanto et. al (2022) also found that cost has an indirect positive effect on the purchasing behavior of consumers for electric motorcycles, where consumers perceive purchase price and high battery costs as hindrances in EM adoption, with other cost-related factors also being attributed, such in the case of purchase subsidies. Moreover, the findings of Zade and Habibian (2021) presented that buyers are less interested to buy as they perceive that electric motorcycles are more expensive than the traditional motorcycles. As consumers receive satisfaction on the products they purchase, there are factors where they base their decision on buying a certain good. Adversely, Hisjam et al. (2022) exhibits that the cost and advancement of a product or technology does not influence the individual's purchasing behavior, as it was according to their study in Indonesia, where the expense influence less in electric motorcycle adoption, compared to determinants such as attitudes, subjective norms, and infrastructure, where the last one was noted as a possible area of improvement on the part of the government, as they may create structures to support electric vehicle adoption (i.e. charging stations, provisions, etc.) and encourage consumers acquiring propensity. In addition, people have to secure their safety before considering buying an electric motorcycle, as previously discussed, the maintenance of an electric vehicle significantly impacts consumer willingness to pay, given its critical role in vehicle performance (Thananusak et al., 2017). As for the analysis of Alanzi (2023) consumers are attracted to low cost products where it motivates their capacity to pay for certain products. As the studies in regard of cost have been discussed, the study will hypothesize the following:

**H6**: There is a significant relationship between cost and willingness to pay for light electric vehicles.

***Safety on WTP***

There are studies where consumers consider safety as a vital factor to determine the willingness to pay, according to the study of Liu and Lai (2020) where they compared the three performance factors in relation to environmentally friendly vehicles in Macau, these being pollution reduction factors, driving performance factors, and power consumption issues. They found that among these proponents, driving performance has a greater effect on electric motorcycle acceptance, thus indicating that consumers prioritize the integration of elements such as comfort, safety, and speed in technology. As for Zhang and Chang (2023), one of the factors that impacts the purchasing intention of the consumers is the durability of the product, particularly the batteries. Accordingly, this supposes that individuals place importance in particular areas, and by their assessment, consider the value of the product, thus long lasting, safe, usable goods are essential for the buyers. In line with the findings of Bisawas and Roy (2016), where along with price, factors such as availability, performance, and quality highly affects the consumers' motivation to pay a price premium, thus concern for quality and price represent major determinants in shaping the willingness to pay, and consequently the relevant markets. In relation to the electric vehicle market,

a study in India contextualized the battery-powered vehicle to their local market, where Indian consumers were willing to pay more for a reduction in charging time and operating cost, and an addition to the driving range capabilities of EVs (Bansal et al., 2021). Another study in regard to electric vehicles, Molin et al. (2017) found that the important factor that influences consumers to pay more is safety. Hence, vehicles are essential for their everyday use, it is reasonable for a consumer to make sure that the vehicle they're using is safe from any possible harm. As the journals in regard of safety have been discussed, the study will hypothesize the following:

**H7**: There is a significant relationship between safety and willingness to pay for light electric vehicles.

***Speed of EV on WTP***

As mentioned, there have been studies which highlighted the consumer's preference for electric motorcycle-related driving performance factors, which particularly includes speed, among others (Liu & Lai, 2020). Similarly in India, the performance of a certain product was found to be valuable for consumers. The findings of Jayasingh et al. (2021) stated that consumers in the market of electric motorcycles consider the speed as an important proponent, where males and females respond more to high-speed and low-speed models respectively, the reason for this is that the average distance traveled by female motorcyclists are shorter compare to the typical travel distance of male drivers. Cecere (2018) assumes that the speed run of a vehicle has little impact in affecting the purchase intention of consumers, where an increase of the maximum speed has a minimal impact on the probability of switching from non-intention to an intent to buy. While discussing speed, the travel distance of an electric motorcycle influences consumers' willingness to pay such that early adopters were found to be largely from suburban or rural areas (Plötz et al., 2014). As the studies provide various findings where it shows the relationship between the speed performance of a certain commodity, the study will hypothesize the following:

**H8**: There is a significant relationship between speed and willingness to pay for light electric vehicles.

***Policies on WTP***

There are literatures where government policies have been affecting the willingness to pay of consumers. According to the study of Liu and Lai (2020) where they studied the effect of environmental policy on the perception and acceptance of an individual on electric motorcycles, they have found that the relevant policies such as environmental policies encouraged the consumers to adopt ecological friendly products. A study in Nepal by Adhikari et al. (2020) where they analyzed the barriers against the use of electric vehicles, they have classified and ranked the barriers and they found that one of the hindrance is policy, the result of their study showed the lack of planning by the government ranked as the third barrier on the use of EVs. Moreover, Yuniaristanto et al. (2022) pointed out that barriers to tax or policy incentives could also be attributed to the similar reluctance exhibited by other factors. Pursuant to the literature where it

presents the relationship between the policies and WTP, the researchers of this study found that there is still limited study where policy is a variable. Hence, as the literatures where it provide various findings, this study will hypothesize the following:

**H9**: There is a significant relationship between policies and willingness to pay for light electric vehicles.

### *2.4 Research Framework*

Explanatory variables as synthesized by Eccarus and Lu (2019) include (1) attitudinal factors, and (2) social and individual factors, where these are expected to influence the consumer's willingness to pay. The study of Zhu et al. (2019) was adapted and constructed to identify the specific component of attitudinal factors (in this case, consumer valuation), and social and individual factors (socio-economic aspects) to be examined. The behavioral relationship between social and economic aspects, valuation for electric motorcycles, and the WTP (Figure 1) is explored.


***Figure 1.*** *Conceptual Framework*

## Methodology

### *3.1 Participants*

The target respondents for this study are the working-age residents of Manila city with a population of 1,846,513 based on the 2020 Census of Population and Housing (2020 CPH) by the Philippine Statistics Authority (PSA). The researchers used a modern and reliable application website sample size generator, with the population size amounting to 1,846,513, and giving a margin of error of 5%, the sample size generated would be a minimum of 385, allowing this study to be accounted for raw data. The working-age residents within the city of Manila were chosen as the respondents as according to RA 11697 Section 9(b) - states that light electric vehicles shall be for exclusive private use. Respondents are invited to participate after informed consent is received.

### *3.2 Instrumentation*

The study gathered the primary data through survey questionnaires based from the research conducted by Zhu et al. (2019) entitled "Exploring the determinants of consumers willingness to buy and willingness to pay for electric motorcycles using CVM method in Macau." Consequently, the researchers in this study created sets of questions where it fits and applies to the target respondents. The first part covers the respondents' willingness to pay, to be measured as a dichotomous variable (1 = Yes, I do have; 0 = No, I do not). The second part consists of the Socio-economic aspect where it is measured using a maximum of 6-point Likert scale. In addition, the age bracket is based on the working age individuals in the Philippines according to the 2020 CPH of Philippine Statistic Authority (PSA) and the annual gross income is based on the income tax table 2024 of Bureau of Internal Revenue (BIR). The third part explores the respondents valuation and the consideration factors related to LEV purchase decision, where it is measured using the 4-point Liker scale and the scale is coded in such a way that higher scores would reflect stronger consideration to the particular item. It must be noted that data produced from the 4-point likert scale is ordinal in nature, thus would be difficult to accurately interpret relative to the dependent variable, thus a mean index will be employed to signal the magnitude of the differing context into one variable.

### *3.3 Statistical Procedures*

Analysis of data will be done through the WarpPLS version 8.0, where the study's statistical assumptions will be verified using a PLS-based structural equation model (SEM) software.

#### *PLS-based SEM and WarpPLS*

Partial least squares structural equation modeling (PLS-SEM, also referred to as composite-based structural equation modelling), allows for the estimation of complex models, which includes several constructs, indicator variables, and structures without the imposition of distributional assumptions on the data (Hair et al., 2018), which is an advantage to studies which generally relies on non-normal data. Shmueli et al. (2016) similarly expressed that the success of PLS stems from its ability to estimate the parameter of complex models without the constraints presented by traditional econometric models. The PLS-SEM approach also highlights the causal-predictive approach to SEM, which emphasizes predictive modeling designed for causal explanations (Sarstedt et al., 2017).

As described by the ScriptWarp Systems (developers of WarpPLS) website, WarpPLS is a powerful PLS-based structural equation modeling software, which can implement classic (composite-based) as well as factor-based PLS algorithms. Features include identification of nonlinear relationships, models linear relationships, estimation of path coefficients, models reflective and formative variables, as well as moderating effects, calculation of values and coefficients, construction of 2D and 3D graphs, and allows for the creation and use of logistic regression variables in models - a significant component to the study's model. As mentioned, the

application performs a variety of analyses, where one of the key elements of the software is its ability to estimate full collinearity coefficients for assessing common method bias (Kock, 2015). Also highlighted is the modeling of dichotomous dependent variables, and latent growth analysis (Kock, 2020). Peer reviewed by Memon et al. (2021), the software has already been utilized by more than 1,200 researchers across different disciplines including economics, and maintains its relevance to basic and applied research by the aforementioned features such as addressing common method bias numerically and executing what-if analysis via simulations.

### *3. Data and Model*

The empirical model was derived from the synthesis of Eccarus and Lu (2019) on the common theories surrounding WTP for LEVs, essentially classifying the explanatory variable into two: (1) attitudinal factors, and (2) social and individual factors. Zhu et al. (2019) further specified and contextualized the components that defined attitudinal factors (consumer's valuation), and social and individual factors (socio-economic aspects). Inputs of the specified components are as follows:

Socio-economic aspects (age, sex, educational attainment, and annual gross income)

Consumer valuation (environmental benefit, cost, safety, speed, policies)

### *Binary Logistic Regression Analysis*

Data analysis would be conducted through the use of binary logistic regression analysis. The binary logistic regression model in this study is presented as follows:

$$\square = \square\square\square(\square_o + \square_1\square_1 + \square_2\square_2 + \ldots + \square_\square\square_\square)/(1 + \square\square\square(\square_o + \square_1\square_1 + \square_2\square_2 + \ldots + \square_\square\square_\square))$$

Where

- $\square$ is the dichotomous dependent variable representing respondents' WTP (if willing the value assigned is 1; if not, the value assigned is 0)
- $\beta_0$ is the intercept or the constant term value of WTP when independent variables are 0.
- $\beta_\square$ are the regression coefficients
- $\square_\square$ are independent variables referencing socio-economic aspects (age, sex, educational attainment, and annual income); and consumer valuation (environmental benefit, safety, cost, speed, and policies)
- The following variables are assigned with their respective measures:

**Age**
1 - [15 - 24]
2 - [25 - 34]
3 - [35 - 44]
4 - [45 - 54]
5 - [55 - 64]
**Sex**
1 - [Male]
0 - [Female]

**Educational Attainment**
1 - [Primary school graduate]
2 - [Junior High school graduate]
3 - [Senior High school graduate]
4 - [Technical/Vocational graduate]
5 - [College graduate]
6 [Postgraduate]

**Annual gross income**
1 - [250,000 and Below]
2 - [250,001 - 400,000]
3 - [400,001 - 800,000]
4 - [800,001 - 2,000,000]
5 - [2,000,001 - 8,000,000]
6 - [8,000,001 and Above]

The variables environmental benefit, safety, cost, and speed will be measure based on the following:
1 - [I definitely would not consider]
2 - [I would not consider]
3 - [I would consider]
4 - [I definitely would consider]

While the variable policies will be measured with the following:
1 - [I am definitely not aware]
2 - [I am not aware]
3 - [I am aware]
4 - [I am definitely aware]

Given the regression, we convert the given into the actual logistic regression model:

$$\square = \frac{\square\square\square(\square_0 + \square_1\square\square\square_1 + \square_2\square\square\square_2 + \square_3\square\square\square\square\square\square\square\square\square\square_3 + \square_4\square\square\square\square\square\square_4 + \square_5\square\square\square\square\square\square\square\square\square\square\square\square_5 + \square_6\square\square\square\square_6 + \square_7\square\square\square\square\square\square_7 + \square_8\square\square\square\square\square_8 + \square_9\square\square\square\square\square\square_9)}{(1 + \square\square\square(\square_0 + \square_1\square\square\square_1 + \square_2\square\square\square_2 + \square_3\square\square\square\square\square\square\square\square\square\square_3 + \square_4\square\square\square\square\square\square_4 + \square_5\square\square\square\square\square\square\square\square\square\square\square\square_5 + \square_6\square\square\square\square_6 + \square_7\square\square\square\square\square\square_7 + \square_8\square\square\square\square\square_8 + \square_9\square\square\square\square\square\square_9))}$$

By having the willingness to pay as the dependent variable, the binary logistic model was developed to estimate the probabilities of respondents' WTP for LEV. The general form of the logistic regression equation is written as follows:

$$\square\square\square(\frac{\square}{1-\square}) = (\square_0 + \square_1\square_1 + \square_2\square_2 + \ldots + \square_\square\square_\square)$$

Converted to the actual form:

$$\square\square\square(\frac{\square}{1-\square}) = (\square_0 + \square_1\square\square\square_1 + \square_2\square\square\square_2 + \square_3\square\square\square\square\square\square\square\square\square\square_3 + \square_4\square\square\square\square\square\square_4 + \square_5\square\square\square\square\square\square\square\square\square\square\square_5 + \square_6\square\square\square\square_6 + \square_7\square\square\square\square\square\square_7 + \square_8\square\square\square\square\square_8 + \square_9\square\square\square\square\square\square_9)$$

## Results and Discussion

The primary objective of the study is to determine the factors that influence the consumers' WTP for light electric vehicles in the city of Manila, Philippines. Because of the current push for the use of electric vehicles in the country, a proper inquiry and identification of the relationship of certain determinants towards people's willingness can serve to better understand the individual's attitude and their demand patterns for LEV. Also to be considered is the lack of contextualized writings of the matter in the Philippines, such that the use of the technology is in its infancy, causing a mismatch between market strategies and national and/or local policies. Prevalent literatures on the subject have categorized relevant theories and summarily presented two affecting factors to WTP, attitudinal factors, and social and individual factors (Eccarius & Lu, 2019), where the study hypothesizes the effects of select determinants from the aforementioned factors (Zhu et al., 2019) on the WTP for LEV.

### *4.1 Descriptive Statistics*

**Table 1***Participants' Willingness to Pay*

| Attributes | Category | N | (%) |
|---|---|---|---|
| **Willingness to Pay (WTP)** | Yes | 305 | 79.22% |
| | No | 80 | 20.78% |

**Table 2** *Participants' Social & Economic Aspects*

| Attributes | Category | N | (%) |
|---|---|---|---|
| **Sex** | Male | 197 | 51.17% |
| | Female | 188 | 48.83% |
| **Age** | 15 - 24 | 123 | 31.95% |
| | 25 - 34 | 70 | 18.18% |
| | 35 - 44 | 87 | 22.60% |
| | 45 - 54 | 74 | 19.22% |
| | 55 - 64 | 31 | 8.05% |
| **Educational Attainment** | Primary school graduate | 6 | 1.56% |
| | Junior High school graduate | 29 | 7.53% |
| | Senior High school graduate | 95 | 24.68% |
| | Technical/Vocational graduate | 62 | 16.10% |
| | College graduate | 165 | 42.86% |
| | Postgraduate | 28 | 7.27% |
| **Annual Gross Income** | 250,000 and Below | 175 | 45.45% |
| | 250,001 - 400,000 | 80 | 20.78% |
| | 400,001 - 800,000 | 94 | 24.42% |
| | 800,001 - 2,000,000 | 32 | 8.31% |
| | 2,000,001 - 8,000,000 | 2 | 0.52% |
| | 8,000,001 and Above | 2 | 0.52% |

*Note.* The annual gross income presented is reflected in Philippine peso (PHP).

**Table 3** *Participants' Awareness on Policies Related to LEV*

| Attributes | Category | N | (%) |
|---|---|---|---|
| **P1** | I am definitely not aware | 116 | 30.13% |
| | I am not aware | 124 | 30.21% |
| | I am aware | 106 | 27.53% |
| | I am definitely aware | 39 | 10.13% |
| **P2** | I am definitely not aware | 74 | 19.22% |
| | I am not aware | 135 | 35.06% |
| | I am aware | 135 | 35.06% |
| | I am definitely aware | 41 | 10.65% |
| **P3** | I am definitely not aware | 20 | 5.19% |
| | I am not aware | 74 | 19.22% |
| | I am aware | 201 | 52.21% |
| | I am definitely aware | 90 | 23.38% |
| **P4** | I am definitely not aware | 67 | 17.40% |
| | I am not aware | 117 | 30.39% |
| | I am aware | 149 | 38.70% |
| | I am definitely aware | 52 | 13.51% |

The collected survey sample amounted to 385 respondents, with most expressing their willingness to pay for light electric vehicles (79.22%), in contrast to those not willing (20.78%) (Table 1). Their social and economic aspects were also analyzed (Table 2). Respondents' sex had a marginally small difference between the majority, which is male (51.17%), from the female (48.83%). Most of the respondents (31.95%) were aged 15 - 24, followed by those aged 35 - 44 (22.60%). The largest cohort of educational attainment by the participants were college graduates (42.86%), in contrast to the least of them which attained primary school education (1.56%). The highest percentage of annual gross income bracket by the respondents were 250,000 and below (45.45%), followed by those earning 400,001 - 800,000 (24.42%), 250,001 - 400,000 (20.78%), and 800,001 - 2,000,000 (8.31%) respectively, where those earning 2,000,001 - 8,000,000 (0.52%), and 8,000,001 and above (0.52%) composed the least respondents.

A distinct variable explored in this study is the respondents' level of awareness towards policies related to LEV (Table 3), where most (30.21%) were not aware, and the least of them (10.13%) were definitely aware of the RA11697 EVIDA Law (P1). Awareness on the exemption from the mandatory unified vehicular volume program (P2) yielded that those who are aware and not aware are equal (35.06%), and the lowest percentage comprises those definitely not aware (10.65%). More than half of the respondents (52.21%) were aware of the non-requirement of LEVs' registration (P3), where those least in number are those who are definitely not aware (5.19%). Finally, their awareness on the road use policies of LEVs were explored, which resulted in the majority of participants (38.70%) are aware, and the least of them being definitely aware (13.51%).

### *4.2 Partial Least Squares of the Binary Logistic Model*

$$lnWTP = \beta_0 + \beta_1 Age_1 + \beta_2 dSex_2 + \beta_3 Education_3 + \beta_4 Income_4 + \beta_5 Environment_5$$
$$+\beta_6 Cost_6 + \beta_7 Safety_7 + \beta_8 Speed_8 + \beta_9 Policy_9 + \beta_9 Policy_9 + \varepsilon$$

Accordingly, the survey questionnaire was divided into three parts: the first covers the respondent's willingness to pay, measured as a dichotomous variable; the second is a Likert scale (except for the variable sex, measured as a dummy) consisting of the socio-economic aspect of the respondents; and the third covers the respondent's consumer valuation, also measured using a Likert scale. Data treatment and analysis is done through the WarpPLS software - a PLS-based SEM application which has a variety of features, most notably the ability to model dichotomous dependent variables (Kock, 2020). Data analysis is done through the use of binary logistic regression model, such that the WTP is measured as the dichotomous dependent variable (denoted as 1 or 0), and further described by the explanatory variables as gathered through the Likert scale, thus estimating the probability of the individual's WTP for LEV. Age bracket is based on the working-age individuals in the Philippines according to the 2020 CPH of the PSA. Sex is the individual's assigned biological characteristics from birth. Educational attainment is according to

the formal education covered by the Philippine education system. Income bracket is based on the annual gross income of the income tax table 2024 of the BIR. Environmental benefit is described as the consumer's knowledge of environmental repercussions on the use of products, in this case LEV. Cost indicates the price considerations of the consumers when purchasing for LEV. Safety describes the wellbeing or the perceived welfare of the user relative to the use of LEV. Speed tackles elements of travel distance or time regarding the driving performance of LEV. Policy involves the effect of government strategies on the acceptance of an individual to LEV.

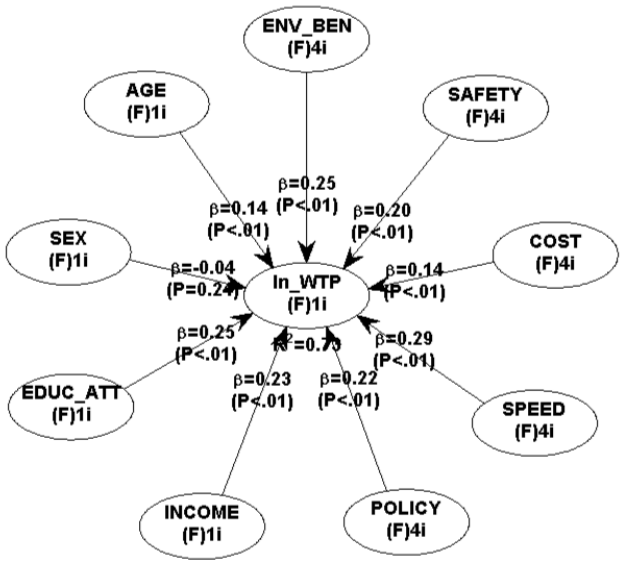


***Figure 2.*** *Structural equation model (SEM)*

The structural model of the WTP for LEV and its explanatory variables mirrors the previously presented framework (Figure 1), where the results show the establishment of the relationship between the former and the latter. Figure 2 also illustrates the initial assumptions made regarding the structural relationship of the WTP for LEV and the proposed determinants such that the study's hypotheses are measured against critical indicators to evaluate and validate the model's reliability.

### *4.3 Results from the Partial Least Squares of the Binary Logistic Model*

**Table 4** *Model Fit and Quality Indices of the SEM*

| | Fit Indices | Quality Indices | Criterion |
|---|---|---|---|
| **1** | Average path coefficient (APC) | 0.194, P<0.001 | Acceptable if P<0.05 |
| **2** | Average R-squared (ARS) | 0.733, P<0.001 | Acceptable if P<0.05 |
| **3** | Average adjusted R-squared (AARS) | 0.727, P<0.001 | Acceptable if P<0.05 |
| **4** | Average block VIF (AVIF) | 1.353 | Acceptable if <= 5, ideally <= 3.3 |
| **5** | Average full collinearity VIF (AFVIF) | 1.574 | Acceptable if <= 5, ideally <= 3.3 |
| **6** | Tenenhaus GoF (GoF) | 0.756 | Small >= 0.1, medium >= 0.25, large >= 0.36 |
| **7** | Simpson's paradox ratio (SPR) | 1.000 | Acceptable if >= 0.7, ideally = 1 |
| **8** | R-squared contribution ratio (RSCR) | 1.000 | Acceptable if >= 0.9, ideally = 1 |
| **9** | Statistical suppression ratio (SSR) | 1.000 | Acceptable if >= 0.7 |
| **10** | Nonlinear bivariate causality direction ratio (NLBCDR) | 0.889 | Acceptable if >= 0.7 |

The following fit indices and quality indices were assessed relative to the SEM, to evaluate and validate the quality of representation of the data by the given model. As seen in Table 4, the results presents average path coefficient (APC) = 0.194, P<0.001; average R-squared (ARS) = 0.733, P<0.001; average adjusted R-squared (AARS) = 0.727, P<0.001; average block VIF (AVIF) = 1.353; average full collinearity VIF (AFVIF) = 1.574; and Tenenhaus GoF (GoF) = 0.756. Additionally, causality assessment indices were also measured where Simpson's paradox ratio (SPR) = 1.000; R-squared contribution ratio (RSCR) = 1.000; statistical suppression ratio (SSR) = 1.000; and the nonlinear bivariate causality direction ratio (NLBCDR) = 0.889, which indicates that the given model is correct in its causal assumption (Kock, 2022). Given the following outcomes, this then suggests that the explanatory variables are viewed as potential determinants to the willingness to pay for light electric vehicles.

### *4.4 Pathways and Hypothesis Testing*

**Table 5** *Structural Relationships*

| | Path | Path Coefficient | P-values | Decision (Ha) |
|---|---|---|---|---|
| **H1** | Age—WTP | 0.137 | 0.003 | Accept |
| **H2** | Sex—WTP | -0.036 | 0.239 | Reject |
| **H3** | Educational Attainment—WTP | 0.250 | <0.001 | Accept |
| **H4** | Income—WTP | 0.231 | <0.001 | Accept |
| **H5** | Environmental Benefits—WTP | 0.245 | <0.001 | Accept |
| **H6** | Cost—WTP | 0.198 | <0.001 | Accept |
| **H7** | Safety—WTP | 0.140 | 0.003 | Accept |
| **H8** | Speed—WTP | 0.292 | <0.001 | Accept |
| **H9** | Policy—WTP | 0.221 | <0.001 | Accept |

After validating the model's fit and quality indices, analyses of the structural relationships of the variables and the proposed hypotheses are needed to further contextualize the results of the SEM. Path coefficients allow for a comprehensive approach to understanding the direct and indirect relationship between multiple independent variables and a dependent variable, such that it incorporates all given conditions and addresses "cause-and-effect" associations. It must be noted however that it does not address true causal inference viewed in the correlation matrix, but instead presents a qualitative interpretation of possible relationships in the tested model (Hollar, 2018). Path coefficients are measured to substantiate their effect, where values above 0.35, 0.15, and 0.02 are assigned as strong, moderate, and weak respectively (Henseler et al., 2016). The explanatory variables of age (path coefficient = 0.137); educational attainment (path coefficient = 0.250); income (path coefficient = 0.231); environmental benefits (path coefficient = 0.245); cost (path coefficient = 0.198); safety (path coefficient = 0.140); speed (path coefficient = 0.292); and policy (path coefficient = 0.221) were found to be statistically significant in their correlation to the willingness to pay for light electric vehicles. The magnitude of their positive effect varies from each path with the strongest being speed, followed by educational attainment. The variable of sex was the only path found to be statistically insignificant (p-value = 0.239), and shows a negative correlation (path coefficient = -0.036) with WTP.

**Table 6** *Hypotheses Testing*

| | Hypotheses | Interpretation |
|---|---|---|
| **H1** | There is a significant relationship between Age and WTP for LEV. | Significant |
| **H2** | There is a significant relationship between Sex and WTP for LEV. | Insignificant |
| **H3** | There is a significant relationship between Educational Attainment and WTP for LEV. | Significant |
| **H4** | There is a significant relationship between Income and WTP for LEV. | Significant |
| **H5** | There is a significant relationship between Environmental Benefits and WTP for LEV. | Significant |
| **H6** | There is a significant relationship between Cost and WTP for LEV. | Significant |
| **H7** | There is a significant relationship between Safety and WTP for LEV. | Significant |
| **H8** | There is a significant relationship between Speed and WTP for LEV. | Significant |
| **H9** | There is a significant relationship between Policy and WTP for LEV. | Significant |

### *4.5 Comparison with Established Literatures*

This section presents the study's findings by having a comparison between the existing literature within the subject of the study. It emphasizes consistencies, inconsistent results, and new findings regarding recognized theories, frameworks, and previous research. This comparison assesses the alignment or divergence of results with prior studies; hence, it validates the findings, identifies gaps, and enhances the overall comprehension of the research issue. Moreover, it emphasizes how the study enhances or supplements existing studies, providing a crucial viewpoint on its implications for theory and practice.

#### *4.5.1 Social & Economic Aspects on WTP*

The four factors that comprise the social and economic aspect are age, sex, educational attainment, and annual gross income. This subsection aims to present the findings and existing literature on each variable that influences willingness to pay.

According to the results of the data, the P-value of age on WTP is 0.003, and educational attainment and income are <0.001, meaning they are all significant. Therefore, it accepts the hypothesis that age is a relevant proponent of consumers' willingness to pay for light electric vehicles. However, given the initial results, the P-value of sex on WTP is 0.239, which means it is insignificant. Hence, it rejects the hypothesis and accepts the null hypothesis that sex is an irrelevant variable in consumers' willingness to pay for light electric vehicles.

Govindasamay et al. (2015) stated, the relevant percentage of consumers who are willing to purchase is around the median age. It means that individuals that are not too young (20 below) and not too old (51-64) are the significant group to have a high intention to consume. Guerra (2017) found similar results, indicating that the age group most likely to purchase an electric vehicle is the 20s. Moreover, the findings of Mauracher et al. (2019) show that the age group of 18-35 has a high possibility of buying sustainable products. These studies align with our findings, as the majority of respondents were in the 15-24 (31.95%) age group, followed by the 35-44 (22.60%) age group. These age groups fall within the median age range, potentially explaining why age is a significant factor in WTP.

The analysis from Pakistan by Khar and Irfan (2021) presents that consumers consider highly educated individuals to be knowledgeable, and this factor influences their buying behavior. In relation to this, Chekima et al. (2015) found similar results in Pakistan, indicating that buyers with higher degrees tend to purchase more environmentally friendly products. Moreover, the study of Yun et al. (2020) found that buyers from urban areas with higher educational backgrounds have higher purchase intentions for health-friendly goods. Another finding from China by Jin and Li (2020) is that the higher the educational achievement of a purchaser, the more they are able to pay for a certain good. These studies align with our findings, as the majority of our respondents hold college degrees (42.86%) and senior high school degrees (24.68%), both of which are considered high educational achievements. Additionally, they reside in Manila City, a highly urbanized area in the Philippines. This could potentially explain why educational attainment is a significant variable in determining WTP.

The findings of Skreli (2016) indicates, the income of an individual influences the financial capacity of the consumers to buy. Another finding by Clark et al. (2017) revealed a positive correlation between income and buyer behavior, suggesting that an increase in a purchaser's income would increase their willingness to pay. This literature could provide strong evidence for the results of our study and potentially explain why income is a significant factor in determining willingness to pay (WTP).

On the topic of sex, Jayasingh et al. (2021) found that most females are more likely to purchase an electric vehicle due to the vehicle's speed performance. The analysis by Bhutto et al. (2021) reveals similar findings, highlighting gender as a crucial variable and identifying females as potential buyers. While previous studies suggest that sex plays a significant and crucial role in

determining willingness to pay, our study's findings indicate that sex is not a significant factor in determining the willingness to pay for light electric vehicles.

### *4.5.2 Consumer Valuation on WTP*

The individual's preferences in relation to their willingness to pay for light electric vehicles was done. Determinants were chosen based on prevailing literature, where the consumer's considerations regarding the features and perceptions of using LEV. Factors which comprise these valuation include: environmental benefits, safety, cost, speed, and policy.

Because of the attached environmental advantages of using EV and LEV in particular, the nature of the perceived ecological benefits the consumer can receive is considered. Environmental benefits received a p-value of <0.001, which infers as having very strong evidence against the null hypothesis; and a moderate effect size (path coefficient = 0.245) on WTP. The outcome of this study coincides with the findings of Chekima et al. (2015), and Konuk (2019), where knowledge of environmental repercussions when using products have a positive correlation with the likelihood of consumer purchase, such that people with pro-environmental beliefs and interests in modern transportation technologies express intentions to purchase alternative fuel vehicles (Kowalska-Pyzalska et al., 2021). Also in agreement with the results are findings from Guerra (2017), Chakraborty and Chakravarty (2021), stating that individuals more concerned with regards to the environment are more likely to willingly pay for an eco-friendly vehicle.

Price-related components such as cost is an evident factor to be considered when discussing the willingness to pay, where several studies have mentioned its importance in the decision making process of consumers. Cost received a p-value of <0.001, which suggests having very strong evidence against the null hypothesis; and a moderate positive effect size (path coefficient = 0.198) on WTP. Interestingly, the result diverged from the majority of the collated articles, which states that cost and willingness to pay have a negative relationship, such that as LEV-related or perceived costs increase, the WTP for LEV decreases.

Safety was also considered as a possible determinant in WTP for LEV. Contemporary literature has described elements such as comfort and safety as priorities in utilizing electric motorcycle technology (Liu & Lai, 2020). This factor received a p-value of 0.003, thus signaling its statistical significance, and had a marginally moderate positive effect on WTP. In consideration of opposing correlations, the result supports the article by Molin et al. (2017), which found that safety significantly impacts the likelihood of consumers to pay more for electric vehicles, particularly LEV.

The findings of the study have resulted in the conclusion that speed is a significant factor in consumers' paying capacity for LEV. Liu and Lai's (2020) analysis, which found that buyers prioritize the speed of two-wheeled battery vehicles, aligns with the results. Jayasingh et al. (2021) found that the speed performance of a vehicle influences the intention of buyers, with individuals having different preferences for both low-speed and high-speed vehicles. The studies provide

evidence that a consumer's WTP significantly correlates with the speed of a light electric vehicle (LEV).

The findings of this study are consistent with the existing literature on the influence of policy on consumers' purchasing behavior. Liu and Lai (2020) discovered that relevant policies have a positive impact on individuals' perceptions. Adhikari et al.'s (2020) analysis revealed that policies significantly hinder the adoption of electric vehicles, with government planning ranking as the third most significant hindrance, which in turn influences buyers' purchase intentions. These studies could potentially explain why policy plays a positive and significant role in WTP.

### 5.1 Conclusion and Recommendations

The determinants of age, sex, educational attainment, income, environmental benefit, safety, cost, speed, and policy were studied relative to their direct effect on willingness to pay, where all except the variable of sex presented a positive direct influence on consumers' WTP for LEV. The social and individual factors of potential consumers are those within the median age range of 20 to 50 years old, who are highly educated, and with a relatively high income. Consequently, the findings indicate that the influence of the aforementioned characteristics are weak, hence, the study finds that though they are considered relevant, their effect on the purchasing decision of buyers are minimal. Consumer valuation of individuals revealed their willingness to pay for the perceived environmental benefit of LEV, as well as the derived non-harmful satisfaction and speed run performances of the vehicle. Interestingly, costs related considerations have a positive impact on their purchase intention, which could imply the consumers' view on the price value of LEV to be a high-cost, high-quality product (Zade & Habibian, 2021). On the other hand, sex was deemed an insignificant direct driver for WTP for LEV, contrary to literatures stating females have a higher willingness to pay for products which address environmental issues (Chekima at al., 2015; Bhutto et al., 2021), where a possible explanation would be the study's disregard of sex as a moderating factor (Jayasingh et al., 2021) suggesting the determinant's indirect impact on other components. As such, the authors recommend continuous investigation of the nuanced association between the determinants, and further analysis of the composed indicators which reflects the viability of the factors as a predictor.

### 5.2 Policy Implications

An overwhelming number of respondents (305) exhibited their willingness to pay for light electric vehicles in the city of Manila, Philippines. Of the majority, 134 of them (43.93%) reported an income level of 250,000 and below, which composes an outstanding number of the respondents. As previously stated, findings suggest that cost-related factors have a moderate positive impact on the consumer's willingness to pay, such that they perceive LEVs as a high-cost and consequently high-quality product. This could then provide an explanation for the high percentage of those willing to pay, despite the majority of the same individuals identifying as the lowest income level from the given income bracket in the survey. It has already been established that the EVIDA Law

already provides fiscal incentives in the form of indirect subsidies (tax breaks, discounts). With that, policymakers could provide supplementary fiscal incentives in the form of direct subsidies, to meet the growing perceived demand for a sustainable and costly product such as LEV. Lastly, the study recommends lifting the banning of light electric vehicles on national roads and this will significantly contribute to the growth of the electric vehicle market in the Philippines as it could encourage consumers to purchase more LEVs due to its accessibility.

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