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COMMUTERS' PREFERENCES AND THEIR WILLINGNESS TO PAY FOR MODERN PUBLIC UTILITY VEHICLE (MPUVs)

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ABSTRACT

This study investigates commuters' preferences and predicts their Willingness to Pay (WTP) for Modern Public Utility Vehicles (MPUVs), focusing on factors of comfort and convenience in an urban setting. A descriptive, quantitative approach was adopted, utilizing a tool-validated structured questionnaire based on the Contingent Valuation Method (CVM). Data were gathered from 324 respondents, consisting of senior high school students and teachers from two nearby private and public schools. Results indicate that while commuters' overall satisfaction with traditional PUVs was moderate, there was a dissatisfaction on environmental sustainability and safety features. Binary Logistic Regression (BLR) analysis identified personal and economic factors as positive predictors of commuters' willingness to pay for MPUVs, although these indicators were not statistically significant. However, two factors— the amount commuters were willing to pay and the overall importance placed on PUVs—showed a significant relationship with WTP. These indicators predict a positive chance in BLR model to answer —Yes, respondents are willing to pay for additional MPUVs. Also, it suggests that as the commuters find the commuter's comfort and convenience factors less important, the commuter's willingness to pay decreases. Thus, the findings suggest opportunities to enhance transportation infrastructure and services, recommending a shift toward a market-driven policy approach.

Keywords: *willingness to pay, modern public utility vehicle, commuters' preferences, comfort, and convenience*

INTRODUCTION

Research Background

Transportation is a crucial aspect of modern society, enabling individuals to travel efficiently and meet their daily needs. With increasing urbanization and population growth, commuting has become a significant part of people's lives. Commuters face various transportation options, including private vehicles, public transport, cycling, and walking. Understanding the factors influencing commuters' transportation preferences is essential for urban planners, policymakers, and transportation providers to develop effective strategies and improve the overall commuting experience. Ensuring safe, affordable, and accessible transport for commuters is also a key target under Sustainable Development Goal 11.

Several factors affects the commuters transportation satisfaction, including personal preferences, convenience, environmental concerns, and socioeconomic factors. Among these factors, income plays a significant role in shaping individuals' transportation choices. One of the key ways in which income affects transportation choice is through affordability. Recent studies on the relationship between income and the choice of transportation highlight how income levels impact the choices and include the implications for transportation planning and equity. The study of Ume et. al. (2023) found that the respondents' monthly income significantly impacts the level of commuters' willingness to pay. Most respondents rated security as the most critical factor in determining how much extra fare they are willing to pay. Furthermore, higher-income individuals typically have greater financial resources, allowing them to afford and maintain private vehicles. In contrast, individuals with lower income opt for public transit and most often experience health risk due to pollution on the road (Shi et al., 2022).

Some research has demonstrated that commuters' perceptions and satisfaction levels can be influenced by many factors, including the specific characteristics of their travel experiences and their own attributes and attitudes (Jang & Ko, 2019). Historically, increases in the fare matrix were brought mainly by increases in fuel prices rather than by consumers' preferences. However, recent research suggests that commuters' preferences and willingness to pay for public transit services can significantly impact the fare structure (Ren & Huang, 2020). Commuters only reveal a higher willingness to pay (WTP) if they see the value of paying more for better transportation facilities and services. In another study, the level of importance commuters place on their preferences can significantly impact their willingness to pay for public transit (Tepmanee & Siridhara, 2020).

In the Philippines, the factors that impact commuters' transport mode choice have shown that regardless of age, gender, income, and travel intent, people's safety is ranked first over accessibility, cost of travel, comfort, and environmental concern. Private and semi-private for-hire vehicles are highly ranked over various mass transport systems when all factors are simultaneously considered, despite the worsening traffic conditions and increasing cost of travel. (Mayo and Taboada, 2020). Moreover, in a study by Gue et al. (2021) on the analysis of the mode choice of the commuters in Baguio City, the role of income in both modes of choice for public and private vehicles is said to be related to the career level and life stage or age of the individual. Very few studies have yet to be conducted regarding the commuters' preferences for the current mode of transportation in Baguio City, which this study intends to explore.

Baguio City is popularly known as a mountain resort in the Philippines for its cool climate and scenic landscapes. It has dealt with criticism for being one of the most polluted cities in the country. Over the past few decades, vehicle emissions have been the primary source of pollution in the city's central business district. Another environmental problem the city faces is poor air quality, which affects health and life-related concerns, as the Department of Environment and Natural Resources (DENR) reported in 2020. Also, in a recent study on the city air quality dispersion, through spatial distribution of PM10 with high concentrations is evident on roads with high vehicular emissions (Ramos & Blanco, 2019). This reputation stems from traffic congestion, rapid urbanization, and topography. Despite these challenges, efforts are being made to address pollution in Baguio. Initiatives include improving public transportation and implementing stricter regulations on vehicle emissions.

The transportation system in Baguio City is characterized by a mix of public and private vehicles navigating through its narrow, winding roads. Despite being a relatively small city, it faces transportation challenges, especially during peak tourist seasons and holidays. The city encountered

severe traffic congestion, compounded by limited road infrastructure. The primary modes of public transportation in Baguio are jeepneys and taxis. While these are essential for mobility, they contribute to traffic congestion and air pollution. Modern transit systems, such as buses, were absent only when the modern PUV was introduced in 2020.

The Philippine government launched the Public Utility Vehicle Modernization Program (PUVMP) under the Department of Transportation (DOTr) to improve public transportation nationwide. This program intends to update the nation's public transportation infrastructure. To improve the standard of public transportation and benefit commuters and operators, the PUVMP aims to replace outdated PUVs with brand new ones with safety features and more environmentally friendly vehicle models (Estipular, 2020). Additionally, the initiative seeks to professionalize the PUV industry by encouraging a culture of dependability, efficiency, and safety among PUV operators and drivers. Existing literature on the topic emphasizes that the program is not merely about replacing old vehicles with newer, more environmentally-friendly ones but rather a comprehensive restructuring of the entire road-based public transport system (Sunio et al., 2020). The program features a range of components, including regulatory reform, route planning, and fleet modernization, all aimed at creating a more sustainable and efficient public transport system. (Guno et al., 2021)

The gap between a government-determined fare matrix and a market-driven fare matrix is a critical issue in public transportation policy. The difference between market-driven fares and government-determined fare structures is a critical consideration in public transportation policy. The Government, particularly the Land Transportation Franchising Regulatory Board, determines the fare prices often aim to achieve social objectives such as affordability and accessibility, ensuring that low-income passengers can use public transit (Bakri et al., 2021). The fare prices determined by the goverment are typically lower than market-driven fares and may be subsidized by the government to cover the difference between operational costs and revenue. The proposed bill, Magna Carta for commuters and transportation, supported all the challenges or issues mentioned. In essence, the bill is a call for "a shift from infrastructure and public policy that are car-centric to sustainable transport and mobility," emphasizing that the latter must "provide safe access and mobility to all, promote economic development, protect and preserve the environment, and uplift the life of the Filipino commuter." reported by Top Gear Philippines, 2022.

On the other hand, market-driven fares are determined by supply and demand, reflecting the actual cost of providing the service and the passengers' willingness to pay, this can lead to higher fares, especially during peak times or on popular routes, but it also encourages efficiency and can generate higher revenue for reinvestment in the transportation system. Bridging the gap between these approaches requires careful consideration of economic sustainability and social equity, potentially through hybrid models that incorporate dynamic pricing within a regulated framework.

The paper intends to determine the conversion of commuters' preferences into a higher WTP. Several factors affecting commuters' transportation preferences explain an array of payment choices. By examining these factors, we aim to gain insights into the decision-making process of commuters and understand how the different elements influence their transportation mode choice. Studies show stylized evidence of factors affecting commuters' decisions in riding different modes of transportation. (Litman, 2023) According to Oliviera & Dias (2019), the influence of demographics on the consumer preferences for alternative fuel vehicles (AFV), wherein no consistent result was found on the consumers' income

and age, however, in terms of gender, education level, and family size, the consumers with higher educational level, women and consumer with more prominent families have higher preferences for AVF.

Research Objectives

Nearly all users of public transportation in Baguio City currently have only two alternatives: jeepneys or taxis. Jeepneys are inexpensive, spartan, and time-and-route restricted. Taxis are several times more expensive in exchange for being considerably more comfortable and time or route unrestricted. Both Jeepney and taxi have its pros and cons. Existing research suggests that market demand exists for a third alternative: time or route-restricted mini buses with fares roughly comparable to jeepneys, comfort roughly comparable to taxis, and considerably lower environmental impact than either taxis or jeepneys. However, precise consumer preferences and demand for modern PUV – and whether the fare increase over jeepneys remains undetermined.

Research Questions

The focus of the study is to determine the commuter's preferences and determinants of the commuters' Willingness to pay (WTP) for an improved transportation experience. To achieve the study's objective, the following research questions guide the investigation:

1. What is the commuters' level of satisfaction with the current mode of transportation (Jeepney and Taxi)?
2. What is the perceived level of importance of commuter preferences for improved transportation?
3. What are the issues and challenges encountered by the commuters?
4. What is the commuter's willingness to pay for the modern PUV or minibus?
5. Do personal and economic factors significantly influence individuals' willingness to pay for additional Modern PUV?

Research Framework

The study utilizes consumer choice theory, including Marginal Utility Theory, which examines consumers' increase in satisfaction from consuming an additional unit of a good. Utility represents that consumers get a specific level of happiness or satisfaction from consuming goods or services; the marginal utility is the benefit of consuming an extra unit. Utility and Price are the monetary values used to measure utility. Additionally, assuming that a household has an income, this income is allocated to expenses, which is explained by Mental accounting theory. It is a tendency to assign different mental values to the same sum of money. Additionally, to estimate the economic value of the comfort and convenience of using the MPUV, it incorporates the Contingent valuation method, which measures the willingness to pay for a good or service with economic value.

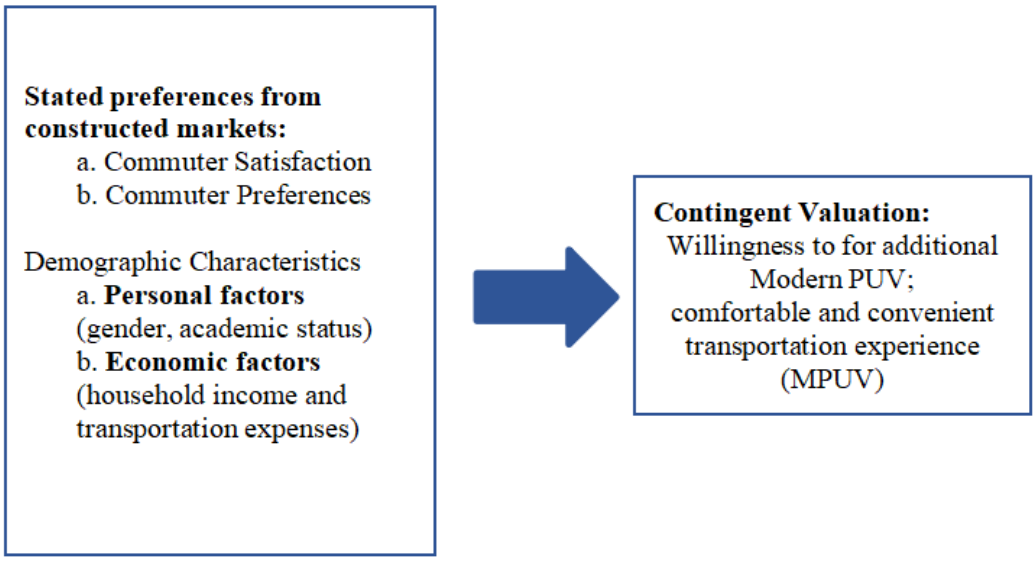

Figure 1 Conceptual Framework

Conceptual framework

The study framework shows how the following variables in the figure are interrelated. Under the demographic characteristics of the commuters are the personal and economic variables that determine the commuter preferences, extent of satisfaction, and importance of comfortable and convenient transportation. Also, personal and economic variable aspects such as educational level, age, and employment status affect WTP, and one aspect of the economic variables that significantly influence the WTP of the commuters is the household monthly income backed by a recent study by Umme et. al. (2023).

Personal factors are associated with what influences the consumption choices of the consumer, according to IGI Global (2019), such as classification, gender, sex, do they own a car, and their preference for comfort and convenience. Economic factors also relate to the pooled household income and transportation expenses. Both demographic characteristics and stated preferences of the commuters are the independent variables that affect the dependent variable: their willingness to pay for additional Modern PUV, which is comfortable and convenient transportation. The guiding framework of the study uses the contingent valuation method, which estimates the monetary value of a good or service. In this case, the transportation comfort and convenience services are estimated using a contingent valuation method questionnaire.

Significance of the study

The significance of the study is to help the city government evaluate the willingness to pay for the implementation of the modern PUV vehicle that was rolled out in 2020 (Llanes, 2020). Understanding its citizens' preferences for the current mode of transportation, which includes traditional PUVs and Taxis in Baguio City, helps the Local Government Units to discuss with the transport providers to effectively allocate resources by prioritizing improvements that the commuters value and are willing to pay. Furthermore, the study result could give insight and recommendations for a market-

driven policy fare matrix to the Land Transportation Franchising Regulatory Board (LTFRB) as a promulgating agency providing public transport prices to the operators and commuters. Consequently, Modern PUV suppliers can improve its payment schemes, transport systems, physical ergonomic designs that suit the needs of the passenger.

METHODS

Research design and population of the study

The study uses a descriptive-quantitative approach to measure the different variables, such as income and transportation expenses. It describes frequency and means and compares and tests hypotheses between relationship variables. To predict the willingness to pay for additional Modern PUVs in terms of economic and personal factors such as comfort and convenience of the MPUV. The study uses the Contingent valuation method (CVM) in which respondents are asked to declare their preferences in hypothetical or contingent marketplaces, allowing researchers to estimate demand for items or services not sold on the open market. In general, the poll draws on a sample of people who are asked to assume that there is a market where they may purchase the items or services under consideration. (OECD, 2018)

Materials and Instrumentation

A tool-validated structured survey questionnaire with sets of closed and open-ended questions is created, which consists of a Likert scale, multiple answer, and dichotomous questions. The survey questionnaire was patterned based on the Contingent Valuation Method. First, the attitude of the respondents is established by determining their level of satisfaction and level of importance regarding the following preferences. The second part is the use of goods or transportation, such as how often, what the purpose is, and when the commuters use the current mode of transportation. The third part is the valuation scenario, which includes the situation and if there would be improvement in the situation. Respondents are asked if they are willing to pay or not and how much they are willing to pay. These part gives value to a better transport experience like the Modern PUV. The fourth and last part is the mode of payment and demographic information. The survey questionnaire was validated, and reliability testing was conducted before it was administered for the actual data-gathering

Data Gathering Procedures

This study follows specific steps to gather data from the schools. Upon the ethics reviewer's approval of the Ethics Clearance, the researcher sought endorsement from the Graduate Program Coordinator of the School of Advance Studies and completed the Request for Data Gathering form. A letter of communication was sent to the private and public schools. Then, following the school's process, the concerned school or office granted permission, and the researcher proceeded to administer the printed questionnaire. In the selection of participants, the administrators randomly select available classes during the time of data gathering.

Statistical Treatment of Data

The collected data is analyzed using appropriate statistical techniques and thematic analysis to identify patterns, binary logistic regression, and key themes related to commuters' transportation preferences. Descriptive and inferential statistical methods are used to treat the data to be collected through the survey questionnaire. The BLR Model predicts outcomes (response of the dependent variable) that are based on the values of a set of predictors (categorical variables). In this case, to predict whether the commuters are willing to pay for additional Modern PUVs to ply the various routes of Baguio City in respect to the personal and economic factors.

Ethical Consideration

Researcher communicate the Informed Consent to the respondents, which includes information about the study, such as its purpose and the researchers' guarantee of their confidentiality by ensuring that the researcher only has access to the data, while for the anonymity of their names was secured and the researchers follows the ethics protocol.

RESULT AND DISCUSSION

Profile of the Respondents

The processed data provides the background of the respondents, which targeted two proximate schools: a public school with 112 respondents (35%) and a private school with 212 respondents (65%). During the gathering of data, the researcher retrieved 324 responses. Out of 324 respondents from schools, 312 students and 10 teachers at the senior high school level responded. Almost 80% of the respondents say they use the traditional PUV (Jeepney) daily as a means of transportation. The commuters use modern PUVs once to twice a week (49%). While the commuters ride taxis one to two times a month (66%) on average. Respondents are primarily students and teachers; their main reason for commuting is going to school. The average commute time varies depending on the location or barangay they are currently living in and the peak hours of their travel time. Also, approximately 38% of the sample owns a car and still commutes using public utility vehicles. The most preferred mode of payment is still cash (70%), and some respondents preferred Cash and BEEP (11%) as the preferred modes of payment. Other modes of payment such as E-wallet, Online Banking, and Credit cards are less preferred because the systems and transaction process are not yet set and ready, such as the need for internet or data in the commuters' cellular phone to access the following applications.

Commuters' satisfaction on the current mode of transportations (Traditional Jeepney, Taxi, and modern PUV)

Commuters' satisfaction level is often based on their travel experiences. Commuters are likely to be highly satisfied when they find the travel experience comfortable and convenient. A five-point Likert scale is used to quantify the commuters' satisfaction level with the city's current mode of transportation (traditional PUV, taxi, and modern PUV). The survey shows that respondents who answered yes are willing to pay (57%) for additional modern PUV, which is slightly higher in numbers compared to those who answered they are not willing to pay for additional modern PUV.

Table 1 below answers the study's first objective and presents a detailed comparison of the commuter's satisfaction in using the traditional PUV and taxi between respondents with willingness to pay and those who are unwilling to pay. When the respondents are classified according to their WTP, the weighted mean of satisfaction of those who answered yes and no is almost proportionate.

Table 1 Commuters' level of satisfaction with the traditional PUV and taxi as per willingness to pay

Descriptive Statistics									
Indicators (Jeepney Satisfaction)	**Did not indicate N=2**		**Yes, WTP N=185**		**Not WTP N=137**		**Total N= 324**		**Descriptive Interpretation**
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	
1. Crowdedness	2.000	1.414	2.746	1.145	2.650	1.179	2.701	1.159	Just right
2. Air Ventilation	3.000	1.414	2.935	1.009	2.905	1.097	2.923	1.046	Just right
3. Cleanliness	2.500	0.707	3.205	0.897	3.255	0.940	3.222	0.914	Just right
4. Seat Comfort	3.000	1.414	3.049	0.940	3.197	0.961	3.111	0.951	Just right
5. Loading and Unloading	4.000	1.414	3.827	1.039	3.978	1.067	3.892	1.052	Satisfied
6. Availability	3.500	0.707	2.962	1.144	3.000	1.266	2.981	1.193	Just right
7. Environment Friendly	3.000	1.414	2.503	1.017	2.438	1.028	2.478	1.021	Dissatisfied
8. Safe and Security	2.500	0.707	2.362	1.163	2.453	1.219	2.401	1.183	Dissatisfied
9. Social Accessibility	3.500	2.121	3.443	1.155	3.489	1.106	3.463	1.136	Satisfied
Overall Mean	**3.000**	**1.257**	**3.004**	**1.056**	**3.041**	**1.096**	**3.019**	**1.073**	**Just right**
Indicators (Taxi Satisfaction)	**Did not indicate N=2**		**Yes, WTP N=185**		**Not WTP N=137**		**Total N= 324**		**Descriptive Interpretation**
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	
1. Air Conditioning	3.500	0.707	3.627	0.919	3.861	0.893	3.725	0.912	Satisfied
2. Cleanliness	3.500	0.707	3.686	0.840	3.869	0.847	3.762	0.845	Satisfied
3. Seat Comfort	4.000	0.000	4.022	0.834	4.102	0.798	4.056	0.816	Very Satisfied
4. Loading and Unloading	4.000	1.414	3.832	1.026	3.891	0.968	3.858	1.001	Satisfied
5. Availability	2.000	1.414	2.870	1.002	2.766	1.073	2.821	1.034	Just right
6. Environment Friendly	3.000	1.414	3.000	0.897	2.905	0.931	2.960	0.912	Just right
7. Safety and Security	3.500	2.121	3.962	0.969	3.912	1.047	3.938	1.006	Satisfied
8. Social Accessibility	3.500	2.121	3.627	0.993	3.650	1.012	3.636	1.003	Satisfied
Overall Mean	**3.375**	**1.237**	**3.578**	**0.935**	**3.620**	**0.946**	**3.595**	**0.941**	**Satisfied**

**Scale Range: (4.50 – 5.00) Very Satisfied, (3.50 – 4.49) Satisfied, (2.50 – 3.49) Just Right, (1.50 – 2.49) Dissatisfied, (1.00 – 1.49) Very Dissatisfied.*

The respondent's current satisfaction with the mode of transportation, traditional PUV and taxis, present a different result using both public utility vehicles provides different comfort and convenience to the commuters. It can be viewed in Table 1 that the total or overall satisfaction for traditional PUV was just right (M=3.019, SD= 1.073). The respondents rated indicators such as environment-friendly, safe, and security as dissatisfied because the traditional PUV still emits pollution and no dashcams are installed. Moreover, in a study on the City, air quality dispersion, through spatial distribution of PM10 concentrations with high concentrations, was evident on roads with high vehicular emissions (Ramos & Blanco, 2019). The satisfaction per indicators for traditional PUV, particularly in seat comfort, was rated just right (M=3.111, SD= .0951), suggesting that the commuters were neither satisfied nor dissatisfied. A recent study by Gumasing et al. (2020) mentioned that the traditional PUV cabin passenger is poorly designed and lacks proper ergonomic features, which makes commuters likely to experience discomfort.

The overall mean taxi level satisfaction was rated satisfied with M=3.59, SD=0.941. Respondents are satisfied with the following commuter preferences regarding air conditioning, cleanliness, loading and unloading, and social accessibility. The taxi's most-rated commuter preference feature is seat comfort (M=4.056, S=0.816). While taxis provide more satisfaction because of their features of comfortable seats, air-conditioned, cleanliness, safety, and social accessibility, commuters only ride the taxi one to two times a month (66%) on average based on the responses. Taxis are rarely used by the commuters because fare is expensive compared to traditional PUV.

Commuters Perceived Level of importance on the PUV Comfort and convenience

Commuters' perception of the importance of a comfortable and convenient travel experience shows how commuters value the different aspects of comfort and convenience using transportation and reflects what commuters consider as crucial indicators for their satisfactory travel experience.

Table 2 Commuter's Preferences level of Importance as per willingness to pay

Indicators	Descriptive Statistics								Descriptive Interpretation
	Did not indicate N=2		Yes, WTP N=185		Not WTP N=137		Total N= 324		
Comfort and Convenience	M	SD	M	SD	M	SD	M	SD	
1. Crowdedness	3.000	1.414	3.914	1.124	3.599	1.292	3.775	1.207	Important
2. Air Conditioning	3.000	1.414	4.119	0.877	3.876	1.067	4.009	0.972	Very Important
3. Cleanliness	3.500	0.707	4.514	0.700	4.409	0.845	4.463	0.768	Very Important
4. Seat Comfort	3.000	1.414	4.411	0.725	4.314	0.945	4.361	0.834	Very Important
5. Physical Condition	3.000	1.414	4.368	0.784	4.292	0.901	4.327	0.843	Very Important
6. Loading and Unloading Area	3.000	1.414	4.314	0.827	4.139	1.023	4.231	0.924	Very Important
7. Availability	3.500	2.121	4.459	0.807	4.526	0.832	4.481	0.827	Very Important
8. Environment Friendly	3.500	2.121	4.486	0.815	4.401	0.943	4.444	0.880	Very Important
9. Safety and Security	3.500	2.121	4.654	0.650	4.584	0.660	4.617	0.669	Very Important
10 Social Accessibility	3.500	2.121	4.476	0.774	4.460	0.805	4.463	0.796	Very Important
Overall Mean	**3.250**	**1.626**	**4.371**	**0.808**	**4.260**	**0.931**	**4.317**	**0.872**	**Very Important**

**Scale Range: (4.50 – 5.00) Very Important, (3.50 – 4.49) Important, (2.50 – 3.49) Moderately Important, (1.50 – 2.49) Slightly Important, (1.00 – 1.49) Unimportant.*

Table 2 provides results for objective 2, where the commuter preference level of importance is the total or overall mean rating (M=4.317, SD=0.872) of Very important. At most, Safe and security (M=4.617) were rated the highest, second Availability (M=4.81, SD=0.827), the third highest, Social accessibility (M=4.463, SD=0.796), and followed by Environment Friendly (M=4.444, SD=0.888). In the study by St-Louis et al. (2014), commuter perceptions and satisfaction are critical in the transportation sector as researchers and policymakers seek to encourage the widespread use of public and active transportation modes. Knowing what the commuters find more important among their preferences helps in understanding their attitude toward the comfort and convenient features of PUVs. We can see in Table 2 that commuters willing to pay have slightly higher mean ratings than those unwilling to pay.

The issues and challenges encountered by the commuters.

Commuters' experience various range of challenges on their way to school or work to present as such and to answer objective 3 of the study using frequency and percentage the top five most common challenges or issues are presented in Table 3. Respondents were allowed to check all challenges and issues that apply to their experiences.

Table 3 What are the issues and challenges encountered by commuters

Challenges / Issues	Frequency	%	Ranks
1) Longer travel time	205	14%	**5**
2) Waiting time is too long during peak hours	289	20%	**1**
3) Unsafe for waiting passengers along sidewalks	87	6%	6
4) Unpredictability of the arrival of Taxi and PUJs	184	13%	**4**
5) Stressful and Tiring	222	16%	**3**
6) Exposure to Pollution (especially for open jeepneys)	237	17%	**2**
7) Physically inconvenient/not ergonomically design of the PUJ	78	5%	7
8) Not PWD friendly	52	4%	8
9) Unwelcome sexual advances from co-passengers or driver	68	5%	7
	1422	100%	

Table 3 presents the top-most selected challenges or issues the commuters encountered and ranked the following items. First is "the waiting time is too long during peak hours" (20%). Commuters wait longer for public vehicles during peak hours due to increased volume of passengers who travel simultaneously. This could lead to traffic congestion and even delays for passengers. Other reasons are the limited transport service, capacity, or the scheduling and timing of transportation services. Wherein travel time includes time spent waiting for the vehicle to arrive, consequently becoming the commuters' stressors as back in the study of Loo and Tsoi (2024), travel time is highly associated with the transport stressor of the passengers. Second is "exposure to pollution" (17%), as the city is a tourist destination with more vehicles on the road, resulting in traffic congestion, especially during peak hours. The gasoline combustion in diesel fuel cars, jeepneys, and buses contributes to air pollution. Vehicular emission is the primary source of pollution on the road, as mentioned by Ramos and Blanco (2019). Third is "stressful and tiring" (16%). Stress and being tiresome during and after commutes are the underlying effects of all the challenges and issues mentioned by commuters. Fourth, "longer travel time" (14%) dramatically affects commuters' satisfaction, whereas the study by Humagain and Singleton (2020) found that longer travel time lowers commuters' satisfaction. Fifth is the Unpredictability of the arrival of taxis and PUJs (13%). Commuters also mentioned that based on their verbatim challenges and issues, the over crowdedness in traditional PUV leads to discomfort or inconveniences with other co-passengers.

The commuter's additional willingness to pay for additional Modern PUV

Based on the city Land Transportation Franchising and Regulatory Board current fare matrix as of 2024 for traditional PUV is 13 pesos while for modern PUV is 14 pesos for regular passengers at a short distance while 20% discount for students, senior citizens, and Person with Disabilities. Given the current price the respondents were are asked how much additional pesos or pesos they are willing to pay

for modern public utility vehicles to ply in the city. Table 4 presents the summary distribution of the commuters who are willing to pay for additional modern PUVs and how much are they willing to pay for additional PUVs, which answers objective 4 of the study.

Table 4 Additional amount commuters' willingness to pay for Modern PUV

3.3 Amount WTP	Frequency	Percent
Did not indicate	4	1%
NO WTP	162	50%
YES WTP - 1.00	75	23%
YES WTP - 1.50	10	3%
YES WTP - 2.00	39	12%
YES WTP - 2.50	10	3%
YES WTP - 3.00	19	6%
YES WTP - 3.50 Pesos & Above	5	2%
Total	**324**	**100%**

Approximately half of the respondents are not willing to pay (50%) and almost half responded yes, they are willing to pay (49.8%) for additional Modern PUV to ply in Baguio City. The common reasons why respondents are not willing to pay based on their verbatim answers, are their allowances are not enough for an increase in fare and that traditional PUV are cheaper, and work the same with lower fares. We see in Table 4 that most of the students who are willing to pay for 1 peso which is about (75), 23%, and those who are willing to pay for 2 pesos are (39), 12% for additional Modern PUV. It was observed in the data that some respondents who live from longer distances such as Philex (Tuba), Ambiong (La Trinidad), Taloy Norte (Tuba) are the ones who are willing to pay an additional amount for Modern PUV due to lack of availability and accessibility of other PUVs in the area.

Binary Logistics Regression

Table 5 shows the result of the Binary Logistic Regression Model to show the impact between the independent variable, WTP to the following dependent variables (Expense, Amount WTP, Gender, Classification, Pooled household Income, Car ownership, Satisfaction of Jeepney and Taxi, Importance of PUV).

Table 5 Personal and Economic Factors affecting the Willingness to pay for additional Modern PUV

Variables in the Equation						
	B	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
(Monthly Transportation Expense)	.258	.241	1.149	1	.284	1.294
3.3 Amount WTP	-4.285	.533	64.505	1	.000	.014
5.2 Gender (Did not mention)			1.575	3	.665	
5.2 Gender (Female)	-3.061	2.548	1.443	1	.230	.047
5.2 Gender (Male)	-.563	1.001	.316	1	.574	.570
5.2 Gender (Non-Binary)	-.631	1.014	.387	1	.534	.532
5.3 Classification (Did not mention)			2.644	2	.267	
5.3 Classification (Student)	2.453	4.144	.350	1	.554	11.622
5.3 Classification (Teacher)	2.129	1.311	2.637	1	.104	8.410
5.4 Pooled Household Income (DNM)			5.222	5	.389	
5.4 Pooled Household Income (10k – 20k)	-1.219	.737	2.737	1	.098	.295
5.4 Pooled Household Income (21k – 30k)	-.003	.688	.000	1	.996	.997
5.4 Pooled Household Income (31k – 40k)	-.521	.743	.492	1	.483	.594
5.4 Pooled Household Income (41k – 50k)	-.226	.867	.068	1	.795	.798
5.4 Pooled Household Income (51k – above)	-.756	1.018	.552	1	.458	.469

5.7 Do you own a car? (Did not mention)			1.061	2	.588	
5.7 Do you own a car? (Yes)	-.404	2.412	.028	1	.867	.668
5.7 Do you own a car? (No)	-.430	.420	1.047	1	.306	.651
Overall mean Jeep Satisfaction	.135	.373	.131	1	.717	1.144
Overall mean Taxi Satisfaction	.456	.408	1.248	1	.264	1.578
Overall mean PUV Importance	-.850	.412	4.264	1	.039	.427
Constant	**6.104**	**2.990**	**4.169**	**1**	**.041**	**447.664**

Objective 5 utilizes Binary logistic regression. The BLR Model predicts outcomes and has only two possible values (1 or 0, yes or no) based on the values of a set of predictors (categorical variables). In this case, we establish the Binary Logistic Model to predict whether the commuters are willing to pay for additional Modern PUVs to ply the various routes of Baguio City or not, with respect to personal (gender, car, importance, traditional PUV and Taxi satisfaction) and economic factors (expense and income). The equation takes the form:

$$(1)\ \ log\frac{(1)}{1-p} = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + \beta nXn$$

Where the following variables:

$\boldsymbol{p}$: is the probability of the event occurring. Probability that a commuter is willing to pay for MPUVs.

$\boldsymbol{log\frac{(1)}{1-p}}$: Odds of the event occurring.

β0 : Intercept term, which represents the log-odds of the outcome when all predictors are 0.

β1, β2, ..., βn : Coefficients for each predictor variable, showing the effect of each variable on the log-odds of the outcome.

X1, X2,..., : Predictor variables are the personal (gender, with car, importance, traditional PUV and Taxi satisfaction) and economic factors (expenses, income level)

The Omnibus test of model coefficient (P=0.000) shows a significant improvement in fit compared to the null model. Therefore, the model is showing a good fit. In another test of goodness of fit, Nagelkerke r square likelihood statistics is 0.753, nearly 1, indicating a good fit of the model. Table 5 presents the probability of falling into the target group if the odds ratio in Exp (B) exceeds 1. Then, the event is likely to occur. The binary logistic model shows the transportation expenses, classifications, and satisfaction with the current mode of transportation, predicting a positive change in the commuters' willingness to pay for modern PUVs but not significant. All other variables are not statistically significant except for "WTP Amount" and "Overall mean of Importance level of PUV."

In Table 5, we can see the model, the additional amount willing to pay was significant (B= -4.285, W=64.50, p= .000, Exp (B) = .014), indicating a trend where decreasing in additional amount the commuters are willing to pay is associated with lesser odds of the willingness to pay. This validates the statement that as the commuters pay less for the additional amount, commuters are willing to pay decreases; the possibility to answer 0 or No is that they are willing to pay for Modern PUV. This finds affirmation in the study of Tepmanee and Siridhara (2020), wherein the level of importance commuters place on their preferences can significantly impact their willingness to pay for public transit. Because

most of the respondents are students, the possibility that their answer would be no; they are willing to pay for additional but at a minimum additional amount in pesos for the modern PUV.

The overall mean on the level of importance of commuter's preferences perceived by the commuters shows a negative coefficient in the Binary Logistic Regression Model and an odds ratio less than 1 (B= - 0.850, W= 4.264, p = 0.39, Exp (B) = 0.427), this means that when respondents find PUV commuters' preferences less important, the odds ratio is closer to 0 or No, which means they are not willing to pay for additional Modern PUV. Alternatively, the more commuters find the PUV important, the commuters are more likely to pay for additional peso on modern PUVs in the city. There is a direct relationship between the perceived level of importance on the comfort and convenience preference by the commuters along with their WTP for MPUV. The result confirms the assumption from the research framework on the marginal utility theory that an increase in satisfaction level leads to an increase in WTP and customers are willing to pay more for better services or goods. Furthermore, in a similar application Caplis & Lopez, (2020) findings suggest that the higher the satisfaction level of commuters, the greater their willingness to pay for proposed Automated Guideway Transit.

CONCLUSION

The main findings of the study on the precise student and teachers' commuters' preferences in Baguio City and demand for modern PUV through the willingness to pay were revealed. By determining their satisfaction level and what comfort and convenience features they perceive as important in Riding PUV. The result shows that the overall satisfaction level of student and teacher commuters to jeepney was just right. They are mostly dissatisfied with the environment-friendly and safe or security features of traditional PUVs or Jeepneys since these are still emitting carbon dioxide because Traditional PUVs are mostly made with a second-hand Deisel engine. Thus, promoting sustainable transportation modes and infrastructure can benefit the environment and individuals of all income levels, contributing to more equitable and sustainable transportation systems.

In the willingness to pay for additional modern PUVs, the binary logistic model shows the transportation expenses, classifications, and satisfaction with the current mode of transportation, predicting a positive change in the commuters' willingness to pay for modern PUVs. However, these indicators are not statistically significant. Conversely, two indicators in the model have a significant relationship with WTP. The first is the additional amount willing to pay, wherein the lesser the additional the commuters have to pay, the chances are that commuters will answer No, they are not willing to pay. The second indicator that yields significant results is the overall level of importance perceived in the preferences by the commuters. The result shows that when commuters perceive the PUV commuters' preferences as less important, they are unwilling to pay for additional PUVs. This means that there is an inverse relationship between the perception of the commuter's preferences importance and their willingness to pay for additional modern PUVs. Similar to the concept, customers tend to pay more when they find value in the service or goods. The higher the satisfaction level of the commuters, the greater their willingness to pay for additional modern PUVs.

The study failed to prove the association between household income and willingness to pay for additional Modern PUV because most respondents are students. Consequently, the study suggests further study on the other types of commuters, such as tourists, those working in other industries, colleges, senior citizens, and PWD. As highlighted in the result, one concern of the commuters is pollution. Thus, the research also recommends the following programs that mitigate the impact of air pollution on the people.

1. Promote Sustainable Transport Practices. Create programs for schools to have a car-free day once a month. Less use of private cars reduces carbon emissions and encourages the use of public utility vehicles, which carry more passengers than private cars.

2. Enhance Transport Service Reliability and Frequency. To reduce waiting times, especially during peak hours, and ensure that PUV arrives more frequently and on time, real-time tracking and communication systems should be implemented to minimize delays and provide accurate information to commuters.

3. Additional Modern Public Utility Vehicles. Increase the number of modern PUVs in some locations or barangays with no to fewer PUVs or long distances and limited transport in some city areas.

4. Better public transport system and services to the comfort and convinience of the commuters.

Lastly, this research suggests that the city government consider the city government considers a market-driven policy fare matrix. A market-driven policy fare matrix based on demand for such high-quality services means better commuters' utility or satisfaction, which could be proportionate to their willingness to pay.

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