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User perceptions of current transport service: a case study in developing country's urban traffic

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ABSTRACT— This study is aimed at analyzing and evaluating the current status of the quality of public transport in Vinh Long province – one of the emerging provinces in the Mekong River Delta (MRD) Vietnam. The research employed the data set of direct interviews with 140 respondents who have and have not to experience in using public transport for analysis and comparison purposes. The contribution of this research is comparing the opinions of current and potential users of public transport and employing the conventional CVM approach and inferred valuation (IV) to compare the fees people are willing to contribute to current public transport improvement projects. The research results revealed that the current state of the transport system has not met the needs of users. The research results also clearly indicate the role of the IV estimation method in adjusting the WTP value elicited closer to reality. The interesting point is that people who have never used public transport are willing to pay more for better quality. In addition, respondents' gender and income influence this willingness to pay for both groups of observations. Based on the analysis results, the study proposes a number of solutions to stakeholders such as the government, public transport companies, and people to promote the development of public transport in the near future.

KEYWORDS: inferred valuation, economic efficiency, environmental efficiency, Mekong River Delta

1. INTRODUCTION

Curently, air pollution in Vietnam, especially in urban areas and big cities, is an environmental issue of concern to the social community and its status is increasing (Ministry of Natural Resources and Environment, 2021). Air pollution has negative impacts on human health, accelerates the aging process, declines respiratory function, causes diseases such as asthma, cancer, neurodevelopmental disorders and malformations congenital in young children; heart disease, stroke, chronic obstructive pulmonary disease and cancer in adults. According to the WHO report (2017) out of the 10 diseases with the highest mortality rate in Vietnam, there are 6 respiratory diseases related to air pollution and air quality. In the disease structure in Vietnam, respiratory diseases are also one of the five most commonly acquired diseases in Vietnam. Air pollution not only affects health but also gives rise to a series of unstable socio-economic problems. According to a report by the World Bank (WB), the global economic loss due to air pollution is about 225 billion USD. For Vietnam, air pollution causes economic losses of about 10 billion dollars per year (accounting for 5-7% of GDP). One of the main causes of air pollution is the number of vehicles that have increased dramatically over the years. In 2020, there are more than 50.6 million vehicles nationwide (more than 2.9 million cars and about 47.8 million motorbikes and motorbikes). When vehicles use fuel to operate, the engine will emit a large amount of gases with toxic components that pollute the environment and directly affect the health of road users and people living along the road. As one of the most modern and developed cities in the MRD, Vinh Long along with the increase in urban population, the development of economy and mechanization, problems such as traffic congestion. Traffic, air pollution, traffic accidents are also increasing rapidly. Before that situation, in order to reduce traffic congestion, the first thing is to reduce the density of vehicles participating on the road. This can be

done when expanding the road system or reducing the number of vehicles in traffic. But to expand the road system requires many costs such as construction costs, compensation costs and time-consuming renovation and construction. Therefore, it is quite easy and appropriate to use public transport to limit private vehicles. According to [7], efficient public transport is one of the key issue to development. For most developing countries, public transport is the only practical means of accessing employment, education and public services.

Stemming from the above fact, this research was conducted to find out the attitudes and needs of the people towards the current state of public transport and the level of contribution to improve the quality of public transport services. Therefore, the objective of this study is to analyze the current situation of the public transport system in Vinh Long, determine the price level people are willing to contribute to the improvement of service quality, and analyze the factors affecting the service quality and decided to be willing to contribute to the improvement of service quality, thereby helping to upgrade the public transport system in this area.

2. Methodology

2.1 Data collection

Primary data was collected by directly interviewing 140 observations of prepared questionnaires. These respondents are local people randomly selected. The questionnaire consists of 5 parts, including introduction of research objectives, introduction questions, respondent information, main contents of the research topic in the form of questions, in which WTP of respondents is collected by CVM method.

2.2 Data analysis

Descriptive statistics method: employed in this study to describe the characteristics of respondents, cognitive characteristics related to using public transport means and the situation of public transport system. In addition, the frequency distribution table of indicators on gender, occupation, income, and education level is also used.
Comparative method: used in this study for the purpose of comparing people's willingness to contribute to improved public transport in Vinh Long city when using traditional CVM and inferred valuation.
Likert scale: a 5-point scale used to assess the status of using public transport vehicles as well as the attitude and satisfaction of passengers towards public transport services. The levels are expressed by the following levels: Totally disagree - Disagree - Neutral - Agree - Totally agree.
Contingent Valuation Methodology (CVM): this is a method used to determine an individual's willingness to contribute to a certain good or service. According to [2], CVM is a commonly used method for valuing environmental quality goods. This method evaluates not based on market price and is used specifically for the non-use value group. By constructing hypothetical market scenarios, it is possible to determine the demand function for environmental goods through the people's WTP or the willingness to accept when they lose that good (WTA - Willingness to accept). Steps to design a CVM study as follow:
Step 1: Build a hypothetical market: Develop scenarios and assumptions for environmental goods and services. These pricing scenarios need to be clearly defined and described, fully explaining the environmental goods and services in question and the nature of the change. This step entails creating a scenario of a means of payment or compensation in the following two forms:
- *Closed Scenario*: A monetary value system is built from low to high or from high to low. With this type of scenario, we have pre-fixed a price for the respondent to choose the option.
- *Open Scenario*: In this scenario, the price is not fixed in advance, but instead, the respondent will give how much money. This study will use an open-ended scenario, the purpose of which is to find out what the average price respondents are willing to pay for improving the quality of public transport services.
Step 2: Determine the bids: Different survey methods can be used, including: Face-to-face interview, Mail/email interview, Telephone interview. The purpose of the survey is to determine the maximum

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willingness to pay to improve the environment (or the maximum payment to prevent the deterioration of environmental quality), in addition to information about other factors affecting the survey results such as education, income, age.

Step 3: Analyze the results: The information collected is used in a variety of ways for many different purposes. The outputs that can be obtained from each CVM study are:

- *Average WTP or WTA*: The average price is easier to calculate if using the "open scenario" survey method, and if using the "closed scenario", for example Yes/No answer, then it is necessary to use econometric techniques to calculate the probability of a "Yes" answer for each offered sum.
- *Bids*: WTP/WTA amount is considered as the dependent variable, and information on variables such as income (I), age (A), education level (E) is collected during the survey used as independent variables.

Regression function: $WTP_i = f(I_i, E_i, A_i)$ where i represents the i^{th} observation value.

The regression model has the form:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5$$

The dependent variable in the regression model is the respondent's decision to contribute (Y), which takes the value 1 if the respondent agrees to contribute to use high-quality public transport services, takes the value 0 if the respondent disagrees.

Table 1: Independent variables in the regression model

Variables	Sign	Descriptions	Expected sign
Gender	X_1	The respondent's gender, takes the value 1 if the respondent's gender is Male, 0 if female	+/-
Occupation	X_2	The respondent's occupation, coded as follows: 1-Student/workers, 0- Others	+
Education level	X_3	The respondent's educational level, coded in the following order: 1-12 is from grade 1 to the end of grade 12; 13-Vocational education; 14-College; 15-University; 16-Above University; 17-Other.	+
Income	X_4	Respondent's income (Million Vietnamese Dong/month/person)	+
Used to use public transport vehicles	**X5**	**1=Used to use, 0-otherwise**	+

Source: Author compile, 2020

Note: The "+" sign represents a proportional relationship with the dependent variable; The sign "-" represents an inverse relationship with the dependent variable.

Gender (X1): Men often watch news more often, so they get more information about environmental pollution due to dust and smoke than women, thereby having a more positive attitude in environmental protection. Therefore, the gender variable is expected to have a positive effect on the respondents' willingness to pay. However, air pollution affects health as well as skin, women are more interested in beauty, so sometimes the price women are willing to pay will also be higher than men. bear the sign (-). According to [8] men tend to be willing to pay more than women 1,840 VND/passenger/way.

Occupation (X2): According to Nguyen Thi Le Ai, Nguyen Minh Tam, Nguyen Tri Quang Hung, Nguyen Minh Ky (2017), occupation has an important influence on the WTP of respondents. For this study, students are the easiest to access and use public transport, so it is expected that they will be willing to decide to

contribute to improving the quality of public transport.

Education level (X3): The higher the level of education, the higher the awareness and understanding of environmental pollution, so it is expected to have a positive influence on the decision to be willing to pay to improve service quality.

Income (X4): The cost of using public transport will be lower than that of personal vehicles, so people with low incomes will tend to use public transport to move. However, according to [8], income is directly proportional to people's willingness to pay.

Have used public transportation (X5): Respondents who have used public transportation vehicles will more or less be aware of the benefits that public transport vehicles bring as well as see the limitations of this means, so expected to have a higher willingness to pay than respondents who have never used it.

Inferred valuation method: Based on the interpretation of [4], respondents will use their own preferences to predict the preferences of others. Based on the results of this assumption, the utility function of the indirect question-based approach is discussed below. Therefore, this study applied a traditional but modified utility function U [5] as follows:

$$U = wM (A, H) + (1 - w) V (I, E)$$

Where M is an added normative or ethical value [1], [3], [10] is a formula for selection performed A and the implied level of fidelity H for the added utility, or willingness to pay for the good, can be present where social influence exists and is recognized. The indirect utility function V is a function of income I and the public good E, while w is a constant representing the weight placed on morality over consumption. [4] further define the respondent's utility function with inferential valuation as follows:

$$U = wM (A = 0) + (1 - w) V (I + (WTP^{I} - E [WTP^{F}]) - 2, E)$$

Where WTPF is the unbiased willingness to pay of others and (WTPI - E [WTPF])-2 is a function expressing the hypothesis in which respondents are paid based on their accuracy. their predictions; although there is disagreement on the meaning of cash payments and shows a more precise preference [6]. [5] suggest that there is no existence of utility from respondents when they predict their willingness to pay others, or in this situation $\partial M / \partial A = 0$. Hence, inferential pricing can produce more accurate WTP values by asking respondents to predict other people's willingness to pay. Notably, willingness to pay from WTPI inferred valuation shows no effect of ethical standards on WTP values, while WTPH can generate higher willingness to pay. Therefore, the objective of this study is to test whether this concept of equilibrium condition exists:

$$WTP^{H} = WTP^{I}$$

3. Results and Discussion

3.1 Description of survey sample characteristics

Out of 140 respondents, there are 50 respondents who have never used public transportation (accounting for 35.71%), of which there are 22 male respondents and 28 female respondents (accounting for 56%), as explained above. the percentage of women participating in public transport means less than that of men because they are afraid to collide with evils when using public transport; The main occupation of this group of respondents are workers/officers, who already have jobs and relatively high incomes, so they need to be equipped with an appearance suitable for the nature of their profession, and sometimes the time. Their travel time is not fixed, so the use of public transport is not convenient.

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Table 2: Description of gender and occupation characteristics of respondents

	Categories	Used to use n=90	Proportion (%)	Never been use n=50	Proportion (%)	Total n=140	Proportion (%)
Gender	Male	48	53.33	22	44	70	50
	Female	42	46.67	28	56	70	50
Occupation	Students	56	62.22	12	24	68	48.57
	Worker	12	13.33	10	20	22	15.71
	Public officials	2	2.22	10	20	12	8.57
	Housewife	6	6.67	4	8	10	7.14
	Trade	4	4.44	2	4	6	4.29
	Other	10	11.11	12	24	22	15.71

Source: Survey data, 2020

From the result of Table 2, we can comment that the number of respondents who have used public transport is nearly 2 times more than the number of respondents who have never used it, this shows that public transport is quite popular with people in the province of Vinh Long. On the other hand, the number of men who have ever used public transport means more than women; Those who used to use are mainly students/students, financially dependent on their families, and those who have worked or have relatively high incomes tend to use personal vehicles more.

The group of respondents who have never used public transportation have a higher educational level than the group of respondents who have used public transportation, specifically, the average education is 12.08, equivalent to the level of 12 to university. Specifically, the lowest level of education in this group is grade 5, the respondents are housewives and have no need to travel; The highest level of education is 15. The education level of the respondents in this group is high, mainly the respondents have worked, it is clear that with the higher education, the respondents tend to use less use public transport more.

Table 3: Description of the education level of the respondents

	Mean	Min.	Max.	Std. Dev.
Total (n=140)	11.87	5	15	2.22
Used to use public transport (n=90)	11.76	5	15	1.9
Never been use public transport (n=50)	12.08	5	15	2.74

Source: Survey data, 2020

Table 3 indicates the average educational level of the group that has never used public transport is higher than that of the group that has used it and is higher than the overall. However, when conducting t-test comparison, we have the result Pr(|T| > |t|) = 0.5616 showing that at 5% significance level we cannot reject the hypothesis H0 that the value is The average level of education in the two groups of respondents is the same. In conclusion, there is no difference in mean education level between the two groups of respondents who have used and never used public transport.

Table 4: Description of the average monthly income of the respondents

	Mean (VND)	Min (VND)	Max (VND)	Std. Dev.
Total (n=140)	4,864,000	0	20,000,000	3,330,000
Used to use public transport (n=90)	4,078,000	0	10,000,000	2,470,000
Never been use public transport (n=50)	6,280,000	0	20,000,000	4,170,000

Source: Survey data, 2020

It can be seen that the average monthly income of the group that has never used public transport is much higher than the overall and the group that has used it. The experince user group has a low average monthly income. However, when tested by t-test, there is no difference between the mean income of the two groups of respondents, Pr(|T| > |t|) = 0.2837, accepting the hypothesis H0: mean value Average monthly income in 2 groups of respondents is not statistically different.

3.2 Respondent's Public Transportation Quality Assessment

Infrastructure factor

Specifically, the criteria "Waiting stations are arranged with comfortable seats", "Waiting stations with safe and clean roofs" have a low rating (two of these criteria have an average value of less than 3), showing the dissatisfaction of the people. The criterion "There are many waiting stations in the city" is the most appreciated criterion among the criteria in "Waiting stations", but the average value is only 3.49, only stops at the level of satisfaction. During the survey, there are many waiting stations in the inner city of Vinh Long that do not have route numbers or route names. The map of the route network and the bulletin board of the routes that will pass. Seats are just iron bars, many waiting houses are not available. The needs of the people have not yet satisfied the people, the State needs to consider and have an investment policy, upgrade the waiting room system, ensure the safety and the wishes of the people.

Table 5: Criteria for waiting public transport stations

Criteria	Mean	Min	Max	Std. Dev.
Waiting stations are arranged with comfortable seats	2.90	1	5	0.82
I feel safe when waiting for the bus at the station	3.17	1	5	0.81
There are many waiting stations in the city	3.49	2	5	0.73
Waiting stations with full route information	3.00	1	5	0.98
Safe and clean covered waiting stations	2.98	1	5	0.97
I can search for stations easily	3.29	2	5	0.66

Source: Survey data, 2020

In general, the 8 indicators showing the service attitude of the staff are rated at a relatively high level by the respondents, which means that the respondents are relatively satisfied with the service attitude of the staff on public transport. But for public transport to develop more and more, the service attitude of the staff must be improved better, the nature of Vietnamese people in general and Vinh Long people in particular is sociable and friendly, so the happier the better.

Table 6: Service attitude of staff on public transport vehicles

Criteria	Mean	Min	Max	Std. Dev.
Be guided wholeheartedly when getting on and off the bus	3.00	1	5	1.07
Bus staff has a polite attitude	3.07	1	5	0.86
I can chat with staff	3.13	1	5	0.84
Be guided to buy tickets wholeheartedly	3.27	1	5	0.84
You can ask for directions go easily	3.49	1	5	0.79
Can ask for bus information easily	3.53	2	5	0.79
The staff always remind passengers about the regulations on the car	3.18	1	5	0.83
Staff always announce the drop off/pick up station on time	3,6	1	5	0.75

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Source: Survey data, 2020

In general, through the survey, the level of facilities on public transport vehicles is not highly appreciated by the respondents who have used them, clearly showing the respondents' dissatisfaction with the facilities of public transport vehicles.

Table 7: Facilities on public transport vehicles

Criteria	Mean	Min	Max	Std. Dev.
The space on public transport vehicles is cool, there is no unpleasant smell	2.62	1	5	0.91
Clean and comfortable seats	2.64	1	4	0.8
Safe and suitable door design	3.27	2	5	0.69
Except for rush hour, the car is usually clean	3.16	1	5	0.88
The car runs smoothly, less shock	2.56	1	5	0.84
Firm handle/grip	3.13	1	5	0.76

Source: Survey data, 2020

The research employed 4 common criteria in expressing the level of security on public transport vehicles. The indicators “never been physically assaulted or harassed on public transport” and “never been pickpocketed or stolen on public transport” have higher averages than other indicators. In which, the indicator "never been groped or harassed" has an average value of 3.67 and the indicator "never been pickpocketed or stolen" has an average value of 3.78. Next is the indicator “no jostling and jostling when traveling by public transport” with an average value of 2.89 and the indicator “No drunken and smokers on public transport” has a low average value. with 2.58. In general, the level of security on public transport vehicles is underestimated by respondents who are former users.

Table 8: Security levels on public transport vehicles

Criteria	Mean	Min	Max	Std. Dev.
Never been pickpocketed or stolen property on public transport	3.78	1	5	0.95
Never been assaulted or harassed on public transport	3.67	1	5	1.1
There are no drunk or smoking people on public transport vehicles	2.58	1	5	1.16
No jostling	2.89	1	5	0.98

Source: Survey data, 2020

Specifically, through the survey results, 4 benefits "Help save costs", "Limit the impact of outside weather", "Reduce air pollution by reducing emissions from personal vehicles", " Help protect people's health, avoid smog on the road" was highly appreciated by the respondents (average value above 4), most of the subjects were respondents with 12 or more education, of which most had professional occupations. Professionals are students/students, especially those who have used public transport have a higher rating than those who have never used public transport. The benefit that respondents rated the lowest was “Reducing traffic accidents” (with an average value of 3.42) with the lowest selected 2 (30 respondents) and the highest 5. Respondents who underestimated the benefits of reducing traffic accidents when using public transport vehicles may derive from the criteria of safe driving by public transport drivers analyzed in the evaluation of public transport service quality.

Table 9: Criteria for benefits when using public transport vehicles

Criteria	Mean	Min	Max	Std. Dev.
Save money	4.11	2	5	0.69
Limit stress when you have to drive the private vehicle yourself	3.74	2	5	0.79
Limit the impact of the weather outside	4.13	3	5	0.54
Having more time to enjoy life (chatting, reading, listening to music)	3.93	3	5	0.73
Reduce congestion, traffic congestion (car stalls)	3.9	2	5	0.78
Reduce traffic accidents	3.42	2	5	0.97
Reduce air pollution by reducing emissions from personal vehicles	4.43	3	5	0.67
Help protect people's health, avoid dust on the road	4.2	3	5	0.69

Source: Survey data, 2020

In general, the respondents have a good perception of the benefits of using public transport, expect that the respondents' willingness to pay for improving the quality of public transport services in Vinh Long city will be high.

The criteria in improving the quality of public transport services are highly appreciated by the respondents with a scale of 5, ranked from 1 (smallest) to 5 (highest) based on the respondents' agreement to the criteria. improve public transport vehicles.

In which, the criterion "Installation of devices to display the destination and timetable with consideration of accessibility for people with disabilities" is the highest rated (average value is 4.69), there are 44 respondents chose level 4 and 96 respondents chose level 5 for this criterion. The lowest level of choice of respondents is the criterion of "Regulated operating time with actual operating time less than 5 minutes" (average value is 4.07), there are 22 respondents choosing the lowest level. Level 3, mainly students/students.

In general, users has the desire to improve the quality of public transport services to both meet the travel needs, while ensuring safety and civilization. Especially, all users are interested in people with disabilities, this shows the compassion of Vinh Long people.

Table 10: Criteria for improving the quality of public transport vehicles

Criteria	Mean	Min	Max	Std. Dev.
Rest stations, terminal points and transit points are arranged at convenient locations, acting as a transit, located near the national highway, with parking, 24/7 telephone.	4.4	3	5	0.55
Install security cameras at transfer points, terminal points, on public transport vehicles	4.26	2	5	0.58
Build a standing force to protect in hot spots	4.44	4	5	0.5
Improve staff behavior on public transport vehicles and around ticketing areas, improve driving techniques and attitudes	4.3	3	5	0.55
The space on public transport vehicles is clean, airy, and noise-reducing. Arrange enough seats.	4.44	4	5	0.5
Install a device that displays arrivals and timetables taking into account accessibility issues	4.69	4	5	0.47
Update and provide timetables and route maps	4.21	3	5	0.45
There is a tool to monitor the vehicle's journey, avoiding the situation of skipping stops and buying time.	4.16	3	5	0.69
Regulated operating interval with actual operating interval less than 5 minutes	4.07	3	5	0.58

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There is a dedicated lane for public transport vehicles, so there is no traffic jam even during rush hour	4.53	3	5	0.53

Source: Survey data, 2020

Through the survey, the solution chosen by the respondents the most is the solution "Invest in a high-quality public transport system" (average value is 4.77), with 6 respondents choosing level 3, the subject is a person who has not yet chosen the third level. used to use public transport, 114 respondents chose level 5, the subjects are mainly people who have used public transport, have an education level of 12 or more and their main occupation is a student/workers This is because students/workers are the biggest users of public transport, so they want public transport to be invested in improving quality. The second preferred solution chosen by the respondents is "Support and subsidy when participating in high-quality public transport" (average value is 4.43), the audience is mainly students/students and people have low income. The solution that respondents choose the lowest is “Towards stopping motorbikes in the inner city” (mean value is 2.83), these respondents are mainly those who have never used motorbikes. Public transport and high-income earners.

Table 11: Solutions to encourage people to use public transport means

Criteria	Mean	Min	Max	Std. Dev.
Invest in a high-quality public transport system	4.77	3	5	0.52
Support and subsidies are available when participating in high-quality public transport vehicles	4.43	3	5	0.58
Moving to stop motorbikes in the inner city	2.83	1	5	1.31
Review and handle motorcycles that do not ensure technical safety and environmental protection	3.73	1	5	0.87
Formulate a scheme to collect tolls for motor vehicles in some areas with high risk of congestion and environmental pollution	3.4	1	5	0.91

Source: Survey data, 2020

3.3 Estimation of People's Willingness to Pay for the Improvement of Gtcc Service Quality in Vinh Long City

Formula for calculating mean WTP is $MeanWTP = \frac{\sum WTP_i}{n}$

Where WTP_i is the willingness to pay to improve the public transport service quality of the th observation, n: is the number of observations. Suppose there is a project to upgrade the quality of public transport services, including the following criteria: (i) Rest stations, terminal points, transit points are arranged at convenient locations, acting as a transit station, located near the national highway, with parking, 24/7 telephone; (ii) Install security cameras at transfer points, terminal points, on public transport vehicles; (iii) Build permanent security forces at hot spots.

- Improve the behavior of staff on public transport vehicles and around the ticketing area, improve driving techniques and attitudes; (iv) The space on public transport vehicles is clean, cool, and noise is reduced. Arrange enough seats; (v) Install a device to display the destination and timetable taking into account accessibility issues for people with disabilities; (vi) Update and provide timetables and route maps; (vii) There is a tool to monitor the vehicle's journey, avoiding the situation of skipping stops and buying time. How much are you willing to contribute for 1 time use of this service (assuming the length of the whole route is 31km and the current fare for the whole route is 9,000 VND/passenger/way).

Table 12: Willingness to make additional contributions to improving the quality of public transport services in Vinh Long for 2 groups of observations

	Mean bid (VND)		Max. (VND)		Min. (VND)		No. of observations agree	
	Users	Non-users	Users	Non-users	Users	Non-users	Users	Non-users
Conventional CVM	7,898	14,923	30,000	19,000	1,000	9,000	88	26
Inferred valuation	7,074	15,500	30,000	24,000	1,000	9,000	68	36

Source: Survey data, 2020

Results of convetional CVM for used users of public transport

Out of the total of 90 respondents who have used public transport, there are 2 respondents who disagree with using improved public transport (accounting for 2.22%) because "prepared to have a personal vehicle". The remaining 88 respondents agreed to use the improved public transport service (accounting for 97.78%). There are 14 additional rates paid by respondents to use high-quality public transport services. In which, the lowest price willing to pay more is 1,000 VND, this is the respondent who is a housewife and the monthly income depends on the family, the highest price paid by 2 respondents is 30,000 VND, here are 2 respondents using public transport vehicles for the reason of long travel distance; The maximum price paid by the respondents is 10,000 VND (10 respondents, accounting for 22.73%). The average price that respondents agree to pay more (compared to the price of Vinh Long - Tam Binh town) is 7,898 VND. The data shows that the average price willing to pay more of 88 respondents is relatively high, close to the current fare for the whole route in the test used to interview respondents (the fare for the whole route is 9,000 VND/passenger). passengers/trip with a route length of 31km), but there is a big difference between the prices offered by respondents.

Of the total 50 respondents who have never used public transport, 26 respondents (52%) agree to use improved public transport means, mainly students/students, 24 respondents. (accounting for 48%) do not agree to use for many different reasons. Reason “Having a personal vehicle was selected by 24 out of 26 respondents (accounting for 92.31%), the main subjects are people who have worked; the reason "Not convenient" has 16/26 respondents (accounting for 61.54%) selected, the majority of subjects are workers and traders; The reason for “Carsickness” was selected by 8/26 respondents (accounting for 33.33%).

Table 13: Reasons for respondents not agreeing to pay to use new public transport means

Reason	Frequency (person)	Proportion (%)
Already have a personal vehicle	24	92.31
Not favorable	16	61.54
Car sick	8	33.33

Source: Survey data, 2020

In general, respondents do not agree to use improved public transport vehicles mostly because they already have personal vehicles. This shows that these respondents do not have a good awareness of the benefits that public transport brings, such as the benefits of reducing congestion, traffic congestion and reducing traffic accidents. There are 4 willingness to pay rates to use the improved public transport service offered by 26 respondents. In which, the highest price willing to pay is 19,000 VND chosen by 8 respondents (accounting for 30.77%), these respondents are mainly students/students and have higher incomes than those with a career. is another student/student; 9,000 VND (equal to the fare for the whole route for Vinh Long - Tam Binh town) is the lowest price because 2 respondents are willing to pay to use high quality public transport service. The price offered by the most respondents was 14,000 with 10 selected respondents (accounting for 38.46%). The average price that 26 respondents are willing to pay to use improved public transport is VND 14,923 with standard deviation 3.12. This price is relatively high compared to the price of the whole route at 9,000

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VND/HK/time.

Results of iferred valuation for used uers of public transport

To the question "*Do you think others would be willing to use the improved public transport service*?" will give us a more accurate result as to whether the respondents want to use the improved public transport service, and how much they are willing to pay more for this service, respondents will use their own preferences to predict the preferences of others without fear of being influenced by ethical standards.

The survey results show that, out of 90 respondents who have used public transportation, only 68 respondents (accounting for 75.56%) think that others will use improved public transport; Meanwhile, according to the traditional CVM method, up to 88 respondents (accounting for 97.78%) choose to use improved public transport means, there is a difference in the number of respondents choosing the option "Yes". "between the two methods. There are 22 respondents (accounting for 24.44%) out of 90 respondents who have used public transportation, choosing the option "No" for the question "Do you think others will be willing to use improved public transport services?", the majority of subjects are people with high incomes and occupations as workers/officers.

There are 12 rates that respondents believe that others will pay more to use the improved public transport service. In which the lowest price is 1,000 VND chosen by 10 respondents and the highest price is 30,000 VND chosen by 2 respondents. The most chosen price by respondents is 5,000 VND with 6 respondents. The average willingness-to-pay price determined by inferential valuation method is 7,074 VND, lower than the willingness to pay more than the traditional method of 824 VND, this difference is not significant.

The data also show that the average price willing to pay more is 824 VND lower than the average price determined by the traditional CVM method, this result is more accurate (based on the interpretation of [4].

Thus, the number of respondents agreeing to use public transport according to method 2 is lower than that of method 1, Vinh Long needs to have better measures to improve the quality of public transport services to attract people to use them. and bring the highest satisfaction to passengers; At the same time, the willingness to pay more of the people of Vinh Long will be at 7,074 VND/passenger/way, the basis for Vinh Long to consider and adjust the fare accordingly.

Results of inferred valuation method for the group of not used public transport

Survey results show that, out of 50 people who have never used public transport, 36 people think others will agree to use improved public transport (accounting for 72%). There are 5 prices offered by the respondents, in which the highest price is 24,000 VND chosen by 4 respondents with profession as public employees, the lowest is 9,000 VND chosen by 4 respondents, the most popular price. The most selected respondents are 14,000 VND and 19,000 VND chosen by 12 respondents. The average price that respondents think others would be willing to pay to use the improved public transport is 15,500 VND 577 VND higher than the average price determined by the traditional CVM method, This shows that the respondents are very supportive of improving public transport services and are willing to pay a relatively large amount of money to use a quality service.

The results show that the average price that respondents are willing to pay to use public transport is quite high, and the highest price that respondents agree to pay is nearly 3 times higher than the fare of current route (9,000 VND/passenger/way), this shows that the current public transport service quality does not meet their current needs, so when public transport vehicles are improved well than learn to accept to spend quite a lot of money

to use.

In addition, the average price determined by the inferential valuation method is 577 VND higher than the average price determined by the traditional CVM method. At the same time, the number of respondents agreeing to use the improved public transport service is higher than 24 respondents, the largest amount of respondents agreeing to pay according to method 2 is also 5,000 VND higher than that of method 1. This is explained as follows: the main reason for respondents not to use public transport is because they already have a personal vehicle, and they default because they already have a personal vehicle, so the use of public transport is not possible. plus is not necessary, so when asked about their own preferences, they think they will not use the improved public transport service, because it is not necessary for them, but somewhere they also want to experience a better public transport service. What is high-quality public transport, so when asked about other people's preferences, they will assume that others agree to use it at a price that they think is most reasonable to them. Because of that, the number of respondents as well as the average price determined by method 2 is higher than that of conventional method.

The results of the regression analysis of the determinants affecting the willingness to pay are illustrate in Table 14.

Table 14: Regresion model results

Variables	Coefficient	Std. Err.	P value
X_1	0.462^{***}	0.162	0.004
X_2	0.020^{ns}	0.025	0.412
X_3	0.076^{ns}	0.051	0.138
X_4	-0.122^{**}	0.052	0.019
X_5	0.169^{ns}	0.163	0.300

Note: ***, ** are 1% and 5% significance level, respectively.

Test of heteroskedasticity: by using Breusch-Pagan test, the results show that p-value=0.0000 <5%, rejecting hypothesis Ho: Homogeneity variance, constant variance, accepting H_1. Therefore, the model is flawed with variable variance. The the model was fixed by robust estimation.
Multicollinearity test: Through the test, the variance inflation factor (VIF) of the independent variables are all less than 2, there is no multicollinearity. Therefore, it can be concluded that there is no multicollinearity for the independent variables.
Autocorrelation test: There is no variable with a value > 0.7, so we can conclude that there is no autocorrelation in the model.
X1 (Gender): according to research results, gender has an influence on passenger's decision. With 1 = 0.462, this means that when other conditions are constant, when the variable X1 (Gender) increases by 1, the probability to agree to pay to improve the quality of public transport services (variable Y) increased, or the decision to agree to pay to improve service quality of male respondents was 0.462 times higher than female respondents. This is true with the initial expectation, the variable X1 (Gender) will have a positive influence on the respondent's decision, in other words: men tend to pay to improve the quality of public transport services. than women.
X4 (Income): According to the regression equation under consideration, 4 = -0.122, this means that when other conditions are constant and the passenger's income increases by 1 dong, the probability of agreeing to pay for reduced service. Thus, true to the initial expectation, the variable X4 has a negative relationship with the decision of the passenger.

In summary, the research results show that the gender variable has a positive influence on the respondents'

decision to agree to pay to improve the quality of public transport services; income variable has a negative effect on the respondent's decision. This is also the basis for Vinh Long to have policies to develop public transport services. Specifically, it is necessary to improve the quality of vehicles in line with the needs of women, especially the security level of vehicles; users of public transport vehicles are mainly low-income people, when the quality of public transport vehicles is improved, it is necessary to have a policy to support fares to encourage passengers to continue using; For high-income people, both appearance and quality are important to them, so to encourage these objects to use, it is necessary to invest in upgrading car quality, better car design.

4. Conclusions

The research results show that the current status of the public transport system of Vinh Long does not meet the needs of passengers, facilities and infrastructure are severely degraded, to develop the system. Public transport needs to invest more in improving the quality of public transport services. The study has applied the traditional CVM and the inferred valuation method with the form of open-ended questions to determine the willingness to pay of consumers for the issue of improving the quality of public transport services. The study has determined the average willingness of road users to pay for the improvement of public transport service quality for those who used to use public transport according to the traditional CVM method and inferred valuation respectively is 7,898 VND/passenger/way and 7,074 VND/passenger/way. For those who have never used public transport according to the traditional CVM method and IV, it is VND 14,923/passenger/way and VND 15,500/passenger/way, respectively.

The price that people are willing to contribute to improve the quality of public transport service is currently quite high compared to the price of the whole route, the people's demand and desire for a quality public transport vehicle is very high. In addition, the study also shows that gender and income factors affect the decision to agree to pay to improve the quality of public transport services, the probability that men agree is 0.462 times higher than that of women; If people's income increases by 1 VND, the probability of people agreeing decreases 0.122 times.

Therefore, based on the analysis results, the study proposes a number of solutions to the stakeholders as follows: (i) the government should invest in supporting the quality of public transport vehicles, invest in the construction of public transport facilities such as green waiting stations, build roads convenient for the operation of public transport vehicles, strengthen intercity and inner city bus routes, strengthen routes passing through markets and industrial parks, training and improving the driver's technique, professional training for public transport staff when encountering unexpected problems on the vehicle. (ii) For transport businesses: invest in upgrading vehicle quality, replacing old cars. Replace gasoline-powered vehicles with clean-fueled, electric vehicles. (iii) For publis transport users: increase the use of public transport vehicles to replace personal vehicles; awareness of public hygiene when participating in public transport; propagate and encourage friends and relatives to use public transport vehicles instead of personal vehicles; boldly contribute ideas to the authorities on issues and expectations when using public transport vehicles.

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5. References

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