

Customer Satisfaction Assessment Between Tricycles And Auto-rickshaws In Zamboanga City Using Traditional And Modified Importance-Performance Analysis

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Abstract: Tricycles and auto-rickshaws are emerging modes of transportation in the Philippines, yet there exists a notable gap in research regarding customer satisfaction between these two popular options. This study aims to compare customer satisfaction levels of tricycles and auto-rickshaws in Zamboanga City using the Heterogeneous Customer Satisfaction Index (HCSI) based on service attributes under safety, fare, cleanliness, comfort, reliability, and customer service, which were assessed using the modified Importance-Performance Analysis (IPA). A total of 385 respondents was surveyed using the adapted matrix for HCSI. The study found out that for both modes using the traditional IPA, there is need a better accessibility for PWDs, reliability of time of arrival to destination, a professional conduct and interaction from the drivers, easement of payment, and proper identification of driver's details. However, for the modified IPA, most of the attributes were found to be at dissatisfactory.

Keywords: Tricycle, Autorickshaws, Importance-Performance Analysis, HCSI,

1. INTRODUCTION

The tricycle is one of the most essential and popular high-occupancy vehicles that service various areas in the Philippines (Beezz, 2016). Also known as a 'trike', it is a three-wheeled motor vehicle with an attached cab that can carry three to four (3-4) passengers per journey deal, as shown in Figure 1. The Piaggio Ape and the Bajaj RE, also known as auto-rickshaws as shown in Figure 2, are new emerging transport options already utilized as public modes of transportation across the Philippines including Zamboanga City (Jan, 2024). Autorickshaws were developed because of rapid urbanization, population growth, and the rising need for cost-effective and efficient transportation options ("Asia-Pacific Rickshaw Ride", 2024). These are symmetrical three-wheeled vehicles that are not considered tricycles, which have a side cabin but are rather termed as "three-wheelers", as defined by Philippine law (Ray, 2018).



Figure 1. A traditional tricycle.



Figure 2. An autorickshaw (Bajaj RE).

Studies such as Chuenyindee *et. al* (2022) and Grujičić *et. al* (2013) have discussed customer perception of service qualities of public transportation services. Additionally, Eboli and Mazulla (2009) conducted research to create a Heterogeneous Customer Satisfaction Index (HCSI), which allows for the tracking for service quality, pinpointing factors that impact customer satisfaction or dissatisfaction, and devising strategies to improve service quality. This index considers both user perceptions of importance and satisfaction rates, while also accounting for the diversity of user opinions through variance analysis. Attributes with more consistent customer judgments are given greater significance in assessing service quality, while attributes with varying opinions are considered less significant.

Importance-Performance Analysis (IPA) is also a useful tool in identifying product or service attributes that are performing well, in need of improvement, cost saving, less focus, etc. (Kulkarni, 2019). Rial *et al.* (2008) concluded that the alternative IPA method made by Abalo *et al.* (2006) presented good solutions to the main problems seen with traditional methods of IPA. In this representation of IPA, diagnostics for each service attribute as well as its urgency or priority level can be determined.

Tricycles and auto-rickshaws are emerging modes of transportation in the Philippines, yet there exists a notable gap in research regarding customer satisfaction between these two popular options. Conducting a thorough comparative study to assess customer satisfaction between tricycles and auto-rickshaws is significant for different stakeholders involved in transportation decisions, it can help provide invaluable insights into preferred modes of transportation and improvements in transportation services.

This study aims to compare customer satisfaction levels of tricycles and auto-rickshaws in Zamboanga City using the Heterogeneous Customer Satisfaction Index (HCSI). This study will also assess service attributes under safety, fare, cleanliness, comfort, reliability, and customer service, using the traditional and modified Importance-Performance Analysis (IPA) model.

2. LITERATURE REVIEW

Transportation is the driving force of any nation as it is an essential component of urban structure and the efficient movement of people and goods (Duran, 2021). Three-wheeled transportation is prevalent in Southeast Asia and it comes in different names, forms, and designs. Cambodia's 'tuk-tuks' are motorcycles with attached back cabins while Thailand's 'tuk-tuks' are similar to auto-rickshaws found in India and the Philippines (Salikha, 2018). Ishak *et al.* (2023) investigated Malaysian views on tricycles as transportation. While favored for goods transport and aiding people with disabilities, they're less accepted for public or private travel. Despite being seen as cost-effective, concerns about comfort and traffic arise. The study highlights significant disadvantages of tricycle use, echoing global trends that are being overlooked in transportation planning, contributing to congestion and pollution.

The Philippines' diverse transportation system includes iconic traditional tricycles and auto-rickshaws. These three-wheelers are utilized in the inner vicinity of cities, where other transportation is inaccessible (Torrero *et al.*, 2023; Obiri-Yeboah, 2021). Both vehicles aim to provide quality service and customer satisfaction (Ong *et al.*, 2023, Singh & Sah, 2023).

Customer satisfaction is a fundamental concept that reflects how consumers perceive a service. The best-known method to measure service quality is the SERVQUAL method, proposed by Parasuraman *et al.* (1985), but it has limitations in numerical scale. To address this gap, the Customer Satisfaction Index (CSI) was introduced; this approach provides a precise measure of customer satisfaction but does not account for the variations in user judgment (Eboli & Mazzulla, 2009). The Heterogenous Customer Satisfaction Index (HCSI) tackles the shortcomings of the prior methods by accounting for user heterogeneity and adjusting scores of importance and satisfaction based on dispersion of the mean (Eboli & Mazzulla, 2009).

Importance-Performance Analysis (IPA) is a product satisfaction and management tool that identifies and assesses a product's strengths and weaknesses (Martilla and James, 1977). In its first iteration, the study first suggested using the Scale Centered Quadrant Model (SCQM). However, the model presented had discriminative values which produced misleading assessment, the Data-Centered Quadrant Model was used (DCQM). DCQM was still criticized which led scientists to introduce discrepancy or gap, the difference in performance and importance, which then led to the introduction of the iso-priority line, a 45° line where attribute importance and performance are equal, and the development of the Diagonal Model (DM) (Rial *et al.*, 2008). However, DM was difficult to understand, so Abalo *et al.* (2007) suggested to incorporate DCQM and SM, which split the model into easily identifiable four sections, that accurately assess the attributes of a product.

According to Grujičić *et al.* (2013), the evaluation of public transport service quality encompasses several key dimensions including passenger comfort, cleanliness, safety, hours of operation, reliability, coverage, cost, frequency, route coverage, fares, accessibility, and availability of parking spaces. Furthermore, additional dimensions such as service frequency and operational hours categorized as service characteristics, as discussed by Eboli and Mazzulla (2009), and the quality of customer service provided by drivers, as explored by Sharma *et al.* (2020) and de Oña *et al.* (2016), contribute significantly to the overall assessment of public transport service quality. Practical implications offered by the dimensions of service characteristics, including factors influencing customer preferences, can be a core strategy that can be used by different stakeholders in improving the service quality of public utility vehicles (PUV) in the Philippines (Chuenyindee *et al.*, 2022).

Customer satisfaction research reveals various factors influencing the choice of transportation. Yet, few studies explore tricycles and auto-rickshaws, especially in the Philippines, and none in Zamboanga City. This highlights the need for further research to understand how these modes differ in customer satisfaction and provide valuable insights for users as well as for transportation operators and policymakers. To stay competitive and successful, businesses must prioritize customer satisfaction and adapt to evolving demands and expectations.

3. METHODOLOGY

This study is a quantitative cross-sectional study to determine customers' satisfaction levels with the two types of three-wheeled public utility vehicles: tricycles and auto-rickshaws. This study used purposive sampling to select survey respondents. This approach ensured data collection from individuals with firsthand experience using both transportation options. To capture a comprehensive perspective, specific locations within a 5-kilometer radius of the city hall shown in Figure 3 were targeted. These included commercial districts, schools, government institutions, and tourist spots. This strategic selection aimed to gather insights from a diverse range of customer segments who utilize these modes of transportation options. Using Cochran's formula, a total of three-hundred and eighty-five (385) samples was used for the study, assuming that half of the sample size is satisfied with tricycles and auto-rickshaws' services, so $p=0.5$ with a 95% confidence level.

Cochran's formula is represented as:

$$n = \frac{z^2 p(1-p)}{e^2} \tag{1}$$

where,

- n : required sample size
- Z : Z-score corresponding to the desired confidence level
- p : estimated proportion of the population with the attribute of interest
- e : margin of error

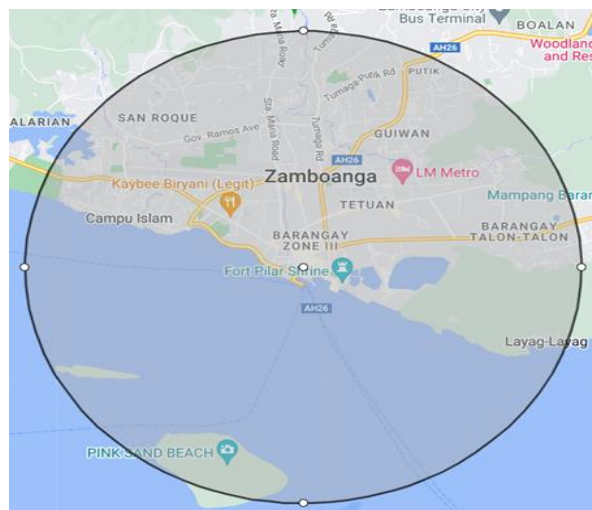


Figure 3. A 5-kilometer radius of the Central Business District (CBD) in Zamboanga City measured from the city hall. (Image Source: Google Maps)

The instrument used for assessing customer satisfaction drew upon the foundation established by Eboli and Mazulla (2009). However, it was adapted to specifically focus on customer perception of tricycles and auto rickshaws. Elements like route characteristics, information provision, personnel behavior, and the physical environment were excluded from the service quality evaluation, to ensure that the instrument captured relevant aspects of customer satisfaction tailored to these unique modes of transportation. The Heterogenous Customer Satisfaction Index was developed to determine the satisfaction level of customers using a transit service which in its context, transit has its fixed route characteristics, information of location of its stops, personnel behavior undergo series of trainings, and the physical environment are more of equal in nature, however, the tricycle and autorickshaw services do not qualify to have these attributes. This is also discussed by Sharma *et. al.*, 2019, wherein the paratransit services were used as the mode of transport to determine the customer satisfaction, that some of the attributes may not be relevant for a given city or region. The operation of the tricycles and autorickshaws in the city does not provide information on its route since they are free to operate to all parts of the city, both local and national highways.

Two (2) sections of a survey questionnaire were employed as the study's instrument. A 5-point Likert scale, from 1 (very weak) to 5 (very strong), was utilized to assess each qualitative attribute's importance and satisfaction levels. The demographic questions in Section A of the questionnaire ask about the respondents' sex, age, occupation, monthly income, reason for travel, and frequency of travel. Respondents are asked to score the relative importance and satisfaction of each of the eight service aspects listed in Table 1 for Section B: customer service (6 items), service characteristics (2 items), comfort (5 items), safety and security (4 items), fare (2 items), cleanliness (2 items), comfort (5 items), reliability (3 items), and accessibility (2 items). Assigned codes will be used for shorter presentation.

The total customer satisfaction rating for tricycles and auto-rickshaws with each attribute taken into consideration is compared using the Heterogeneous Customer Satisfaction Index (HCSI) by Eboli and Mazulla (2009).

The following equation provides the formula:

$$HCSI = \sum_{k=1}^N [S_k^c \cdot W_k^c] \quad (2)$$

where,

$$S_k^c = \frac{S_k}{\frac{\sum_{k=1}^N \frac{S_k}{var(S_k)}}{\frac{S_k}{var(S_k)}}} \quad (3)$$

$$W_k^c = \frac{\frac{I_k}{var(I_k)}}{\sum_{k=1}^N \frac{I_k}{var(I_k)}} \quad (4)$$

where,

S_k^c : average of the customer-evaluated satisfaction rate (S_k) for the k items, adjusted based on the deviation from the mean value

W_k^c : the weight of the k items, adjusted by its deviation from the average value, and calculated using the rates of importance (I_k) based on consumer assessment.

Table 1. Eight service aspects to score for relative importance and satisfaction

Service Aspect	Service Attribute	Assigned Code
Safety and Security	Any form of assault or harassment is not experienced inside the vehicle.	SS1
	Theft or robbery is not experienced inside the vehicle.	SS2
	Any form of road accidents are not encountered throughout the journey.	SS3
	The driver's personal information are completely displayed on the vehicle.	SS4
Fare	The cost of fare is reasonable for the total distance travelled.	F5
	Payment is done with ease.	F6
Cleanliness	The interior of the vehicle is clean and well taken care of.	CL7
	The exterior of the vehicle is clean and well taken care of.	CL8
Comfort	The seat of the vehicle is comfortable and spacious.	C9
	The vehicle is well-ventilated.	C10
	The overall trip was smooth and no problems were encountered.	C11
	The vehicle does not cause any unnecessary noise and vibrations.	C12
	Amenities such as music systems, mirrors, etc. were available inside the vehicle.	C13
Reliability	The vehicle I have traveled on consistently arrived at the destination on time.	R14
	The driver maintained a safe and comfortable speed throughout the journey.	R15
Customer Service	During your trips with the vehicle, breakdowns or incidents were not experienced.	R16
	The driver communicated clearly and politely throughout the journey.	CS17
	The driver showed professionalism in their conduct and interactions.	CS18
	The complaint you have was acknowledged and resolved promptly.	CS19
	The driver presented a neat and clean overall appearance.	CS20
	The driver was ready to assist with any specific needs or inquiries during the journey.	CS21
	The driver seemed familiar with the route and shortcuts to the destination.	CS22
Service Characteristics	The number of vehicles present is enough to accommodate all passengers.	SC23
	The vehicle is always available during the time you need it.	SC24
Accessibility	The vehicle's design or layout allows easy entry and exit.	A25
	The vehicle is easily accessible for people with disabilities (PWDs).	A26

The introduction of variance modifies the significance and satisfaction rates, giving greater weight to the attributes with more uniform customer judgments and less weight to the qualities with more diverse judgments. This approach is especially helpful since it gives an objective assessment of how effectively the public transportation system meets the needs of its users.

The modified Importance-Performance Analysis (IPA) method presented by Abalo *et al.* (2017) was adapted in this study. Traditional IPA, as shown in Figure 4, often uses direct ratings from respondents to determine the importance of attributes. Abalo *et al.* (2007) suggest a derived-importance approach using statistical techniques such as multiple regression analysis. This method aims to objectively determine the importance of each attribute based on its impact on overall satisfaction or another dependent variable. Instead of simply plotting raw performance scores, the modified IPA considers the gap between perceived performance and the ideal performance. This gap provides a clearer indication of areas needing improvement. In traditional IPA, the quadrants are divided using the mean scores of importance and performance. Abalo *et al.* (2007) propose

using the median or other central tendency measures to position the quadrants more accurately, thereby improving the reliability of the categorization. To account for statistical variability, the modified IPA includes confidence intervals around the mean performance scores. This addition helps to identify whether differences between attributes are statistically significant. Standardizing the importance and performance scores (e.g., z-scores) can help to mitigate the effects of scale usage bias and improve the comparability of attributes.

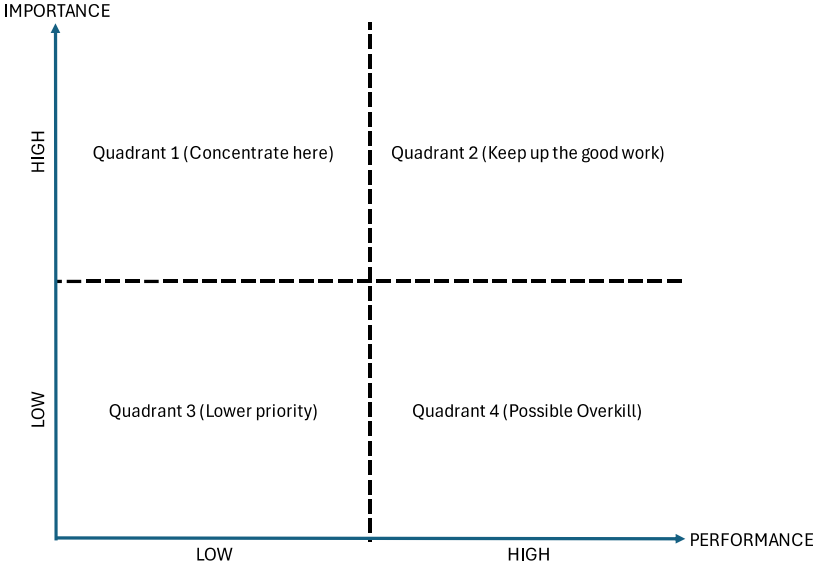


Figure 4. The Traditional Importance-Performance Analysis

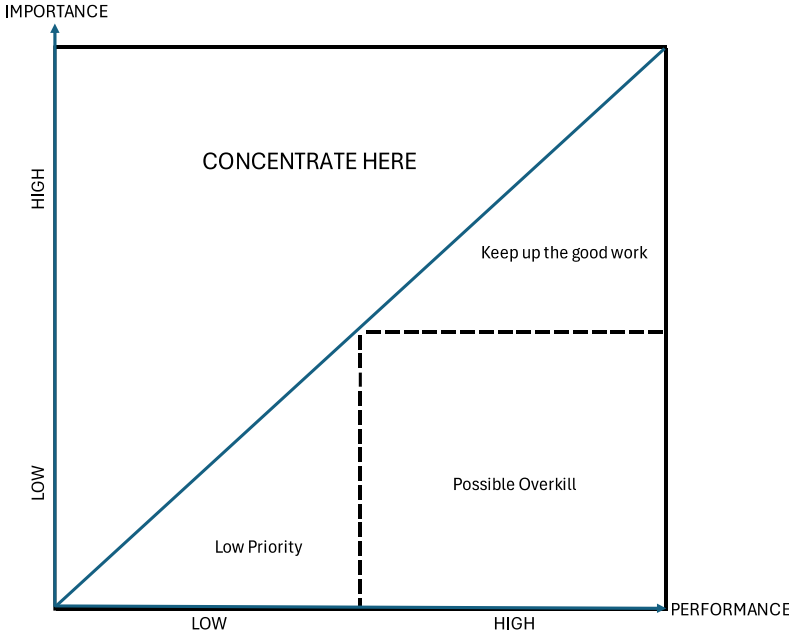


Figure 5. The modified Importance-Performance Analysis

In this method the importance and performance averages of each attribute are taken as coordinates and plotted on the Revised IPA graph, taking the difference of these averages provides discrepancy value of the attribute as shown in Figure 5. This discrepancy value represents the difference of the ideal and perceived, i.e., ideal and perceived performance and ideal and perceived importance. Importance and performance grand averages are also drawn as perpendicular lines in their respective axes. Using this method, status assessment for the different attributes can be determined.

4. RESULTS AND DISCUSSION

For both tricycles and autorickshaws, only the fare cost had an unsatisfactory average score. Table 2 presents the satisfaction and importance scores for tricycles and autorickshaws. Generally, attributes with an average satisfaction score below 3.0 are considered critical service aspects. The highest average satisfaction score for tricycles was for the attribute indicating no theft or robbery inside the vehicle, while for autorickshaws, it was the comfort and spaciousness of the seat. Observing the average importance scores, passengers deem all service attributes very important, with only five attributes for tricycles and one for autorickshaws scoring below 4.0.

Table 2. Importance and Satisfaction Statistics for HCSI

Service Aspect	Service Attribute (Assigned Code)	Tricycles				Autorickshaws			
		Importance		Satisfaction		Importance		Satisfaction	
		Mean	Var	Mean	Var	Mean	Var	Mean	Var
Safety and Security	SS1	4.32	1.06	3.88	1.16	4.30	1.14	3.95	1.30
	SS2	4.35	1.22	4.20	1.23	4.17	1.05	4.14	1.22
	SS3	4.21	1.11	3.80	1.12	4.32	0.89	3.89	1.00
	SS4	4.21	1.18	3.69	1.34	4.25	1.06	3.65	1.24
Fare	F5	3.89	1.82	2.88	1.37	4.05	1.39	2.95	1.36
	F6	4.25	0.88	3.67	0.86	4.24	0.64	3.67	0.77
Cleanliness	CL7	4.05	1.03	3.45	0.86	4.27	0.75	3.94	0.90
	CL8	3.99	1.14	3.54	0.86	4.17	0.80	3.89	0.77
Comfort	C9	4.08	0.99	3.54	0.92	4.41	0.63	4.16	0.82
	C10	4.13	1.01	3.70	0.90	4.28	0.78	3.96	0.85
	C11	4.23	0.76	3.73	0.87	4.32	0.66	3.83	0.80
	C12	3.84	1.66	3.10	0.96	4.18	0.93	3.65	1.06
	C13	3.68	1.13	3.33	1.01	3.73	1.01	3.52	1.01
Reliability	R14	4.21	0.82	3.56	1.01	4.27	0.70	3.69	0.99
	R15	4.22	0.84	3.70	0.82	4.21	1.02	3.80	0.86
	R16	4.37	0.92	3.89	1.01	4.42	0.70	4.06	0.85
Customer Service	CS17	4.27	0.78	3.78	0.88	4.23	0.79	3.90	0.91
	CS18	4.24	0.89	3.68	0.77	4.27	0.83	3.73	0.84
	CS19	4.14	1.07	3.35	1.14	4.16	0.87	3.42	1.06
	CS20	3.97	1.16	3.54	0.91	4.03	1.01	3.64	0.78
	CS21	4.16	0.81	3.73	0.82	4.17	0.83	3.79	0.82
	CS22	4.46	0.62	4.13	0.88	4.43	0.63	4.14	0.81

Service Characteristics	SC23	4.11	1.00	3.75	1.01	4.27	0.83	3.92	0.87
	SC24	4.23	0.86	3.77	0.88	4.27	0.79	3.85	0.82
Accessibility	A25	4.27	0.72	3.86	0.84	4.33	0.67	4.09	0.82
	A26	4.20	1.11	3.30	1.25	4.35	0.81	3.67	1.51

Table 3. HCSI Results

Service Attribute	Tricycles					Autorickshaws				
	Importance Weight	Weighted Score	Corrected Importance Weight	Corrected Satisfaction	Weighted Score	Importance Weight	Weighted Score	Corrected Importance Weight	Corrected Satisfaction	Weighted Score
SS1	0.04	0.16	0.04	3.42	0.12	0.04	0.15	0.03	2.91	0.08
SS2	0.04	0.17	0.03	3.79	0.12	0.04	0.16	0.03	3.42	0.10
SS3	0.04	0.15	0.03	3.41	0.12	0.04	0.15	0.04	3.67	0.13
SS4	0.04	0.14	0.03	2.70	0.09	0.04	0.14	0.03	2.60	0.08
F5	0.04	0.10	0.02	1.59	0.03	0.04	0.11	0.02	1.55	0.03
F6	0.04	0.14	0.04	4.13	0.18	0.04	0.14	0.05	4.23	0.21
CL7	0.04	0.13	0.04	3.65	0.13	0.04	0.15	0.04	4.21	0.18
CL8	0.04	0.13	0.03	3.87	0.12	0.04	0.15	0.04	4.75	0.18
C9	0.04	0.13	0.04	3.58	0.13	0.04	0.17	0.05	5.12	0.27
C10	0.04	0.14	0.04	4.01	0.15	0.04	0.15	0.04	4.51	0.18
C11	0.04	0.15	0.05	4.24	0.21	0.04	0.15	0.05	4.49	0.22
C12	0.04	0.11	0.02	2.64	0.05	0.04	0.14	0.03	3.05	0.10
C13	0.03	0.11	0.03	2.90	0.08	0.03	0.12	0.03	2.98	0.08
R14	0.04	0.14	0.05	3.31	0.15	0.04	0.14	0.05	3.33	0.15
R15	0.04	0.14	0.04	4.42	0.20	0.04	0.15	0.03	4.08	0.12
R16	0.04	0.16	0.04	3.96	0.17	0.04	0.16	0.05	4.71	0.22
CS17	0.04	0.15	0.05	4.31	0.21	0.04	0.15	0.04	4.05	0.16
CS18	0.04	0.14	0.04	4.62	0.20	0.04	0.14	0.04	4.02	0.15
CS19	0.04	0.13	0.03	2.59	0.09	0.04	0.13	0.04	2.70	0.10
CS20	0.04	0.13	0.03	3.64	0.11	0.04	0.13	0.03	4.14	0.12
CS21	0.04	0.14	0.05	4.48	0.21	0.04	0.14	0.04	4.23	0.16
CS22	0.04	0.17	0.06	5.14	0.33	0.04	0.17	0.05	5.15	0.27
SC23	0.04	0.14	0.04	3.66	0.13	0.04	0.15	0.04	4.28	0.16
SC24	0.04	0.15	0.04	4.27	0.19	0.04	0.15	0.04	4.41	0.18
A25	0.04	0.15	0.05	4.71	0.25	0.04	0.16	0.05	4.99	0.24
A26	0.04	0.13	0.03	2.30	0.08	0.04	0.14	0.04	2.17	0.09
	<i>CS Index</i>	3.65	<i>Heterogenous CS Index</i>	3.83		<i>CS Index</i>	3.81	<i>Heterogenous CS Index</i>	3.98	

Satisfaction and importance ratings provided by bus passengers were used to calculate the HCSI, shown in Table 3. The final column lists the weighted scores, indicating each attribute's contribution to the HCSI score. By weighing satisfaction and importance scores based on variance, the HCSI scores for tricycles and autorickshaws are 3.83 and 3.98, respectively. The highest weighted score for tricycles was for the attribute "The driver seemed familiar with the route and shortcuts to the destination," while for autorickshaws, it was "the seat of the vehicle is comfortable and spacious."

From the traditional IPA, there are four quadrants to consider as shown in Figure 4. For tricycle, the result of the IPA is shown in Figure 6. Most service attributes fall on the “Keep up the good work” and “lower priority” and few of which on the “Concentrate here” and “Possible Overkill”. Only 5 service attributes that need to be given priority for better performance and have higher importance: there is need a better accessibility for PWDs, reliability of time of arrival to destination, a professional conduct and interaction from the drivers, easement of payment, and proper identification of driver’s details must be considered.

Table 4. Importance and Satisfaction Statistics for Modified IPA

Service Aspect	Assigned Code	Tricycles			Autorickshaws		
		Importance	Satisfaction	Disc.	Importance	Satisfaction	Disc.
Safety And Security	SS1	4.318181818	4.704545455	0.386364	4.295454545	3.946969697	-0.34848
	SS2	4.386363636	4.196969697	-0.18939	4.204545455	4.136363636	-0.06818
	SS3	4.242424242	3.825757576	-0.41667	4.356060606	3.924242424	-0.43182
	SS4	4.212121212	3.666666667	-0.54545	4.25	3.621212121	-0.62879
Fare	F5	3.893939394	2.878787879	-1.01515	4.053030303	2.946969697	-1.10606
	F6	4.25	3.674242424	-0.57576	4.242424242	3.666666667	-0.57576
Cleanliness	CL7	4.053030303	3.446969697	-0.60606	4.265151515	3.939393939	-0.32576
	CL8	3.992424242	3.568181818	-0.42424	4.166666667	3.886363636	-0.2803
Comfort	C9	4.083333333	3.537878788	-0.54545	4.409090909	4.159090909	-0.25
	C10	4.128787879	3.696969697	-0.43182	4.28030303	3.962121212	-0.31818
	C11	4.265151515	3.734848485	-0.5303	4.348484848	3.833333333	-0.51515
	C12	3.840909091	3.098484848	-0.74242	4.181818182	3.621212121	-0.56061
	C13	3.681818182	3.356060606	-0.32576	3.727272727	3.545454545	-0.18182
Reliability	R14	4.212121212	3.560606061	-0.65152	4.272727273	3.689393939	-0.58333
	R15	4.21969697	3.704545455	-0.51515	4.212121212	3.803030303	-0.40909
	R16	4.371212121	3.893939394	-0.47727	4.416666667	4.060606061	-0.35606
Customer Service	CS17	4.272727273	3.78030303	-0.49242	4.234848485	3.901515152	-0.33333
	CS18	4.242424242	3.651515152	-0.59091	4.272727273	3.704545455	-0.56818
	CS19	4.143939394	3.348484848	-0.79545	4.159090909	3.424242424	-0.73485
	CS20	3.96969697	3.537878788	-0.43182	4.03030303	3.643939394	-0.38636
	CS21	4.159090909	3.734848485	-0.42424	4.174242424	3.787878788	-0.38636
	CS22	4.462121212	4.128787879	-0.33333	4.431818182	4.143939394	-0.28788
Service Characteristics	SC23	4.113636364	3.75	-0.36364	4.272727273	3.916666667	-0.35606
	SC24	4.227272727	3.772727273	-0.45455	4.265151515	3.848484848	-0.41667
Accessibility	A25	4.265151515	3.863636364	-0.40152	4.333333333	4.090909091	-0.24242
	A26	4.196969697	3.303030303	-0.89394	4.348484848	3.666666667	-0.68182

For autorickshaws, more service attributes contributed to be of high performance and importance. However, the attributes that need to be given priority for better performance and have higher importance are still the same with the tricycles, that is, there is need a better accessibility for PWDs, reliability of time of arrival to destination, a professional conduct and interaction from the drivers, easement of payment, and proper identification of driver’s details must be considered as shown in Figure 7.

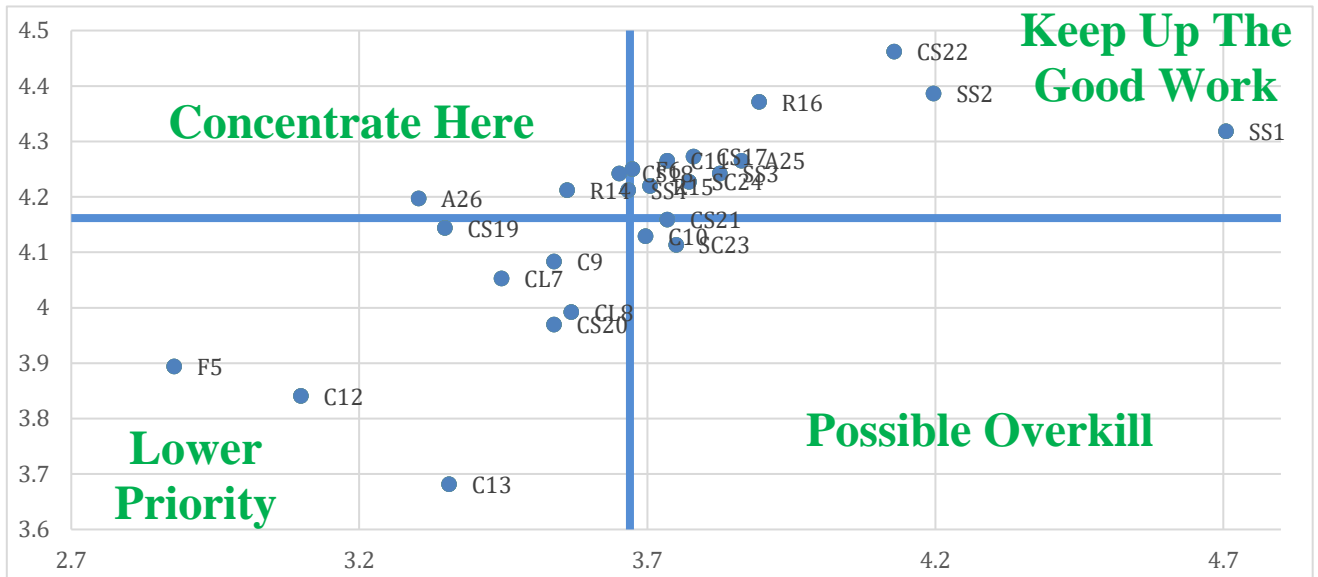


Figure 6. The traditional IPA for Tricycle

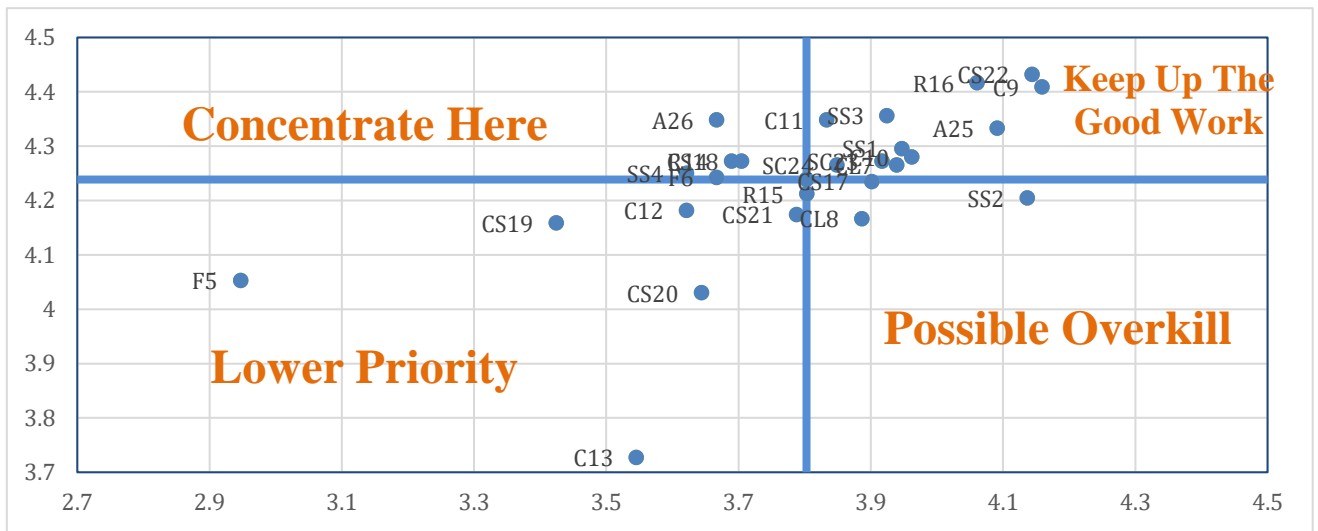


Figure 7. Traditional IPA for autorickshaws.

In the case of the modified IPA, for tricycles, almost all Importance mean values were greater than Performance mean values except for # 1, which pertains to the attribute of not experiencing any form of harassment inside the said vehicle as shown in Table 4. However, all values had Importance values greater than Performance values for auto-rickshaws. These data can be well represented in the following graphs. Figure 8 represents data for tricycles while Figure 9 represents data for autorickshaws.

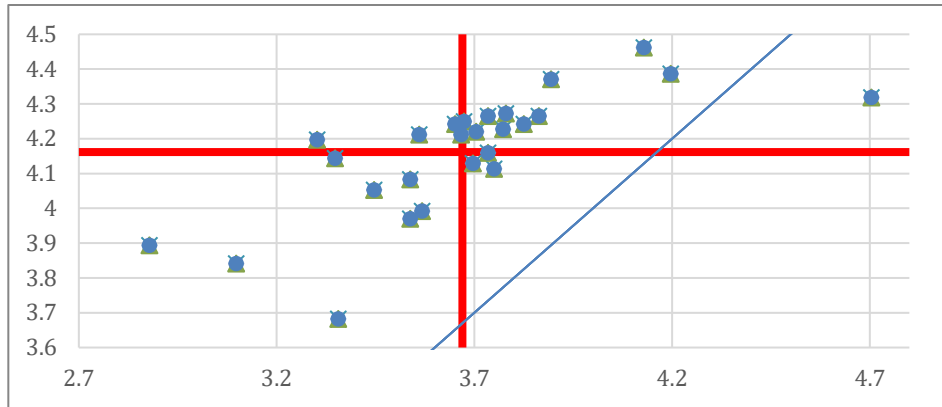


Figure 8. Modified IPA for Tricycles

Figure 8 shows that all attributes except one, which is Code SS1 pertaining to ‘Any form of assault or harassment is not experienced inside the vehicle’ under the Safety and Security service aspect, are above the discrepancy line. While most of the attributes showed the necessity for improvement, the aspect of safety could be one of the most important attributes that the customer sought after their service. This may also a result of its operation, since tricycles, even autorickshaws, operate a 24-hour service. Also, since the presence of the traditional services existed long enough for it to be established as a safe mode of transport for the customers.

Attributes below the discrepancy line are considered those that may be satisfactory while those above are dissatisfactory. Their discrepancy value can determine the degree to which they are unsatisfactory. Thus, we can then say that the three (3) most dissatisfactory attributes are F5 (Fare), A26 (Accessibility), and CS22 (Customer Service), each having a discrepancy value of -1.01515, -0.89394, and -0.79545, respectively. SS1 gained a positive discrepancy value of 0.38636.

Figure 9 shows that all attributes are above the discrepancy line and are therefore dissatisfactory. Knowing this, the three (3) highest discrepancy values are once again those of are F5 (Fare), A26 (Accessibility), and CS22 (Customer Service), with each now having discrepancy values of -1.10606, -0.73485, and -0.68182, respectively.

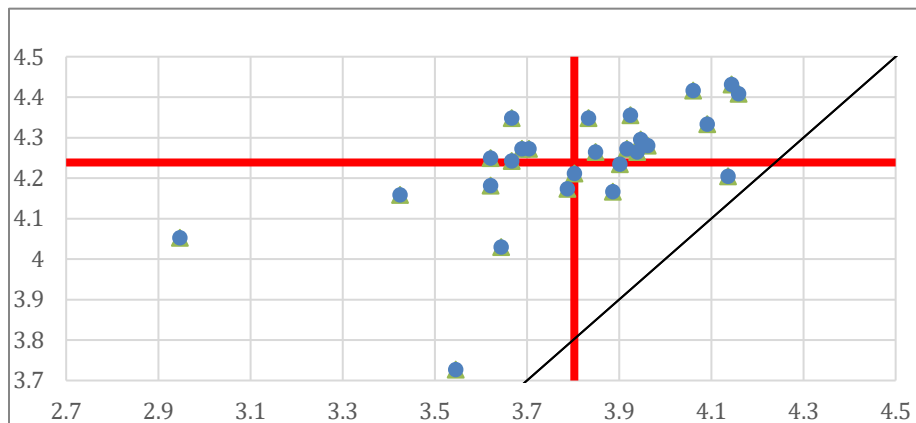


Figure 9. Modified IPA for Auto-rickshaws

Both from the tricycles and autorickshaws resulted the same three highest discrepancy values: fare, accessibility, and customer service. While each mode is required to post the fare matrix based on Ordinance 617, as shown in Figure 10, it is not really being followed by drivers which resulted to a “negotiation” as to how much the customer is willing to pay. With low enforcement of the said matrix, and with the clamor of drivers asking for a change in the fare matrix, the burden is then transferred to the customers. This is not a unique situation because in the Municipality of Concepcion, there is also a dissatisfaction among passengers on the fare inconsistencies, leading to a compromised affordability of this mode of transport (Caoleng, 2024).

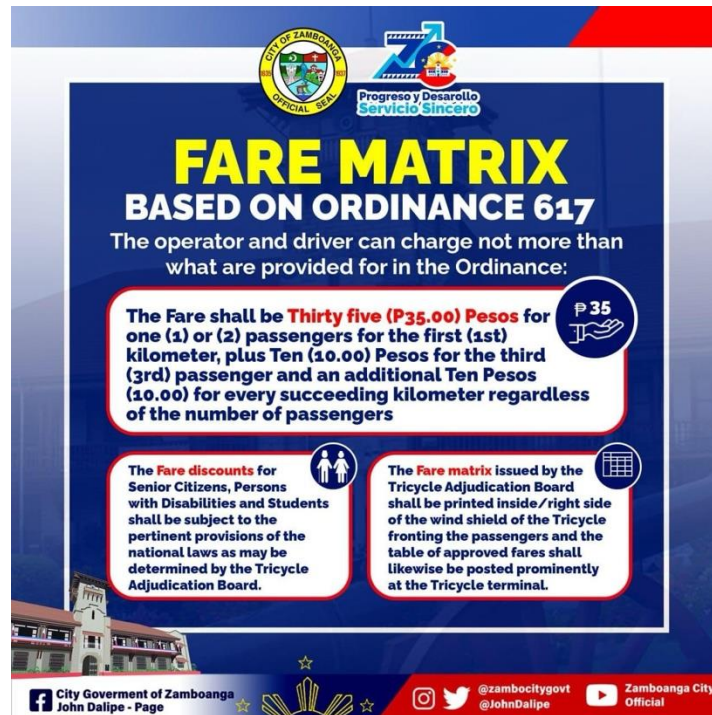


Figure 10. The fare matrix for tricycles which also applies to autorickshaws as posted from the official Facebook page of the Office of the City Administrator – Zamboanga.

Image source: <https://www.facebook.com/share/b3xG8Wzow7R1KP09/?mibextid=WC7FNe>

Accessibility for People With Disabilities (PWDs) is also one the problems due to the design of the tricycle and autorickshaw. While these mode of transports offer a door-to-door service, PWDs still find it hard for them to use the service since there are essential components for accessibility are missing from the overall design of the tricycle and autorickshaw. Customer service, such as knowledgeable on shortcut destination, also affected the customer satisfaction. This could mean that customers are more informed as to what route is best suited to reach their destination at the fastest time possible. This also because of the overwhelming number of tricycles and autorickshaws operating at the city and drivers came from different parts of the city. The familiarization of the route could mean that some drivers did not come from the location of the destination of the customers, hence, they are not well-informed of the routes best suited to use.

After comparing the means of the attributes between tricycles and autorickshaws in terms of performance and importance using a pooled t-test analysis, it was found that the P-values for importance and performance were 0.08976 and 0.12898, respectively. Since such values are greater than our threshold of 0.05, we have not found sufficient evidence to reject the null. Thus,

there is no significant difference in either case. This only means that the tricycles and autorickshaws have the same perception of dissatisfaction from their customers. This is however an intriguing case since these modes of transport are still being used by customers despite their dissatisfaction level with its services. This can be because of there are limited alternative transport such as public transport causing most customers still patronizing the use of tricycles and autorickshaws. Another is, though fare resulted as the highest dissatisfied attributes, the inconsistencies in the fare matrix create windows for opportunity for negotiation, which cannot be done in other mode of transport.

5. CONCLUSION

This study on tricycles and autorickshaws in Zamboanga City, Philippines, reveals key insights into customer satisfaction and areas needing improvement. Evaluating 26 service attributes, including safety, fare, cleanliness, and comfort, the study shows that, except for fare cost (scoring below 3.0), passengers generally find many attributes satisfactory. Tricycles scored highest in safety, while autorickshaws were praised for seat comfort and spaciousness. Most attributes were rated very important, with few exceptions below 4.0, emphasizing their crucial role in overall satisfaction. The HCSI scores were 3.83 for tricycles and 3.98 for autorickshaws, indicating higher satisfaction with autorickshaw services. The IPA revealed areas needing improvement, particularly fare cost, cleanliness, and comfort. A pooled t-test analysis found no significant differences in importance and performance ratings between the two vehicle types, indicating common issues across both.

While passengers generally value and are satisfied with various service attributes, the cost of fares remains a critical issue. The findings suggest that both tricycle and autorickshaw services need to address specific areas, particularly fare cost, cleanliness, and comfort, to enhance overall passenger satisfaction. The absence of significant differences in satisfaction levels between the two vehicle types further highlights the need for a comprehensive approach to improving service quality. Future efforts should focus on addressing these critical areas to ensure a more satisfactory and reliable transportation experience for passengers in the Philippines.

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APPENDIX – The Customer Satisfaction Survey Sheet

A Customer Satisfaction Assessment Between Tricycles and Auto-rickshaws in Zamboanga City																
CUSTOMER SATISFACTION SURVEY																
Code number:		Weather:		Date and Time:												
Barangay:		Interviewer:														
SECTION A																
1) Age	<input type="checkbox"/> 0 - 10	4) Monthly Income	<input type="checkbox"/> No income	<input type="checkbox"/> 80,000-89,999												
	<input type="checkbox"/> 11 - 20		<input type="checkbox"/> below 10,000	<input type="checkbox"/> 90,000-99,999												
	<input type="checkbox"/> 21 - 30		<input type="checkbox"/> 10,000-19,999	<input type="checkbox"/> 100,000-109,999												
	<input type="checkbox"/> 31 - 40		<input type="checkbox"/> 20,000-29,999	<input type="checkbox"/> 110,000-119,999												
	<input type="checkbox"/> 41 - 50		<input type="checkbox"/> 30,000-39,999	<input type="checkbox"/> 120,000-129,999												
	<input type="checkbox"/> 51 - 60		<input type="checkbox"/> 40,000-49,999	<input type="checkbox"/> 130,000-139,999												
	<input type="checkbox"/> 61 - 70		<input type="checkbox"/> 50,000-59,999	<input type="checkbox"/> 140,000-150,000												
	<input type="checkbox"/> 71 - 80		<input type="checkbox"/> 60,000-69,999	<input type="checkbox"/> above 150,000												
	<input type="checkbox"/> 80 - above		<input type="checkbox"/> 70,000-79,999													
2) Sex	<input type="checkbox"/> Female	5) Trip Frequency	_____ times per <i>week</i> or <i>month</i> (encircle week or month)													
	<input type="checkbox"/> Male															
3) Occupation	<input type="checkbox"/> Government employed	6) Trip Purpose	<input type="checkbox"/> To Work	<input type="checkbox"/> Social												
	<input type="checkbox"/> Privately employed		<input type="checkbox"/> To School	<input type="checkbox"/> Dining Outside Home												
	<input type="checkbox"/> Student		<input type="checkbox"/> Business	<input type="checkbox"/> Shopping/Market												
	<input type="checkbox"/> Self-employed		<input type="checkbox"/> To Send/Pick up	<input type="checkbox"/> Church												
	<input type="checkbox"/> Unemployed		<input type="checkbox"/> Other Family	<input type="checkbox"/> Members/Friends												
	<input type="checkbox"/> Others (specify): _____		<input type="checkbox"/> Medical	<input type="checkbox"/> Others (Specify): _____												
SECTION B																
Rate the following attributes according to their importance and satisfaction on a scale of 1 - 5.																
1 - Very Weak		2 - Weak		3 - Moderate		4 - Strong		5 - Very Strong								
SERVICE QUALITY		TRICYCLES					AUTORICKSHAWS									
Service Aspects	Service Attributes	How important is the given attribute?					How satisfied are you with the given attribute?									
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Safety and Security	Any form of assault or harassment is not experienced inside the vehicle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Theft or robbery is not experienced inside the vehicle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Any form of road accidents are not encountered throughout the journey.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The driver's personal information are completely displayed on the vehicle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fare	The cost of fare is reasonable for the total distance travelled.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Payment is done with ease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cleanliness	The interior of the vehicle is clean and well taken care of.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The exterior of the vehicle is clean and well taken care of.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comfort	The seat of the vehicle is comfortable and spacious.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The vehicle is well-ventilated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The overall trip was smooth and no problems were encountered.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The vehicle does not cause any unnecessary noise and vibrations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reliability	Amenities such as music systems, mirrors, etc. were available inside the vehicle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The vehicle I have traveled on consistently arrived at the destination on time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The driver maintained a safe and comfortable speed throughout the journey.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer service	During your trips with the vehicle, breakdowns or incidents were not experienced.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The driver communicated clearly and politely throughout the journey.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The driver showed professionalism in their conduct and interactions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The complaint you have was acknowledged and resolved promptly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The driver presented a neat and clean overall appearance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The driver was ready to assist with any specific needs or inquiries during the journey.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Service Characteristics	The driver seemed familiar with the route and shortcuts to the destination.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The number of vehicles present is enough to accommodate all passengers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accessibility	The vehicle is always available during the time you need it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The vehicle's design or layout allows easy entry and exit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	The vehicle is easily accessible for people with disabilities (PWDs).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>