Gender-Based Service Quality Evaluation of Multimodal Public Transportation in DKI Jakarta

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GENDER-BASED SERVICE QUALITY EVALUATION OF MULTIMODAL PUBLIC TRANSPORTATION IN DKI JAKARTA

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ABSTRACT

In DKI Jakarta, despite the extensive infrastructure development, there has been a significant decline in the usage of public transportation. This can be attributed to the inadequate quality of the services provided. Various studies have highlighted the significance of evaluating the quality of service in public transportation to ensure passenger satisfaction and attract new users. However, there is no agreement on the most effective methodology and suitable indicators for conducting such analyses. In addition, there is a growing recognition of the importance of promoting gender equality in multimodal public transportation (MMPT) and understanding gender differences and perceptions of MMPT services. A case study was carried out in DKI Jakarta, the capital of Indonesia, to analyse the influential indicators of the quality of MMPT. The analysis used the Importance Performance Analysis (IPA) combined with the Tarrant and Smith procedure. These indicators greatly impact the perception of MMPT services for both genders. Safety against crimes, facilities for disabled people, pregnant women, and senior citizens, announcements in the required language, clarity in travel-related information, and availability of seats inside vehicles are the most influential indicators of the quality of the services. However, there are significant differences in how women and men perceive the importance and performance of indicators related to seating availability, coordination between transport operators, and passenger information.

Keywords: *Public transportation; Quality of service; Gender equality; Multimodal public transportation (MMPT); Importance Performance Analysis (IPA)*

INTRODUCTION

In recent decades, the world has experienced significant growth due to factors such as population expansion, urbanization, and an increasing desire for travel (*RTYB-2017-18-2018-19*, n.d.). Due to the rapid increase in population, there has been a significant rise in private car usage, resulting in a decline in the utilization of public transportation (PT). Cities often face challenges such as limited space, an imbalance between travel demand and supply, and evolving patterns of movement. Given the complexity of travel patterns and urban expansion, individuals relying on public transportation have to make use of multiple modes to reach their destinations (Aljoufie et al, 2011) . Improving public transportation is crucial for creating more sustainable cities. It is essential to address issues such as traffic congestion, pollution, and traffic accidents on a global scale (Navarrete & Ortúzar, 2013)**.** It is crucial to prioritize the enhancement of public transportation systems in order to make them a more appealing and favored option for people to travel (Krishankumar Raghunathan et al., n.d.).

Jakarta's public transportation system has come a long way in the past few years because of the addition of different types of mass transit, such as commuter trains (KRL), bus rapid transit (BRT), mass rapid transit (MRT), and light rail transport (LRT). Even though a lot of infrastructure has been built, new reports from the Jabodetabek urban transportation policy integration project (JUTPI) 2018 show that the percentage of people who use public transportation is drastically falling compared to those who drive their own cars. JUTPI stated that in 2002, more than half of people used public transportation. By 2010, that number had dropped to less than half. With more than 80% of the mode share, private cars are dominating in the world of commuter transportation in 2018. Also, 72% of commuters use both cars and bikes in 2019 (*Statistik-Komuter-Jabodetabek-2019*, n.d.), with an impressive 59% choosing motorcycles as their main mode of transportation (SATRIO PANGARSO WISANGGENI et al., 2022). This change brings up important questions about the problems and reasons why people in Jakarta are using more cars and less public transportation. (Adib et al., n.d.)

Traffic jams and long travel times are two problems that many cities in growing countries have, including Jakarta, which is the capital of Indonesia and a very busy city. In addition to these problems, women often say they feel unsafe using public transportation in Jabodetabek because of the high rate of violence and harassment, especially on crowded buses and trains. This fear could come from worries about their own safety, cultural concerns, or the social norms in their communities, which could stop them from taking public transportation. It is common for women to be told they can't leave the house without a male family member or friend, or they are told they shouldn't travel alone in some parts of the world**.** It is crucial to prioritize the enhancement of public transportation systems in order to make them a more appealing and favored option for people to travel (Hidayati, 2023)

A lot of study has been done to find out how people use public transportation (Arabikhan et al, 2016). These studies keep showing how important passengers' perception are for improving service quality (SQ), getting more people to use public transportation, and solving problems in cities. For instance, Mandhani et al. (2021), showed that improving service quality leads to more people using public transportation. New research on how people travel shows that different genders have different transportation needs and choices (Lodhi et al., 2022). It has been agreed that gender, which shows the differences between men and women, is one of the most important user traits and a key factor in dividing and sorting public transit passengers' needs (Ganesan-Lim et al., 2008) (Juwaheer, 2011).

The gender gap is a significant problem in transportation, particularly for the DKI Jakarta community. Planners and policymakers have been devoting time and energy to the process of

allocating additional resources to develop and promote public transportation as a mode that is environmentally friendly. However, transit agencies pay little attention to examining the relationship between gender and users' opinions of the service quality (SQ) of the transport system. Studies on the evaluation of SQ that make a distinction between the genders can assist policymakers in the development of gender-specific measures, which can help policymakers maintain current users and attract new users. As a result, it is absolutely necessary to incorporate and normalize gender in the SQ evaluation, as this can increase the number of people who ride public transit and the city's overall economic well-being.

Within this context, the objective of this study is to evaluate the perceived quality of MMPT by passengers based on a range of indicators identified in the literature review. Through an experimental study conducted in DKI Jakarta, this study was found to address the following research questions: (1) Which variables have the greatest impact on the quality of MMPT (2) Do passenger MMPT quality levels vary based on gender? and (3) Which indicators have the greatest impact on the quality of MMPT in terms of gender perceptions? Through this study, a comprehensive analysis was conducted to identify the key variables that require immediate attention and improvement. Methods such as Tarrant and Smith (T&S) and importance performance analysis (IPA) worked well together in this case.

METHODS

An invaluable component of the IPA-T&S process is the service quality classification method. Services can be more easily categorized using the IPA-T&S method, which uses four quadrants to describe managerial decisions. The level of service quality can also be evaluated with the help of service quality indexes. In other words, if the services offered are of equal quality across all indicators (such as "good"), the IPA analysis will enable the classification of these services into one of the four quadrants. This classification will help stakeholders make informed decisions. The successful implementation of these methodologies was shown by Freitas et al. (2018) in their assessment of the quality of different services and also by Freitas et al. (2023a) in their evaluation of the quality of urban bus services.

Estimates are made for the $\overline{I}_j$, average importance, and $\overline{P}_j$, average service performance, for each indicator j, where j is from 1 to m. The indicators' overall importance and the MMPT service performance are denoted by I and P, respectively. These two factors form the vertex of the "I-P graph.".
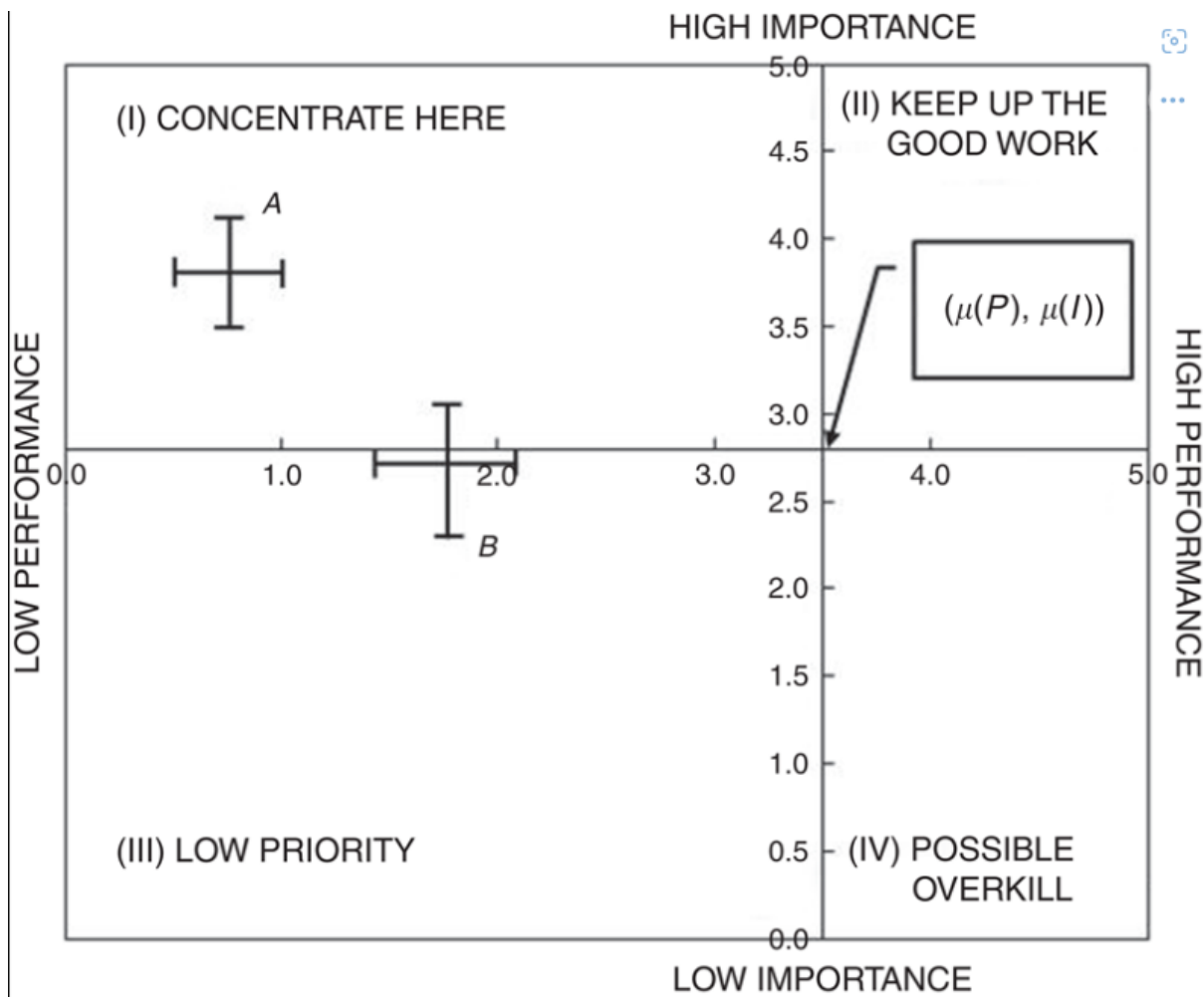
Figure 1 IPA and T & S graph (Freitas et al., 2018b)

$$SQ_j = \left.\frac{\sum_{\alpha=1}^{n}(I_j^{\alpha} * P_j^{\alpha})}{\sum_{\alpha=1}^{n} I_j^{\alpha}}\right.$$

$$SQ_{\alpha} = \left.\frac{\sum_{j=1}^{m}(I_j^{\alpha} * P_j^{\alpha})}{\sum_{j=1}^{m} I_j^{\alpha}}\right.$$

$$SQ = \sum_{\alpha=1}^{n}\sum_{j=1}^{m}(I_j^{\alpha} * P_j^{\alpha}) \left/ \sum_{\alpha=1}^{n}\sum_{j=1}^{m} I_j^{\alpha}\right.$$

The set of expressions in Table 1 provides signs for evaluating the service quality of MMPT. SQ_j represents the service quality on each indicator (Ind). SQ_{α} represents the level of service quality as seen by α passenger, while the total quality of the service is represented by SQ. The methodological flowchart for this research is illustrated in Figure 2.

Table 1 Service quality classification

Group (G)	Limits of indicator
G_5 "Very Bad"	$1.00 < SQ, SQ_\alpha, SQ_j \leq 1.50$
G_4 "Bad"	$1.50 < SQ, SQ_\alpha, SQ_j \leq 2.50$
G_3 "Regular"	$2.50 < SQ, SQ_\alpha, SQ_j \leq 3.50$
G_2 "Good"	$3.50 < SQ, SQ_\alpha, SQ_j \leq 4.50$
G_1 "Very Good"	$4.50 < SQ, SQ_\alpha, SQ_j \leq 5.00$
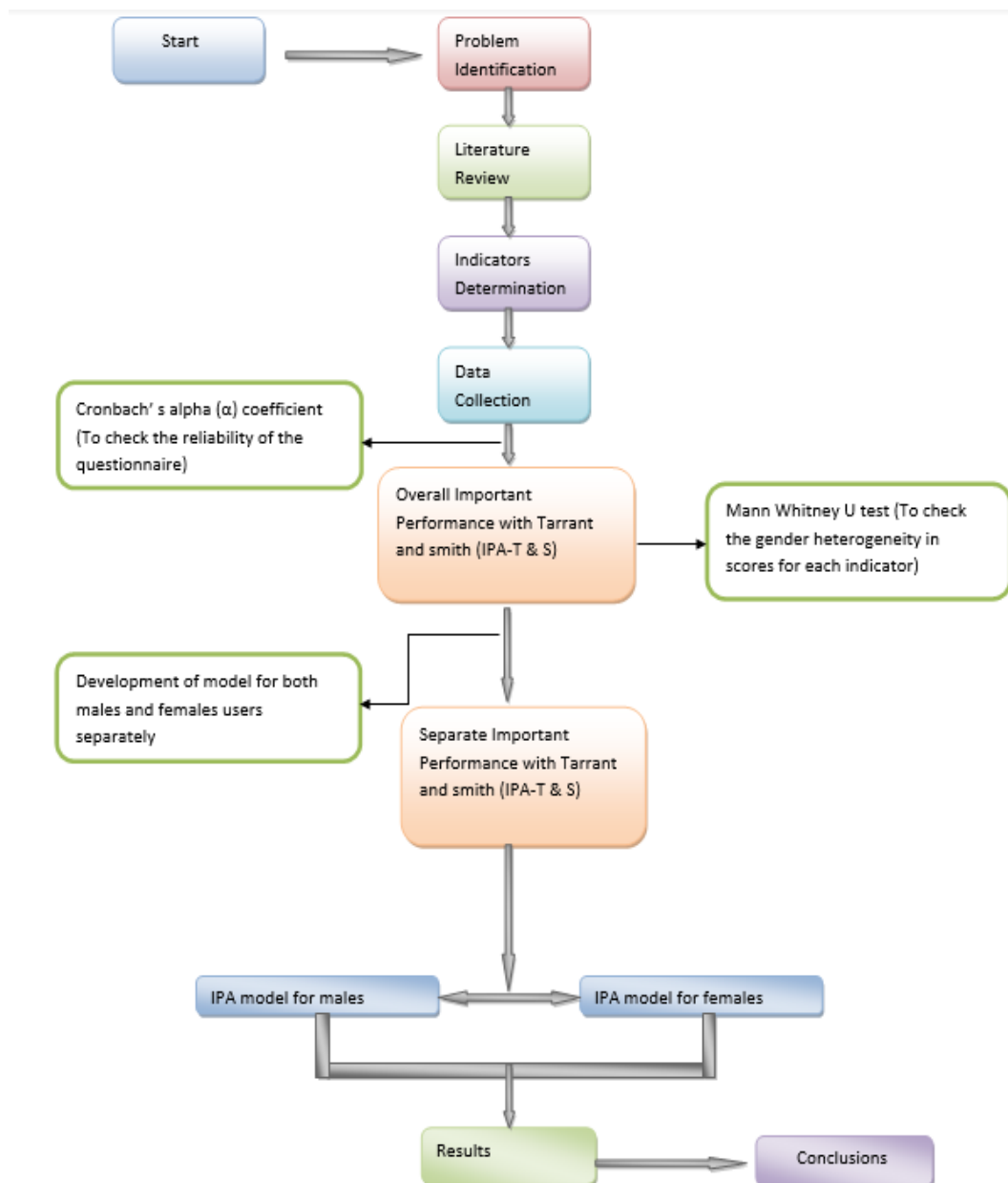
Figure 2 Methodology flowchart

At first, the problem is identified, and then indicators are derived from the literature that has been reviewed, as given in Table 2. After data collection, Cronbach's alpha (α) is determined to check the reliability of the questionnaire, and then the Mann-Whitney U-test is employed to study gender heterogeneity in scores for each indicator. Subsequently, an overall importance performance analysis is conducted in conjunction with the Tarrant and Smith procedure. In order to create different models for males and females, a separate IPA combined with the T & S procedure is done. In the final section, a conclusion is derived from these structural equation models.

Sampling

The following formula is used for determining an appropriate sample size: This formula is provided by (Krejcie & Morgan, 1970).

$$n = \frac{X^2(N).(P).(1-P)}{ME^2(N-1) + X^2(P).(1-P)}$$

In the above formula n = sample size, X^2 = chi square (3.8342) at 95% confidence level, N = Ridership Population, ME = Marginal Error (5%) and P = Proportion of Ridership population (0.5).

In 2022, 1.216 million People/day use MMPT (KRL, Transjakarta, MRT, LRT) in DKI Jakarta (Statistik Transportasi Provinsi DKI Jakarta 2022, n.d.).

$$n = \frac{3.8342(1216000).(0.5).(0.5-1)}{0.05^2(1216000-1) + 3.8342(0.5).(0.5-1)}$$

$$n = 383$$

From the above formula we calculate sample size which is 383.

Scaling and data collection

In the field of research and data collection, Likert scales stand out as widely recognized and crucial tools. Scholars such as Bollen & Barb (1981) and Simićević et al (2016) have underscored the preference for 5-point scales, particularly among the general population, deeming them as effective as any other scale (Joewono, n.d.). Consequently, this research will adopt a 1–5 point Likert Scale, where respondents will indicate their satisfaction levels ranging from 1 (highly dissatisfied) to 5 (highly satisfied). This scale choice aligns with its utilization in various studies focused on service quality, as evidenced by Mandhani et al. (2020) and Dell'Asin et al. (2015).

A total of 388 DKI Jakarta MMPT users' data were gathered via online questionnaires and in-person administration of surveys. The online survey involves distributing a Google Forms questionnaire to MMPT (Transjakarta, KRL, MRT, and LRT) users in DKI Jakarta using social media and WhatsApp. When administering the questionnaire in person, it is given to respondents inside MMPT (Transjakarta, KRL, MRT, and LRT) stations and vehicles in DKI Jakarta.
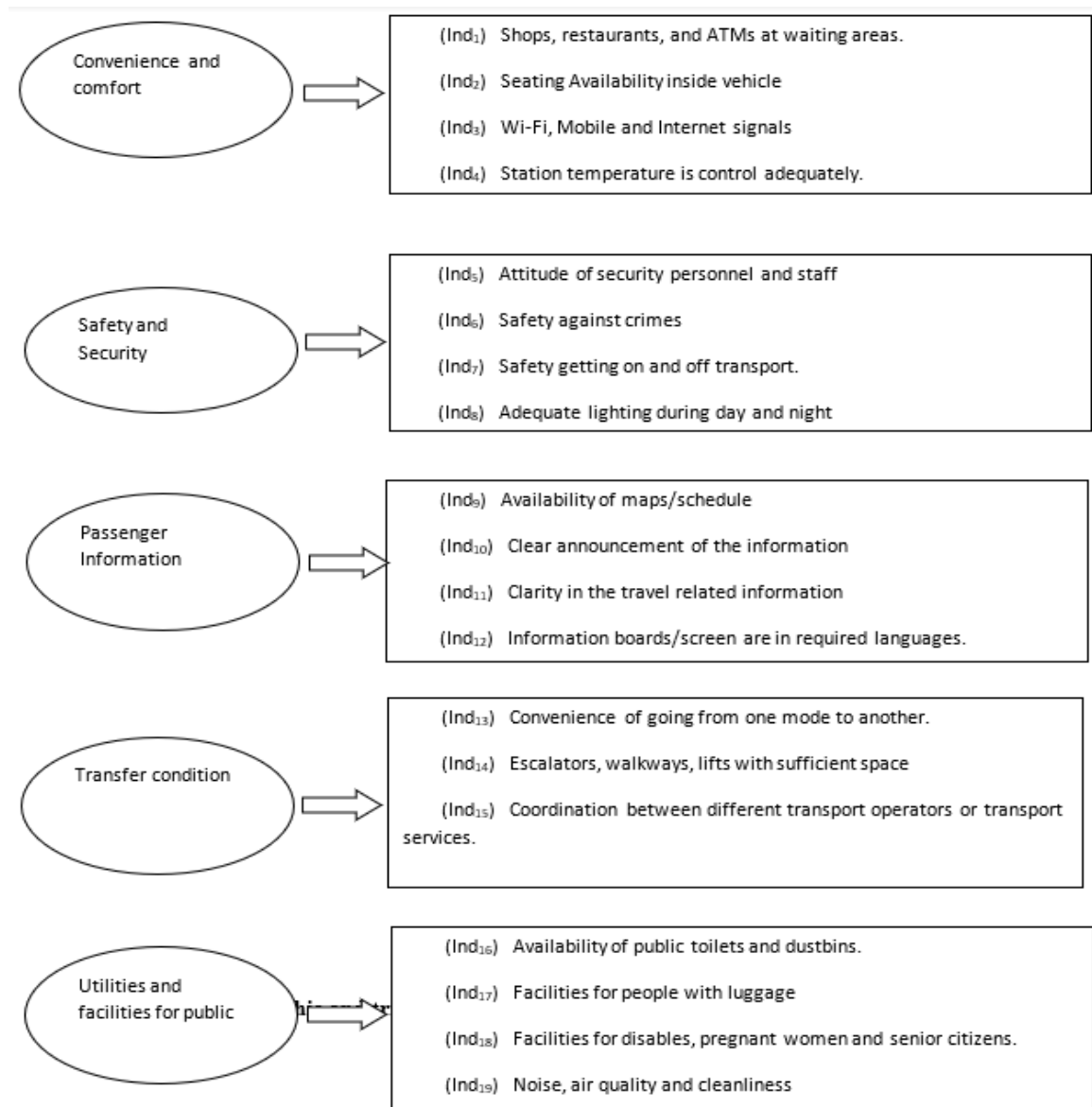
Questionnaire development

A total of 19 attributes, considered observable indicators, were identified for inclusion in the primary questionnaire survey from the literature studies, as given in Table 2. These indicators were grouped under five factors, as described in Figure 3. The final questionnaire was split into three independent portions, addressing socioeconomic indicators, travel characteristics, and satisfaction ratings associated with the selected indicators.

Table 2 Indicators and recent studies

Research Indicator (Ind)	Ref.1 (Eboli & Mazzulla, n.d.)	Ref.2 (Chauhan et al., 2022)	Ref.3 (Hickman et al., 2015)	Ref.4 (Hernandez et al., 2016)	Ref.5 (Freitas et al., 2023b)	Ref.6 (Mandhani et al., 2021b)	Ref.7 (Bose & Pandit, 2020)	Ref.8 (Mandhani et al., 2020)	Ref.9 (Kim et al., 2018)	Ref.10 (Lois et al., 2018)
Ind_1		●	●	●						●
Ind_2			●	●	●	●		●		●
Ind_3		●	●	●		●		●		
Ind_4				●	●				●	
Ind_5	●	●				●		●		
Ind_6	●				●	●		●	●	
Ind_7				●		●		●		
Ind_8		●		●		●		●		
Ind_9	●	●		●			●			●
Ind_{10}										
Ind_{11}				●		●		●		
Ind_{12}		●								
Ind_{13}				●				●		
Ind_{14}		●		●					●	
Ind_{15}		●		●		●			●	●
Ind_{16}		●							●	
Ind_{17}		●	●							
Ind_{18}		●	●					●		
Ind_{19}		●	●	●		●		●	●	●

Figure 3 Service Quality Indicators and thier Factors

Mann-Whitney U test was applied to determine whether there were significant differences in the responses of men and women on the importance and performance scores. There are two hypotheses for all indicators: the null hypothesis and the alternative hypothesis. In the H_0, null hypothesis, the mean of men's responses is equal to the mean of women's responses. On the other hand, in the H_1, alternative hypothesis, the mean of men's responses is not equal to the mean of women's responses. The test involves rejecting the null hypothesis if the p-value is less than or equal to the significance level ($\alpha = 0.05$).

RESULTS AND DISCUSSION

Descriptive Analysis

A total of 388 users participated in this study, consisting of 198 females (51%), and the remaining 190 (49%) were males. Table 3 illustrates the socio-economic and travel characteristics of both genders. The majority of male and female participants fell within the age range of 17–30 years. About 34% of females and 31% of males possessed their own car. Around 63% of females and 70% of males were students. It was determined that the proportion of men participating in work trips was less than that of women, which was found to be 19%, while the proportion of women was 22%. A sizeable portion of women and men, which is 41% and 49%, respectively, had a monthly income that was less than 5 IDR million. Approximately 51% of males and 47% of females are currently pursuing or have completed their ungergraduate studies, while 34% of women and 28% of men hold employment. Both females and males were involved in weekly travel. However, a large percentage of females (35%) and males (33%) reported a trip frequency of 2 to 3 times per week. Consequently, we can observe that females were more likely than males to engage in shopping and leisure trips.

Table 3 Socio-demographic and trip characteristics

Characteristics	Description	Gender		%
Age (Years)	<17	Male	24	12.63
		Female	18	9.09
	17-30	Male	141	74.21
		Female	132	66.67
	31-45	Male	15	7.89
		Female	40	20.2
	>45	Male	10	5.26
		Female	8	4.04
Car ownership	Yes	Male	59	31.05
		Female	67	33.84
	No	Male	131	68.95
		Female	131	66.16
Income (IDR)	<5 IDR Million	Male	93	48.95
		Female	81	40.91
	5-10 IDR Million	Male	68	35.79
		Female	67	33.84
	10-20 IDR Million	Male	20	10.53
		Female	30	15.15
	>20 IDR Million	Male	9	4.74
		Female	20	10.1
Profession	Working	Male	53	27.89
		Female	67	33.84
	Student	Male	134	70.53

Characteristics	Description	Gender		%
		Female	125	63.13
	Retired	Male	2	1.05
		Female	1	0.51
	Not working	Male	1	0.53
		Female	5	2.53
Education	Elementary	Male	24	12.63
		Female	54	27.27
	Senior High school	Male	50	26.32
		Female	25	12.63
	Undergraduate	Male	97	51.05
		Female	94	47.47
	Graduate	Male	19	10
		Female	25	12.63
Travel Frequency	1 time a week	Male	78	41.05
		Female	79	39.9
	2-3 times a week	Male	63	33.16
		Female	70	35.35
	4-5 times a week	Male	27	14.21
		Female	28	14.14
	>5 times a week	Male	22	11.58
		Female	21	10.61
Trip purpose	Education	Male	50	26.32
		Female	41	20.71
	Working	Male	37	19.47
		Female	44	22.22
	Recreation/shopping	Male	78	41.05
		Female	91	45.96
	Others	Male	25	13.16
		Female	22	11.11

Questionnaire's reliability

Cronbach's alpha (α) coefficient was used to examine the reliability of the questionnaire by determining the importance scores (α_I) and performance scores (α_P) for each dimension(Cronbach, n.d.). The study found the following values: convenience and comfort ($\alpha_I = 0.712$; $\alpha_p = 0.733$), safety & security ($\alpha_I = 0.860$; $\alpha_p = 0.866$), Passenger information ($\alpha_I = 0.901$; $\alpha_p = 0.898$), Transfer condition ($\alpha_I = 0.864$; $\alpha_p = 0.883$), and utilties and facilities for public ($\alpha_I = 0.883$; $\alpha_p = 0.892$). The aforementioned values collectively indicate the questionnaire's reliability. The questionnaire is appropriate for exploratory research purposes due to the fact that all of the alpha values are above 0.60 (*Multivariate Data Analysis*, n.d.). Increasing the reliability of the questionnaire does not require the elimination of any indicator.

There is no need to eliminate any indicator in order to improve the reliability of the questionnaire.

Classification of service quality & IPA

With respect to the MMPT services in DKI Jakarta, the total quality of service (SQ) evaluation reveals that 5% of respondents consider them "good," and 95% consider them "very good." .These results indicate an enhancement in the service quality of MMPT in the city. The data shown in Table 4 reveals that the quality of services has been evaluate as "very good" in 18 among the total 19 indicators. Very good services are offered based on eighteen specific indicators (Ind_1, Ind_2, Ind_4, Ind_5, Ind_6, Ind_7, Ind_8, Ind_9, Ind_{10}, Ind_{11}, Ind_{12}, Ind_{13}, Ind_{14}, Ind_{15}, Ind_{16}, Ind_{17}, Ind_{18}, Ind_{19}), while good services are provided based on only internet signals (Ind_3). Ind_2, Ind_6, Ind_{16}, and Ind_{18} are the most important indicators. Table 4 and Fig. 4 present the findings of the IPA-T&S process. The mean importance and performance scores were determined using a 95% confidence range to establish the standard error.

Table 4. The "IPA–T & S" results

Ind.	Importance					Performance					SQ$_j$
	$\bar{I}_j$	$(\bar{I}_j)_{sup}$	$(\bar{I}_j)_{inf}$	SE	T & S	$\bar{P}_j$	$(\bar{P}_j)_{sup}$	$(\bar{P}_j)_{inf}$	SE	T & S	
Ind_1	4.41	4.45	4.37	0.04		4.36	4.4	4.32	0.04		4.51
Ind_2	4.67	4.7	4.64	0.03		4.63	4.66	4.6	0.03		4.71
Ind_3	4.34	4.39	4.29	0.05		4.28	4.33	4.23	0.05		4.47
Ind_4	4.5	4.54	4.46	0.04		4.45	4.49	4.41	0.04		4.56
Ind_5	4.58	4.61	4.55	0.03	*	4.54	4.58	4.5	0.04	*	4.63
Ind_6	4.69	4.72	4.66	0.03		4.62	4.66	4.58	0.04		4.71
Ind_7	4.62	4.65	4.59	0.03	*	4.55	4.59	4.51	0.04	*	4.65
Ind_8	4.59	4.63	4.55	0.04	*	4.55	4.59	4.51	0.04	*	4.66
Ind_9	4.63	4.67	4.59	0.04	*	4.6	4.64	4.56	0.04		4.69
Ind_{10}	4.68	4.71	4.65	0.03		4.63	4.66	4.6	0.03		4.7
Ind_{11}	4.66	4.69	4.63	0.03		4.62	4.66	4.58	0.04		4.71
Ind_{12}	4.62	4.65	4.59	0.03	*	4.59	4.63	4.55	0.04		4.67
Ind_{13}	4.53	4.57	4.49	0.04		4.46	4.5	4.42	0.04		4.58
Ind_{14}	4.63	4.66	4.6	0.03	*	4.53	4.57	4.49	0.04	*	4.61
Ind_{15}	4.57	4.6	4.54	0.03	*	4.5	4.54	4.46	0.04	*	4.6
Ind_{16}	4.67	4.7	4.64	0.03		4.6	4.64	4.56	0.04		4.68
Ind_{17}	4.53	4.57	4.49	0.04		4.47	4.51	4.43	0.04		4.58
Ind_{18}	4.7	4.73	4.67	0.03		4.64	4.67	4.61	0.03		4.72
Ind_{19}	4.61	4.64	4.58	0.03	*	4.52	4.56	4.48	0.04	*	4.61
	$\bar{\bar{I}} = 4.59$					$\bar{\bar{P}} = 4.53$					SQ = 4.63

*A confidence interval that crosses the quadrant boundary (Tarrant and smith type)
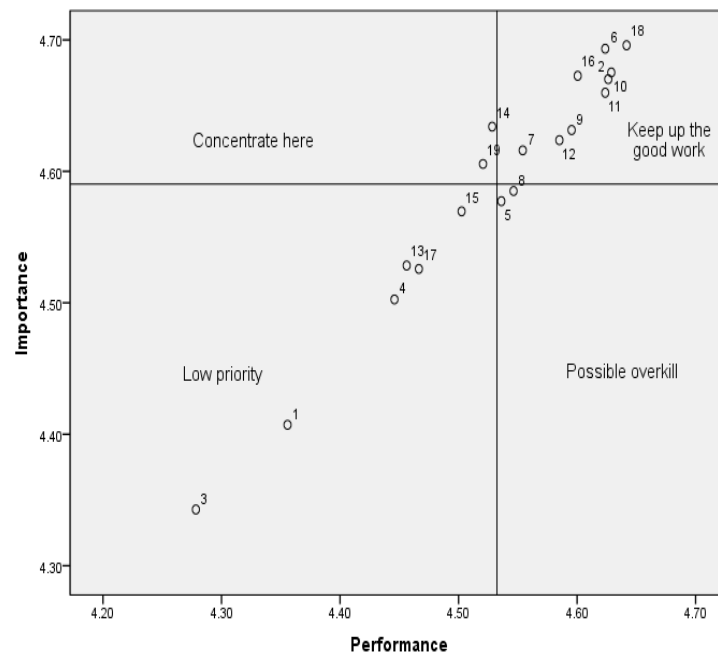
Figure 4 The IPA graph

It is important to note that the quadrants labeled "low priority" and "keep up the good work" contained the greatest number of indicators. The "keep up the good work" quadrant has the most influential indicators. Passengers hold a favorable perception of the MMPT service quality with regard to utilities and facilities for the public, convenience and comfort, safety and security, and passenger information. In particular, MMPT is safe against crimes (Ind_6), facilities for disabled people, pregnant women, and senior citizens are available (Ind_{18}), announcements of information are presented in the required language (Ind_{10}), travel-related information is clarified (Ind_{11}), and seats are available inside vehicles (Ind_2). Transit companies need to continue providing high-quality services across all of those indicators. In addition, based on the findings of the T&S procedure, there is no guarantee that (Ind_7), (Ind_9), and (Ind_{12}) are exclusively assigned to the "keep up the good" category. Therefore, it is also plausible to consider these variables as part of the "Concentrate here" quadrant. Ind_{14} and Ind_{19} are also parts of the "concentrate here" and "keep of the good work" quadrants.

On the other hand, no one service quality of MMPT is bad evaluated. Contrary to previous studies, there have been reports of passenger dissatisfaction regarding factors such as buses' numbers by (Nwachukwu, 2014) and the frequency of transport services by (De Oña et al., 2013) and (Le-Klähn et al., 2014). While there may be occasional issues with routes due to factors like traffic accidents, road repairs, or bad weather, other problems can be attributed to transit policies, such as poor route planning or a large number of stops. Additionally, concerns related to transport upkeep, including insufficient maintenance protocols or a discrepancy between passenger capacity and the number of vehicles available, can affect service quality significantly. It is imperative for transport authorities to scrutinize these key metrics to identify the underlying causes of transport service.

Our findings are not consistent with certain significant indicators that have been highlighted in other studies, such as temperature Delgado Jalón et al. (2019) and Esmailpour et al. (2020). Our study has identified several indicators that are considered "low priority" for MMPT service. These indicators include (Ind_1), (Ind_3), (Ind_4), (Ind_{13}), and (Ind_{17}). It is worth

mentioning that the average scores of these indicators exceed 4.0. More or less, these kinds of indicators shouldn't be ignored; they're just less important than the ones listed above. Moreover, the outcomes of the T and S process don't necessarily indicate that (Ind_5) and (Ind_8) are placed alone in the "possible overkill" quadrant. Thus, these indications can also be considered "low-priority" indicators. Similarly, the "low priority" and "possible overkill" quadrants also contain Ind_{15}.

Differences between female and male responses

Table 5, Table 6, Figure 5 and Figure 6 display the findings of the "IPA-T&S" for women and men respondents, respectively. Both groups of respondents have the same variables allocated to each quadrant. This is the case for both groups.

**Table 5** The IPA–T & S results for male

Ind.	Importance					Performance					SQ_j
	$\bar{I}_j$	$(\bar{I}_j)_{sup}$	$(\bar{I}_j)_{inf}$	SE	T & S	$\bar{P}_j$	$(\bar{P}_j)_{sup}$	$(\bar{P}_j)_{inf}$	SE	T & S	
Ind_1	4.35	4.42	4.28	0.07		4.27	4.34	4.2	0.07		4.56
Ind_2	4.59	4.64	4.54	0.05	*	4.56	4.61	4.51	0.05		4.76
Ind_3	4.29	4.36	4.22	0.07		4.22	4.3	4.14	0.08		4.5
Ind_4	4.47	4.52	4.42	0.05		4.42	4.48	4.36	0.06	*	4.58
Ind_5	4.54	4.59	4.49	0.05	*	4.48	4.53	4.43	0.05	*	4.68
Ind_6	4.66	4.71	4.61	0.05		4.6	4.66	4.54	0.06		4.73
Ind_7	4.59	4.64	4.54	0.05	*	4.52	4.58	4.46	0.06	*	4.68
Ind_8	4.54	4.6	4.48	0.06	*	4.49	4.55	4.43	0.06	*	4.69
Ind_9	4.61	4.66	4.56	0.05		4.54	4.59	4.49	0.05		4.74
Ind_{10}	4.64	4.68	4.6	0.04		4.57	4.62	4.52	0.05		4.76
Ind_{11}	4.63	4.68	4.58	0.05		4.57	4.62	4.52	0.05		4.76
Ind_{12}	4.57	4.62	4.52	0.05	*	4.52	4.57	4.47	0.05	*	4.74
Ind_{13}	4.49	4.54	4.44	0.05		4.39	4.45	4.33	0.06		4.64
Ind_{14}	4.62	4.67	4.57	0.05		4.47	4.53	4.41	0.06	*	4.68
Ind_{15}	4.51	4.56	4.46	0.05	*	4.43	4.49	4.37	0.06	*	4.67
Ind_{16}	4.64	4.69	4.59	0.05		4.56	4.61	4.51	0.05		4.72
Ind_{17}	4.47	4.53	4.41	0.06		4.41	4.47	4.35	0.06		4.63
Ind_{18}	4.66	4.71	4.61	0.05		4.61	4.66	4.56	0.05		4.75
Ind_{19}	4.58	4.63	4.53	0.05	*	4.48	4.54	4.42	0.06	*	4.65
	$\bar{\bar{I}} = 4.55$					$\bar{\bar{P}} = 4.48$					SQ = 4.59

*A confidence interval that crosses the quadrant boundary (Tarrant and smith type)

Table 6 The IPA–T & S results for female

Ind.	Importance					Performance					SQ$_j$
	$\bar{I}_j$	$(\bar{I}_j)_{sup}$	$(\bar{I}_j)_{inf}$	SE	T & S	$\bar{P}_j$	$(\bar{P}_j)_{sup}$	$(\bar{P}_j)_{inf}$	SE	T & S	
Ind$_1$	4.46	4.52	4.4	0.06		4.43	4.49	4.37	0.06		4.51
Ind$_2$	4.74	4.78	4.7	0.04		4.69	4.73	4.65	0.04		4.71
Ind$_3$	4.39	4.45	4.33	0.06		4.33	4.4	4.26	0.07		4.47
Ind$_4$	4.54	4.59	4.49	0.05		4.47	4.52	4.42	0.05		4.56
Ind$_5$	4.62	4.67	4.57	0.05	*	4.59	4.64	4.54	0.05	*	4.63
Ind$_6$	4.72	4.77	4.67	0.05		4.65	4.7	4.6	0.05		4.71
Ind$_7$	4.64	4.69	4.59	0.05	*	4.59	4.64	4.54	0.05	*	4.65
Ind$_8$	4.63	4.68	4.58	0.05	*	4.6	4.65	4.55	0.05	*	4.66
Ind$_9$	4.66	4.71	4.61	0.05	*	4.65	4.7	4.6	0.05		4.69
Ind$_{10}$	4.71	4.75	4.67	0.04		4.68	4.72	4.64	0.04		4.7
Ind$_{11}$	4.69	4.73	4.65	0.04		4.68	4.72	4.64	0.04		4.71
Ind$_{12}$	4.67	4.72	4.62	0.05	*	4.65	4.7	4.6	0.05		4.67
Ind$_{13}$	4.57	4.62	4.52	0.05		4.52	4.58	4.46	0.06	*	4.58
Ind$_{14}$	4.65	4.7	4.6	0.05	*	4.58	4.63	4.53	0.05	*	4.61
Ind$_{15}$	4.63	4.68	4.58	0.05	*	4.58	4.63	4.53	0.05	*	4.6
Ind$_{16}$	4.71	4.76	4.66	0.05		4.64	4.69	4.59	0.05		4.68
Ind$_{17}$	4.58	4.63	4.53	0.05	*	4.53	4.58	4.48	0.05	*	4.58
Ind$_{18}$	4.73	4.78	4.68	0.05		4.67	4.72	4.62	0.05		4.72
Ind$_{19}$	4.63	4.68	4.58	0.05	*	4.56	4.61	4.51	0.05	*	4.61
	$\bar{\bar{I}}$ = 4.63					$\bar{\bar{P}}$ = 4.58					SQ = 4.68

*A confidence interval that crosses the quadrant boundary (Tarrant and smith type)
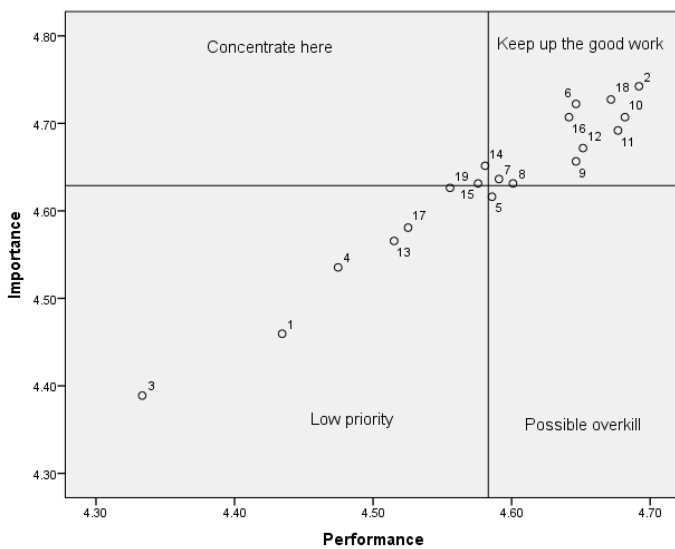
Figure 5 The IPA graph for female
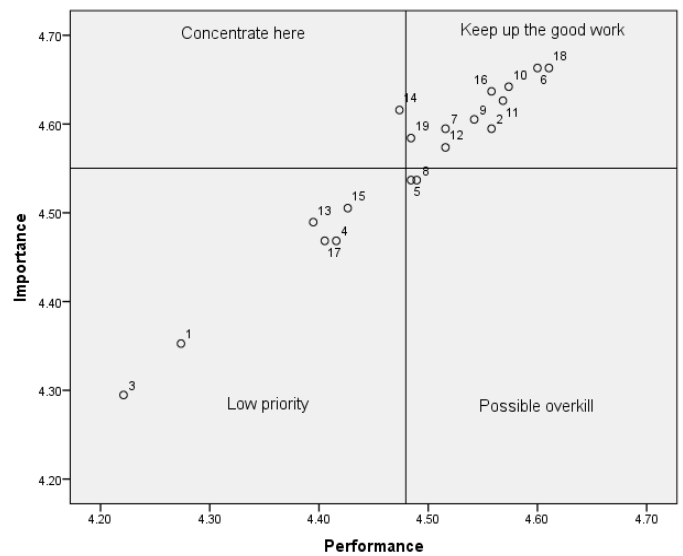
Figure 6 The IPA graph for male

Based on the scores given by the female respondents, it appears that Ind_{17} is not completely categorized as "low priority" according to the "T&S procedure.". To ensure prevention, it is recommended that Ind_7 can also be included in the "concentrate here". According to the "T&S procedure," it's noted that Ind_7, Ind_9, and Ind_{12} do not completely fall into the "keep up the good work". To avoid any potential issues, it is recommended that these criteria be considered in the "possible overkill". In addition, the importance score of service quality (SQ) varies between females and males concerning Ind_2, Ind_9, Ind_{14}, and Ind_{17}. Due to their combined assignment to the "concentrate here" and "low priority", Ind7 and Ind5 also need careful consideration.

The "T&S procedure" indicates that Ind_{15} is not entirely placed in the "low priority", according to the scores provided by the male respondents. To prevent this, it is recommended that this variable be included in the concentrate here quadrant. The IPA-T&S procedure also states that Ind_2, Ind_5, Ind_7, Ind_8, Ind_{12}, and Ind_{19} are not fully allocated to the "keep up the good work". To prevent this, it is recommended to include such indicators in the "possible overkill" quadrant. Ind_4, Ind_8 and Ind_{15} also require consideration as these indicators are included in the "possible overkill" and " lower priority" quadrants. Similarly, Ind_7, Ind_{14}, and Ind_{12} are parts of the "keep up the good work" and "concentrate here". In addition, there are differences in the performance of service quality (SQ) for females and males in relation to Ind_4, Ind_{12}, and Ind_{17}.

There are statistically significant differences ($p < 5\%$) in responses between men and women when it comes to the importance level of certain indicators. These differences have been statistically proven with a significance level of $\alpha = 0.05$. Specifically, Ind_2, Ind_{12}, and Ind_{15} have shown significant differences in their importance levels based on the responses of males and females. The p-values for these indicators are 0.015, 0.046, and 0.027, respectively. Based on our research, it appears that women prioritise certain aspects of transportation more than men. These include the availability of seats for sitting inside vehicles, information boards or screens in their preferred language, and effective coordination between different transport operators or services.

On the other hand, when looking at the MMPT performance ratings, there are statistically significant differences in how men and women perceive the performance of bus transportation in relation to Ind_2, Ind_{12}, and Ind_{15}. These differences are statistically significant, with p-values of 0.030, 0.027, and 0.024, respectively. All these p-values are less than 0.05. These findings indicate that female passengers tend to have a more positive perception of factors such as seat availability, information boards or screens in their preferred language, and coordination among different transport operators or services.

We found no evidence that criminality or violence discourages men and women from using MMPT, contrary to previous research Abdullah et al. (2022) and Zheng et al. (2022). For the simple reason that our data indicates that the safety against crimes and behavior of security personnel and staff at MMPT stops and stations are very good.

CONCLUSION

This study aimed to evaluate the perceived quality of MMPT by passengers in DKI Jakarta. It also sought to identify the indicators that have the greatest impact on the quality of MMPT for passengers and determine if there are any differences in perception based on gender. Safety against crimes, facilities for disabled people, pregnant women, and senior citizens, announcements in the required language, clarity in travel-related information, and availability

of seats inside vehicles are the "most influential indicators" of the quality of the MMPT services in DKI Jakarta. Notably, indicators related to public utilities and facilities, passenger information, convenience and comfort, safety and security, and overall quality of services should be upheld. The utilization of "IPA-T&S" procedure brings about two significant contributions: Firstly, this procedure outlines 4 distinct approaches to management. Secondly, this approach ensures that all indicators are thoroughly and accurately assigned to the appropriate quadrants, reducing the risk of incorrect decisions.

The study was conducted in DKI Jakarta, the capital of Indonesia. The urban mobility patterns in this capital may vary compared to smaller and metropolitan cities. Given the focus of previous research on different metropolitan cities such as Delhi (India) and a city of Brazil, it is important to approach our results with caution when comparing them to studies conducted in different regions. Further studies can focus on utilizing the indicators and integrated techniques from this study to evaluate the service qualities in MMPT (including gender considerations) in different cities. This can help identify the key indicators that have the greatest impact on service quality. In order to accurately evaluate the service quality of transport, it is important to consider the individual performance of each company, route, and driver. This is because services can differ significantly in terms of their quality and consistency. Therefore, it's essential to conduct more comprehensive and thorough data collection.

REFERENCES

Abdullah, A., Ababio-Donkor, A., & Adams, C. A. (2022). Gender Disparities in the Access and Use of Urban Public Transport in Abuja, Nigeria. *Sustainability (Switzerland)*, *14*(9). https://doi.org/10.3390/su14095219

Adib, A., Shiddiqi, A., Sutjiningsih, D., Tjahjono, T., Darmajanti, L., & Bawono, A. A. (n.d.). *THE STUDY OF SOCIAL INCLUSION AND GENDER EQUALITY ON PUBLIC TRANSPORT SATISFACTION: CASE OF METROPOLITAN JAKARTA*. https://www.iqair.com/indonesia/jakarta

Aljoufie, M., Zuidgeest, M., Brussel, M., & van Maarseveen, M. (2011). Urban growth and transport: Understanding the spatial temporal relationship. *WIT Transactions on the Built Environment*, *116*, 315–328. https://doi.org/10.2495/UT110271

Arabikhan, F., Postorino, M. N., Dupont-Kieffer, A., & Gegov, A. (2016). Gender-based analysis of zones of tolerance for transit service quality considering intelligent transportation systems. *Transportation Research Record*, *2541*, 73–80. https://doi.org/10.3141/2541-09

Bollen, K. A., & Barb, K. H. (1981). Pearson's R and Coarsely Categorized Measures. In *Review* (Vol. 46, Issue 2). https://www.jstor.org/stable/2094981

Bose, T., & Pandit, D. (2020). Heterogeneity in perception of service quality attributes of bus transit across various user categories- A case of Kolkata. *Transportation Research Procedia*, *48*, 2784–2799. https://doi.org/10.1016/j.trpro.2020.08.239

Chauhan, V., Gupta, A., & Parida, M. (2022). Evaluating service quality of Multimodal Transportation Hub (MMTH) in Delhi, India: A gender-based perspective. *Case Studies on Transport Policy*, *10*(2), 1234–1248. https://doi.org/10.1016/j.cstp.2022.04.007

Cronbach, L. J. (n.d.). COEFFICIENT ALPHA AND THE INTERNAL STRUCTURE OF TESTS*. In *PSYCHOMETRIKA* (Vol. 16, Issue 3).

De Oña, J., De Oña, R., Eboli, L., & Mazzulla, G. (2013). Perceived service quality in bus transit service: A structural equation approach. *Transport Policy*, *29*, 219–226. https://doi.org/10.1016/j.tranpol.2013.07.001

Delgado Jalón, M. L., Gómez Ortega, A., & De Esteban Curiel, J. (2019). The social perception of urban transport in the city of Madrid: the application of the Servicescape Model to the bus and underground services. *European Transport Research Review*, *11*(1). https://doi.org/10.1186/s12544-019-0373-5

Dell′Asin, G., Monzón, A., & Lopez-Lambas, M. E. (2015). Key quality factors at urban interchanges. *Proceedings of the Institution of Civil Engineers: Transport*, *168*(4), 326–335. https://doi.org/10.1680/tran.13.00039

Eboli, L., & Mazzulla, G. (n.d.). *Service Quality Attributes Affecting Customer Satisfaction for Bus Transit*.

Esmailpour, J., Aghabayk, K., Abrari Vajari, M., & De Gruyter, C. (2020). Importance – Performance Analysis (IPA) of bus service attributes: A case study in a developing country. *Transportation Research Part A: Policy and Practice*, *142*, 129–150. https://doi.org/10.1016/j.tra.2020.10.020

Freitas, A. L. P., Monteiro, G. A. P., & Costa, H. G. (2018a). Assessing the quality of information technology infrastructure services. *Industrial Management and Data Systems*, *118*(9), 1821–1836. https://doi.org/10.1108/IMDS-09-2017-0415

Freitas, A. L. P., Monteiro, G. A. P., & Costa, H. G. (2018b). Assessing the quality of information technology infrastructure services. *Industrial Management and Data Systems*, *118*(9), 1821–1836. https://doi.org/10.1108/IMDS-09-2017-0415

Freitas, A. L. P., Silva Filho, M. T. S., & de Assis, D. A. (2023a). An analysis of gender differences and perception of influential criteria for the quality of urban bus transportation: Evidence from Brazil. *Journal of Public Transportation*, *25*. https://doi.org/10.1016/j.jpubtr.2023.100050

Freitas, A. L. P., Silva Filho, M. T. S., & de Assis, D. A. (2023b). An analysis of gender differences and perception of influential criteria for the quality of urban bus transportation: Evidence from Brazil. *Journal of Public Transportation*, *25*. https://doi.org/10.1016/j.jpubtr.2023.100050

Ganesan-Lim, C., Russell-Bennett, R., & Dagger, T. (2008). The impact of service contact type and demographic characteristics on service quality perceptions. *Journal of Services Marketing*, *22*(7), 550–561. https://doi.org/10.1108/08876040810909677

Hernandez, S., Monzon, A., & de Oña, R. (2016). Urban transport interchanges: A methodology for evaluating perceived quality. *Transportation Research Part A: Policy and Practice*, *84*, 31–43. https://doi.org/10.1016/j.tra.2015.08.008

Hickman, R., Chen, C. L., Chow, A., & Saxena, S. (2015). Improving interchanges in China: The experiential phenomenon. *Journal of Transport Geography*, *42*, 175–186. https://doi.org/10.1016/j.jtrangeo.2014.12.004

Hidayati, I. (2023). Breaking the commute barrier: How women in Jabodetabek overcome daily challenges on commuting for work. *ETNOSIA : Jurnal Etnografi Indonesia*, *8*(1), 44–62. https://doi.org/10.31947/etnosia.v8i1.26085

Joewono, T. B. (n.d.). *User Perceptions of Private Paratransit Operation in Indonesia*.

Juwaheer, T. D. (2011). *Gender bias in hotel guests' perceptions of service quality: an empirical investigation of hotels in Mauritius* (Vol. 9, Issue 5). http://ertr.tamu.edu

Kim, J., Schmöcker, J. D., Yu, J. W., & Choi, J. Y. (2018). Service quality evaluation for urban rail transfer facilities with Rasch analysis. *Travel Behaviour and Society*, *13*, 26–35. https://doi.org/10.1016/j.tbs.2018.05.002

Krejcie, R. V, & Morgan, D. W. (1970). DETERMINING SAMPLE SIZE FOR RESEARCH ACTIVITIES. In *EDUCATIONAL AND PSYCHOLOGICAL MEASUREMENT* (Vol. 30).

Krishankumar Raghunathan, Dragan Pamucar, Muhammet Deveci, & K S Ravichandran. (n.d.). Prioritization of Zero-Carbon Measures for Sustainable Urban Mobility Using Integrated Double Hierarchy Decision Framework and EDAS Approach. *The Science of The Total Environment*.

Le-Klähn, D.-T., Hall, C. M., & Gerike, R. (2014). Analysis of Visitor Satisfaction with Public Transport in Munich. In *Journal of Public Transportation* (Vol. 17, Issue 3).

Lodhi, R. H., Rana, I. A., & Waheed, A. (2022). Gendered mode choice preferences and characteristics for educational trips in Abbottabad, Pakistan: An empirical investigation. *Case Studies on Transport Policy*, *10*(4), 2102–2110. https://doi.org/10.1016/j.cstp.2022.09.010

Lois, D., Monzón, A., & Hernández, S. (2018). Analysis of satisfaction factors at urban transport interchanges: Measuring travellers' attitudes to information, security and waiting. *Transport Policy*, *67*, 49–56. https://doi.org/10.1016/j.tranpol.2017.04.004

Mandhani, J., Nayak, J. K., & Parida, M. (2020). Interrelationships among service quality factors of Metro Rail Transit System: An integrated Bayesian networks and PLS-SEM approach. *Transportation Research Part A: Policy and Practice*, *140*, 320–336. https://doi.org/10.1016/j.tra.2020.08.014

Mandhani, J., Nayak, J. K., & Parida, M. (2021a). Establishing service quality interrelations for Metro rail transit: Does gender really matter? *Transportation Research Part D: Transport and Environment*, *97*. https://doi.org/10.1016/j.trd.2021.102888

Mandhani, J., Nayak, J. K., & Parida, M. (2021b). Establishing service quality interrelations for Metro rail transit: Does gender really matter? *Transportation Research Part D: Transport and Environment*, *97*. https://doi.org/10.1016/j.trd.2021.102888

Multivariate Data Analysis. (n.d.).

Navarrete, F. J., & Ortúzar, J. de D. (2013). Subjective valuation of the transit transfer experience: The case of Santiago de Chile. *Transport Policy*, *25*, 138–147. https://doi.org/10.1016/j.tranpol.2012.10.006

Nwachukwu, A. A. (2014). Assessment of Passenger Satisfaction with Intra-City Public Bus Transport Services in Abuja, Nigeria. In *Journal of Public Transportation* (Vol. 17, Issue 1).

RTYB-2017-18-2018-19. (n.d.).

SATRIO PANGARSO WISANGGENI, ALBERTUS KRISNA PRATAMA PUTRA, & MARGARETHA PUTERI ROSALINA. (2022, February 4). Sepeda Motor Pilihan Utama Komuter. *Kompas*.

Simićević, J., Milosavljević, N., & Djoric, V. (2016). Gender differences in travel behaviour and willingness to adopt sustainable behaviour. *Transportation Planning and Technology*, *39*(5), 527–537. https://doi.org/10.1080/03081060.2016.1174367

Statistik Transportasi Provinsi DKI Jakarta 2022. (n.d.).

statistik-komuter-jabodetabek-2019. (n.d.).

Zheng, Y., Kong, H., Petzhold, G., Barcelos, M. M., Zegras, C. P., & Zhao, J. (2022). Gender differences in the user satisfaction and service quality improvement priority of public transit bus system in Porto Alegre and Fortaleza, Brazil. *Travel Behaviour and Society*, *28*, 22–37. https://doi.org/10.1016/j.tbs.2022.02.003