Evaluating Mass Rapid Transit (MRT) Service Quality According to Customers' Age Group of Varying Travel Pattern

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Abstract In contrast to developed countries, developing countries still have low use of public transportation. Thus, to improve overall customer experience and MRT ridership, it is critical to address consumers' public transportation service quality expectations. This objective of this paper is to describe demographic characteristics that may affect customer perceived service quality and any variations in customer perception between different age groups. This survey collected questionnaire results from MRT users of the SBK Line. The methodology of this paper includes using the SERVQUAL dimensions (Reliability, Assurance, Tangibility, Empathy, and Responsiveness) with the inclusion of Safety & Security and Accessibility dimension. Cluster Analysis (CA) was included in this study to segregate respondents' age groups. The outcome of this analysis shows that most respondents were in the age range of 25–31, which consists of 38.7%. Overall, it is concluded that mean importance scored higher than mean performance for all clusters. The Importance-Performance Analysis (IPA) results show that the perceived service quality varies with age. However, respondents of all ages agree that the safety and security dimension is considered satisfactory. It is intended that this article will encourage stakeholders to improve the quality of MRT, especially in Malaysia, so that the country can compete on a global scale in terms of public transportation.

Keywords Mass rapid transit · Public transportation · Rail transportation · Service quality · Cluster analysis · Importance-performance analysis (IPA) · Age

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1 Introduction

As population development is growing higher due to the increasing economic demands for more human resources, the criteria of an effective and productive mass transportation system are becoming more critical [1, 2]. People from rural to urban areas have increased the need for alternate transport infrastructure because of the availability of jobs in cities. In Malaysia, public transportation is expanding, particularly rail transit, which connects metropolitan areas to the city centre, which houses the country's key business and commercial sectors.

For example, the Mass Rapid Transit (MRT) construction in Klang Valley is rapidly growing. It offers the latest technology as compared to other types of transit trains such as Light Rapid Transit (LRT) and KL Monorail [3]. The first line was introduced back in 2016 and it starts from Sungai Buloh and ends in Semantan (SBK Line). This rapid progress has the potential to have a positive impact in the transportation sector, where it has been shown to minimise the risk of traffic accidents, pollution, and global warming [4, 5].

Even though the public is generally aware of the positive impact in MRT usage, the current ridership is low with just over 25 percent of the projected ridership of 400,000 passengers daily [6]. There could be many reasons due to this shortcoming, one being the perception that the services provided by public transportation authorities are insufficient [7, 8]. There have been many instances where the existing facilities are not as reliable as expected [9], frequent reports on train delays [10], and an increase in the number of crime incidents are reported in MRT stations [11].

While the service quality of public transportation in Malaysia, such as bus, LRT, and Monorail, has been thoroughly discussed, the influence of age on MRT service quality is rarely mentioned [1]. Hence, this study aims to demonstrate the impact of different age populations on the service quality of MRT in Malaysia. It is intended that this article will encourage stakeholders to improve the quality of MRT, so that the country can compete on a global scale.

2 Data Collection

The survey is developed by using past literature reviews from similar research on customers' satisfaction [12–14], and it contains three main sections. The first section is about the respondents' general data and travel behaviour, while the second section shows the data on customers' travel patterns. The third segment is the measurement of performance and the importance of the service quality attributes to customers according to the modified SERVQUAL dimensions. Respondents were asked to rate the attributes on a five-point Likert scale, with 1 = strong disagreement and 5 = strong agreement.

The necessity of selecting an optimal sample size demonstrates the relevance of choosing a sufficient sample size for minimising the cost of sampling errors. There

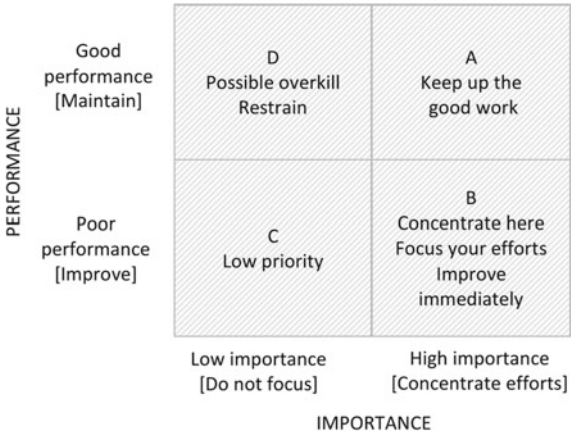

Fig. 1 Traditional IPA map [20]

are no clear recommendations for selecting sample sizes, according to Azmi Mat [15]. Based on anecdotal data, each survey required at least 100 to 200 respondents.

3 Methods of the Research

The systematic procedure for inspecting the data includes an analysis of the respondents' descriptive analysis and Cluster Analysis (CA) as it is recommended to use CA when dealing with nonnormal variables because respondents' demographic backgrounds and experiences can affect their assessments of performance and importance, and different demographic segments can produce substantially different results [16]. The approach taken in this article is the use of CA to group survey participants who share similar age range to observe their views towards services. Cronbach's alpha (a) was adopted for the study to perform a reliability test. The outcome is a number between 0 and 1, with 1 being the most reliable [17, 18]. If the value is less than 0.6, the dimension will not be evaluated [19]. Finally, the gap between passengers' needs and satisfaction with MRT service quality in the third segment of the questionnaire was analysed, and the values were plotted into Importance-Performance Analysis (IPA) charts [20] (Fig. 1).

4 Results and Discussion

In this section, the results were presented with the use of analyses including Reliability test, Descriptive analysis, and Importance-Performance Analysis (IPA).

Table 1 Reliability test results of each dimension

Dimension	Performance	Importance
	Cronbach's Alpha	Cronbach's Alpha
Reliability	0.777	0.904
Assurance	0.801	0.882
Tangibility	0.881	0.901
Empathy	0.863	0.899
Responsiveness	0.856	0.917
Safety & Security	0.727	0.845
Accessibility	0.819	0.903
Total	0.950	0.977

4.1 Reliability Test

Table 1 shows Cronbach's alpha values after analysing respondents' views regarding this study. The total number of respondents analysed is 137, after removing eight (8) respondents who have never used MRT's services. By observing the table, it indicates that the values obtained are relatively high and reliable.

4.2 Descriptive Analysis

In this part of the study, the distribution of results was analysed according to respondents' age group.

4.2.1 Section 1—Demographic analysis

Table 2 shows a summary of the demographic analysis of every cluster. These options were chosen to be analysed and further relate with their views on provided quality services in MRT using the IPA matrix.

4.2.2 Section 2—Travel Pattern

In Cluster 2, most of the respondents use MRT to Shop or Eating out (42%), followed by To or from work (36%). To or from work ranks first in trip purpose for Cluster 3 with 36%. Recreation/Social/Place of worship and Shopping or Eating outranks high up in Cluster 3 with 32% and 23% respectively. The remainder of the respondents in Cluster 3 chose others for their commute purpose.

Recreation/Social/Place of worship, shopping/eating out, and others rank high in Cluster 4 with the same percentage of 12%, while only 4% uses MRT as their work

Table 2 Demographic analysis of respondents

Question	Responses	Below 20 (C1)		21–35 (C2)		36–50 (C3)		51–60 (C4)		Above 60 (C5)	
		N	%	N	%	N	%	N	%	N	%
Gender specification	– Male	0	0	11	21	12	55	18	47	15	68
	– Female	2	100	42	79	10	45	20	53	7	32
Occupational status	– Student	2	100	34	64	0	0	0	0	0	0
	– Employed	0	0	19	36	18	82	20	53	2	9
	– Unemployed	0	0	0	0	2	9	3	8	3	14
	– Retired	0	0	0	0	2	9	15	39	17	77
	– Disabled	0	0	0	0	0	0	0	0	0	0
Monthly income	– Less than 1,000	1	50	34	64	1	5	7	18	4	18
	– 1,001–5,000	1	50	15	28	8	36	10	26	9	41
	– 5,001–10,000	0	0	4	8	6	27	12	32	5	23
	– 10,001 and more	0	0	0	0	7	32	9	24	4	18

* N = Frequency, % = Percentage

commute. In the last cluster (C5), where most of these respondents were retired, they mostly use the MRT to connect to their Recreation/Social/Place of worship location (32%). While analysing these figures, it can be concluded that most of the respondents use MRT to Shop/Eat out.

Next, 45% of Cluster 2 respondents chose MRT to travel as their Preference, while 34% and 21% have Economy and Need, consequently as their reason. More than half of users in Cluster 3 opts for MRT as their Preference. Another 18% uses MRT for its economic reason, and the remainder uses MRT as a necessity. Respondents in Clusters 4 and 5 have a similar answering pattern. Most of them chose MRT because of their preferences followed by Economy, and a tiny percentage of respondents use MRT because they need to.

Lastly, the ranking for the frequency of using MRT is similar in most clusters. A larger proportion of respondents in each cluster only uses the MRT Once in a while. During weekdays, where people usually commute to work, 13% of Cluster 2, 14% of Cluster 3 and 4 and, 5% of Cluster 5 respondents use the MRT. As for the weekends, only a small percentage of respondents use the MRT, with one (1) person in Cluster 1, Cluster 3, and Cluster 4. The results show that respondents hardly use the MRT as their first option to commute (Table 3).

Table 3 Travel pattern of respondents

Question	Responses	Below 20 (C1)		21–35 (C2)		36–50 (C3)		51–60 (C4)		Above 60 (C5)	
		N	%	N	%	N	%	N	%	N	%
Trip purpose	– To or from work	0	0	19	36	8	36	2	4	4	18
	– Shopping/Eating out	0	0	22	42	5	23	12	32	5	23
	– Recre-ation/Social/Place of worship	1	50	6	11	7	32	12	32	7	32
	– School	1	50	4	8	0	0	0	0	0	0
	– Medical/Dental	0	0	0	0	0	0	0	0	0	0
	– Other	0	0	2	4	2	9	12	32	6	27
Reason of using MRT	– Need	0	0	11	21	3	14	3	8	1	5
	– Economy	1	50	18	34	4	18	11	29	4	18
	– Preference	1	50	24	45	15	68	24	63	17	77
Travel frequency	– Once in a while	1	50	27	51	15	68	28	74	12	54
	– Occasionally	0	0	17	32	2	9	5	13	5	23
	– Weekends	0	0	1	2	2	9	2	5	2	9
	– Weekdays	0	0	7	13	3	14	2	5	3	14
	– Every day	1	50	1	2	0	0	1	3	0	0

* N = Frequency, % = Percentage

4.3 Importance-Performance Analysis (IPA) of Each Cluster

The IPA results are tabulated and graphed for each cluster, which is separated by age range. Cluster 2 was used as an example because this age group has the most significant number of respondents.

4.3.1 21–35 (Cluster 2)

Individuals in this category has the greatest number of respondents. Table 4 indicates the average performance and importance as well as the gap between those two factors for each dimension, while Fig. 2 shows the IPA results for Cluster 2. For this set of respondents, empathy and safety and security dimension is located in quadrant A "Keep up the good work", meaning that they are very satisfied with the performance as weighing to its importance. Meanwhile, there are two dimension that lie in quadrant C "Low priority", namely assurance and responsiveness. This demonstrates that most customers are unhappy with these characteristics but do not consider they are significant. These qualities also need to be improved, but only after the qualities in quadrant B have been improved (concentrate here), where in this case the dimension accessibility is highlighted.

Table 4 Mean performance and mean importance of Cluster 2

Attributes	Mean performance	Mean importance	Gap
Reliability	4.12	4.37	−0.25
Assurance	3.78	4.31	−0.53
Tangibles	4.03	4.36	−0.34
Empathy	4.22	4.41	−0.18
Responsiveness	3.66	4.25	−0.59
Safety & Security	4.08	4.48	−0.41
Accessibility	3.97	4.46	−0.49
Total	3.98	4.38	–

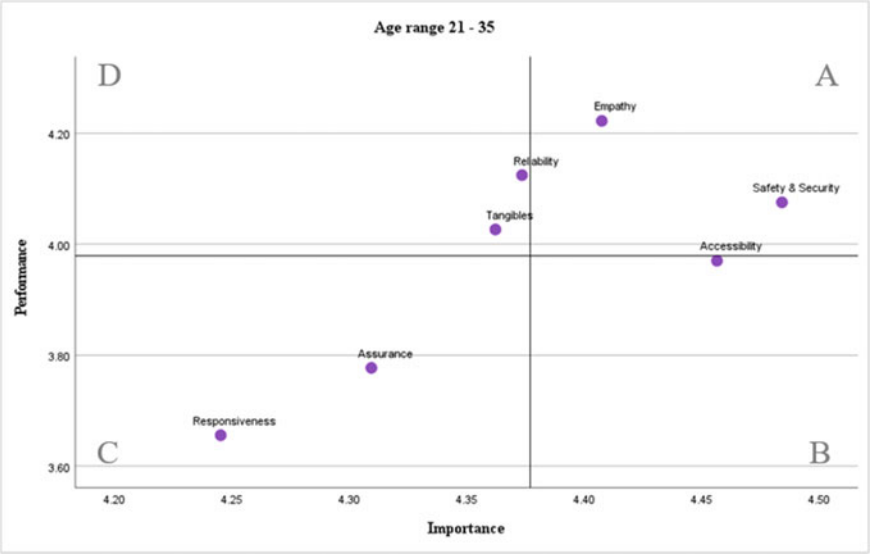

Fig. 2 IPA results for cluster 2

5 Conclusion

The objective was to acquire information on respondents' satisfaction in MRT services by segmenting them according to their age groups. It is revealed that the dimension that affects the perception of customers varied significantly. This objective contradicts the study made by C.Morton [21]. The results are shown in this study that the young (35 and under) and elderly generation (above 60) perceived the tangibility dimension has the most negligible impact on attracting customers. Nevertheless, the mid-range age group (36–60) viewed the tangibility dimension as vital and good performance. Despite the variation, some dimensions have a similar perspective in

all ages. For example, most age groups are satisfied with the factors in the safety and security dimension. Therefore, it is suggested that stakeholders and authorities maintain or expand the budget allocated in the safety and security dimension.

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