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The Influence of Service Quality and Train Comfort towards Passengers' Satisfaction: A Case Study of KTMB ETS

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Abstract: Aim of this study is to identify the most significant service quality and train comfort factors that influence passenger satisfaction and to determine the current level of train comforts and service quality of KTMB ETS railway transport. The study adopted SERVQUAL model to evaluate rail service quality with focusing on five dimensions namely tangible, responsiveness, assurance, reliability, and empathy. The study had been measured the comfort level of ETS from the four dimensions, noise, vibration, coach design layout and speed. Nine hypotheses were tested empirically. A total of 204 valid data has been gathered through distribution of online form. Descriptive analysis and Spearman correlation were performed and analyzed. The results show that all hypotheses were accepted, and dimensions of SERVQUAL and train comfort have positive relationship with passenger satisfaction. In terms of service quality, reliability is the most significant factor that influences the passengers' satisfaction while the dimension of train comfort is vibration. The overall passenger satisfaction is high that ETS has showed the high current level of performance. This study would be beneficial to future study especially on more details on investigate the service quality and train comfort on railway transport system and provide the large improvement opportunity to the future researchers in determining the factors that influence the passengers' satisfaction especially on train comfort which lack of the current exist information. The finding of the study is limited to the context of ETS services under KTMB operation. The study could be expending to other EMU services by another operator using the developed instrument.

Keywords: Electric Train Service (ETS), Passengers' satisfaction, Service quality and train comfort

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1. Introduction

1.1 Research Background

There are various railway operators face the same issues and challenges when it comes to satisfy the customer's wants and demand while maintaining high performance. The railway service providers must act and figure out the new plan towards effectiveness strategies of business that can be implemented into the service sector (Kotler *et al*., 2018). Urban rail transit operations industries in Malaysia still lack an effective assessment instrument to define the scarcity factors in their product services, which is a crucial requirement for developing services, increasing riding, and introducing a sustainable transport strategy. Indeed, excellent quality of service and facilities comfort will improve customer satisfaction, customer loyalty, which contributes to consumer retention and encouraging recommendations (Suki, 2014). There is adequate research on railway service quality in developed countries and developing countries (Niu *et al*., 2019). The limitations exist regard to the investigation of service quality or train comfort that affect the passengers' satisfaction on the train industry especially monorail, commuter rail, mass rapid transit (MRT) and so on but only lack of the study on ETS. To fill this gap, this study used the SERVQUAL model with a combination of transport comfort models to evaluate the essential service quality dimensions and comfort level of ETS that affect to passengers' customer satisfaction in Malaysia. KTMB ETS was selected as a focus in this research due to cope with rising average daily ridership demand of KTMB ETS passengers and provide better potential services including cargo activities. The common issue discussed in previous studies often related to passenger satisfaction towards passenger loyalty; service quality in the transport system; and the riding comfort for railway industries. Hence, this study focuses on those significant issues that combine the service quality and train comfort as factors on influencing passenger satisfaction.

1.2 Problem Statement

There are many consumer complaints about KTMB ETS. The main reasons for the problems have been complaints regarding service quality and train comfort (Isai, 2020). The services provided by KTMB ETS did not satisfy the passengers as well; especially the punctuality and seat comfort are the most important complaints. Facilities of ETS as the tangibility provided by KTMB should be investigated in affecting passengers' satisfaction. Furthermore, there are only 78% of passengers satisfied railway service quality provided by KTMB were punctual while not reaching 90% for KPI set by top level management. In addition, the main problem of KTMB ETS delays often linked to the attitude and behaviors of drivers which eventually affect the performance of the railway service. Thus, this research will focus on the responsiveness and assurance of the staff. In addition, train comfort becomes a significant issue to have a better comfortable environment. According to Nordin *et al*. (2016), the factors of train comfort that have the potential to influence the passengers' satisfaction are noise, vibration, coach design layout, and speed. These are the major dimensions that will negatively affect the passengers' satisfaction. Furthermore, the serious problem of vibration and noise of the train will lead to difficultly performing the common activities. A Poor and discomfort environment may have the possibility to bring a negative effect on physical and mental health. When the level of discomfort is higher than the passengers' acceptable level, passenger's perceived choice of transportation modes is often will not be public transport (Imre & Çelebi, 2017).

1.3 Research Questions

(i) What is the most significant service quality factors influence passenger satisfaction?
(ii) Which train comfort factors influence passenger satisfaction on KTMB ETS railway transport?
(iii) What is the current level of train comforts and service quality of KTMB ETS railway transport?

1.4 Research Questions

(i) To identify the most significant service quality factors that influence passenger satisfaction
(ii) To investigate train comfort factors that influence passenger satisfaction on KTMB ETS railway transport.
(iii) To determine the current level of train comforts and service quality of KTMB ETS railway transport.

1.5 Scope of the Study

The study was conducted on the main rail operator in West Malaysia, Kereta Tanah Melayu Bersepadu (KTMB). In this study, the researcher focused on the expected 328 passengers of KTM Electric Train Service (ETS) as the respondents for the research. The selection of the respondents in this research is based on the ETS passengers who have experienced use to service provided by KTMB.

1.6 Significance of the Study

The results of this research redounded the potential advantages of the Malaysian railway industry especially KTMB in considering the aspect of service quality and train comfort to satisfy customers 'needs and wants. It significantly provided the benefits of better service to rail transport passengers. Besides, it also clarifies the opportunity to service quality and train comfort improvement for rail operators in which this study contributes to the satisfaction level of passengers to able KTMB easily to know the factors affecting passenger's satisfaction and enhance their competitive advantages. Through increasing the service quality and train comfort of ETS, also benefits the passenger to have a good experience to enhance the passengers 'satisfaction when using ETS. Lastly, it can be used by other rail operators to simulate their ridership and also for future research as a guide for future use.

2. Literature Review

2.1 Service Quality and SERVUAL Model Dimensions

Service quality of the public transportation framework is crucial to improve efficiency, pick up benefits and increment passengers' loyalty (Awasthi *et al*., 2011). Service quality could be enhanced and, as a result, the usage of services could be expanded by reviewing passengers experience on trains and stations and undertaking passenger satisfaction surveys on their attitudes and preferences. Developing an awareness of passengers' service demands is necessary to achieve more ridership and a modal change in favor of rail transport. According to Parasuraman *et al*. (1988), the previous research had shown the rail transport system service quality factors of the SERVQUAL model have the potential on influencing passengers' satisfaction. Among the main dimensions are tangibility, reliability, responsiveness, assurance, and empathy.

(a) Tangibility

Tangible is the physical evidence of the service. In term of railway transports context, this is an element that represents the appearance of the personnel (on-train workers), physical facilities (train coaches), equipment associated with the service (train ticket, receipt), decorations and business hours the tools and equipment used to provide the service including other passengers in the service facility. Clarity of information given in timetables and station, cleanliness of train coaches, and station appearance send high-quality experiences to their expected passengers (Randheer, 2011) and attractive ambiance is seen as the effect of tangibility on passenger satisfaction (Zhang *et al*., 2016). Thus, based on the above arguments, this leads to the development of the following hypothesis:

H1- Tangibility has a significant positive impact on passenger satisfaction.

(b) Reliability

According to Saputra (2010), reliability can be described as the ability to provide the services promised correctly and the willingness to be trusted, particularly in supplying services on time, in the same manner as agreed without making any errors at any duration in delivering the services. The rail operator is in a role to deliver service to the passenger as planned; to be efficient in managing passenger care issues; to provide service at the agreed time and to hold passengers informed about when services should be delivered. Maintaining an error-free record and punctuality are a standard of reliability in terms of railway service quality which has a significant effect on passengers' satisfaction (Pakurár, 2019). According to Eboli and Mazzulla (2015) showed the reliability of a transport system is very important in affecting customers' perception which if the train is delayed or unpunctual, it leads to dissatisfaction with a passenger. Therefore, based on the above arguments, the researcher developed the following hypothesis:

H2- Reliability has a significant positive impact on passenger satisfaction.

(c) Responsiveness

Responsiveness means a willingness and readiness on the part of the employee or the worker to help customers and at the same time to offer excellent, attractive, and prompt service to customers. This aspect includes the timely and responsive handling of passengers' requests, questions, and complaints (Jomnonkwao *et al*., 2020). The train workers and the train drivers are expected to treat themselves in a polite and well-disposed way towards the passengers, as opposed to indicating frustration or rudeness to the passengers (Fang *et al*., 2019). The responsiveness of the railway sector is expected to have a strong association with passengers' satisfaction. The research proposes the following hypothesis:

H3- Responsiveness has a significant positive impact on passenger satisfaction.

(d) Assurance

Every rail operator is responsible to provide safe and reliable services to the passenger and societies; assurance awareness plays a significant role (Luke & Heyns, 2020). Assurance defines as the awareness and courtesy of workers and their ability to express faith and trust. It also requires integrity, courtesy, trust, and defense. It also means keeping consumers updated in their native language and responding to them, regardless of their educational qualification, nationality, and age. When a company provides the service is uncertain, that will directly affect the choice of the passenger as the risk is higher to get an unsatisfied outcome. There is a significant positive relationship between assurance and passenger satisfaction (Parasuraman *et al*., 1988). Based on the above discussion, the following hypothesis has reached:

H4- Assurance has a significant positive impact on passenger satisfaction.

(e) Empathy

Empathy concerns caring and provision of individualized attention to passengers by personnel of the rail transports service (Zeithaml *et al*., 2006). According to Bahari *et al*. (2017), empathy is the practice of viewing things from the perspective of the consumer, and it is a vital aspect of delivering the best customer service. To develop understanding, the service provided operator management will try to consider passenger desires and expectations and take action to satisfy them (Isa *et al*., 2020). Research has shown that there is a substantial impact on passenger loyalty due to flexible working hours, individualized focus, a deeper perception of the passenger's particular needs in the service

industry, and the empathic aspect, both of which play a key role in passenger satisfaction. According to the above reviews, the study proposed the following hypothesis:

H5- Empathy has a significant positive impact on passenger satisfaction.

2.2 Train Comfort

Ride comfort is one of the key features of the assessment of the performance of railway vehicles. Riding quality and train comfort, along with safety, track stability, and train curve- negotiation capacity, are the top standards for determining the dynamic performance of the railway vehicle (Dumitriu & Leu, 2018). To obtain the passenger comfort parameters accurately and easily, various other aspects influencing passengers' comfort are mentioned in the literature (Nordin *et al*., 2016): noise, vibration, design layout, and speed. This field study found out those factors that affect passengers experienced to be more comfortable, which means better facilities. According to Nordin *et al*. (2016), the train comfort factors have the potential on influencing passengers' satisfaction. The item measurement for train comfort including four dimensions which are noise, vibration, design layout, and speed.

(a) Noise

According to Maillard *et al*. (2019), the high-speed off-road noise generated by the rail network is considered the combination of two major source families: radiation of the vehicle and the track due to the excitement of the contact wheel or rail patch. Such motion is commonly referred to as rolling noise and aero acoustic sources produced by turbulence around the structure of the vehicle that is called the aerodynamic noise. Engine noise is one of the key contributors to customers' satisfaction as well as a significant feature considered during the design phase of IC engines (Zouani & Hanim, 2016). The impacts of train noise are not only led to poor physical and mental health but also cause the communication among passengers are constraint especially speaking and listening (AlKheder *et al*., 2019). The researcher hypothesized a direct influence of noise on passenger satisfaction to use ETS as follows:

H6- Noise of ETS has a significant positive impact on passenger satisfaction.

(b) Vibration

Vibrations relevant to train comfort will be regarded at the outset of the design process (Yoo *et al*., 2005). In fact, passengers' satisfaction is primarily influenced by vibration and noise generated from the floor and the bench. In addition, the degree of vibration is critical when it comes to running safely on freight wagons. The training comfort in a passenger coach and the vibration in a freight car was evaluated on customer perceived to identify the factor affecting passengers' satisfaction (Nassiri *et al*., 2011). Moreover, reading and writing by hand are among the most frequent activities while riding by train. The complexity of these tasks will be difficult to perform and enhanced by the motion and vibration caused by the bogie, the train body, and the seats (Hancock *et al*., 2017). Based on the literature above, the following hypothesis has developed:

H7- Vibration of ETS has a significant positive impact on passenger satisfaction.

(c) Design Layout

The train coaches' capacity is an important factor to influence the train schedule quality (Qi *et al*., 2016). The design of a comfortable seat ergonomically will either be the most significant factor, since passengers spend much of their time seated (Cuenca, 2020). Several studies on ride comfort and seat comfort related to ergonomics developed in the past to enhance customer satisfaction (Lee *et al*., 2009). Passenger perception of comfort is not only affected by this varying sensitivity with frequency

but also depends on the seat comfort and design layout of the coach. Based on the previous literature, this brings to the development of the following hypothesis:

H8- Design layout of ETS has a significant positive impact on passenger satisfaction.

(d) Speed

Higher speeds of train may lead to enhancement of vibration and reduced train comfort for passengers (Liu *et al*., 2019). As train speeds rise, the intensity of rail-generated noise and vibration is usually higher, with significant train environmental concerns (Krylov, 2001). Poor environmental issues will directly lead to a drop in customer satisfaction levels. A mixture of higher vehicle speeds and an unimproved rail line can have a negative impact on passenger comfort (Orvnäs *et al*., 2010). Besides, when the high speed brings noise and vibration on the train, it has negative effects on safety behavior and emotional of passengers to make them feel uncomfortable. Based on the review of many works of literature, the hypothesis in this study has developed:

H9- Speed has of ETS has a significant positive impact on passenger satisfaction.

2.3 Passengers' Satisfaction Index

Passengers' satisfaction is an overall measure of the customer's purchasing experience, which may create a satisfied or disappointed feeling. According to Painoli and Kukreti (2020), measuring the overall satisfaction of the passengers inside the train, the service quality and train comfort factors with respect to the service provided of ETS should be designed based on the previous research. Passengers Satisfaction Index is a measure of the level of service based on the perspective of passengers on train service and comfort aspects expressed in terms of the value of the rate of service relative to the preferences of passengers expressed in terms of the satisfaction rate. Passengers Satisfaction Index based on decisions expressed on a numerical scale. Hence, it allows the index to be easily calculated by the researchers.

2.4 Conceptual Framework

A conceptual framework as in Figure 1 has been developed to study the relationship between the variables. There are two main independent variables which are service quality and train comfort. The service quality can be classified into five sub-items namely: tangibility, reliability, responsiveness, empathy, and assurance. While the train comfort can be categorized into four sub-items which are noise, vibration, design layout, and speed. The dependent variable is passenger satisfaction.

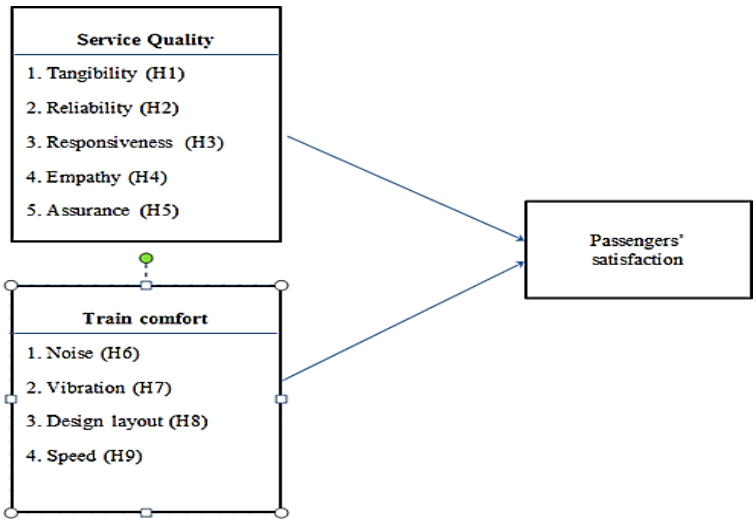

Figure 1: Conceptual framework

3. Research Methodology

3.1 Research Design

The quantitative study approach is used because it allows the generalization of numerical data that can be changed into useful statistical data (DeFranzo, 2011). This design gives information on the correlation research that addressed the research questions and objectives. The researcher used an online survey instrument known as Google Form as a medium of distributing questionnaires to the targeted respondents as it is more cost-effective and time-saving.

3.2 Population, Sampling and Data Collection Techniques

Based on statistics from the Rail Transport Ministry of Transport 2018, there was a 3.93 million passenger population in Malaysia. The targeted population would be the ETS passengers. The size of the sample was determined by using the G-Power analysis to determine the sample size from the pilot test and to obtain the appropriate sample size for this research. The results show that the effect size (d) is below 0.5 which can be considered as small effect size (Sullivan & Feinn, 2012). Hence, a total sample size of n=328 indicates that the sample size of data collection is sufficient for this study. Convenience sampling was used because the sampling is convenient and has been helpful for pilot studies and for the generation of hypotheses. Data was collected through Google Form. This is because the online questionnaire is easy and quick which allows the researcher to get the required data faster and more effective compared to paper-based distribution (Dewaele, 2018).

3.3 Construct Measurement

The questionnaire is divided into four parts; parts A, B, C, and D as summarized in Table 1. The questions of Part B, Part C, and Part D were given in the form of an ordinal measurement where 7-point Likert scales were used because it provides respondents to further nuance their responses. (1= completely disagree, 2= strongly disagree, 3= Disagree, 4= Neutral, 5= Agree, 6= strongly agree, 7= completely agree).

Table 1: Construct measurement

Section	Variables	Measurement	Scale of measurement

Section	Variables	Measurement	Scale of measurement
A: Demographic	Gender	Nominal	-
	Age	Ordinal	-
	Race	Nominal	-
	Education	Nominal	-
	Experience to use ETS.	Nominal	-
	Frequency of using ETS per week.	Ordinal	-
Independent variables			
B: Service quality	Tangibility	Ordinal	7-points likert scale
	Reliability	Ordinal	7-points likert scale
	Responsiveness	Ordinal	7-points likert scale
	Empathy	Ordinal	7-points likert scale
	Assurance	Ordinal	7-points likert scale
C. Train comfort	Noise	Ordinal	7-points likert scale
	Vibration	Ordinal	7-points likert scale
	Design layout	Ordinal	7-points likert scale
	Speed	Ordinal	7-points likert scale
Dependent variable			
D. Passengers' satisfaction	Environment	Ordinal	7-points likert scale
	Personnel service	Ordinal	7-points likert scale
	Service	Ordinal	7-points likert scale
	Tangible products	Ordinal	7-points likert scale
	Value	Ordinal	7-points likert scale

3.4 Pilot Test

A total of 30 respondents has participated in the pilot test and showed an excellent reliability result. There was a total number of 41 items tested in the reliability test and it had been summarized in Table 2. The overall result of Cronbach's Alpha (α) value obtained is 0.972, indicating that was deemed as excellent and there was no item had been deleted.

Table 2: Overall reliability test for pilot study

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.972	0.973	41

4. Results and Discussion

4.1 Survey Response Rate

The G-Power analysis is used to estimate the efficiency of the sample size, the minimum difference of respondents that would be considered important by researchers. The effect size calculation is 0.2251670 if the sample size is 204. According to Cohen (1988), an effect size of more than 0.2 can be considered as a small effect size which indicates the sample size is sufficient for this research in a small group population. The summary of the survey response rate is depicted in Table 3.

Table 3: Summary if survey response rate

Population	Sample size	Set of online questionnaires distributed	Valid questionnaires returned	Overall percentage
3.93 million	328	328	204	62.2%

4.2 Demographic Analysis

Table 4 summarized the overall 214 respondent's demographic information:

Table 4: Overall demographic information

Demographic	Classification	Frequency (N)	Percentage (%)
Gender	Male	117	57.4
	Female	85	41.7
	Prefer not to say	2	1.0
Age	below 21 years old	5	2.5
	21-30 years old	156	76.5
	31-40 years old	30	14.7
	41-50 years old	11	5.4
	51-60 years old	2	1.0
	61 years old and above	0	0
Nationality	Malaysian	202	99
	Other	2	1.0
Race	Malay	102	50
	Chinese	74	36.3
	Indian	28	13.7
	Other	0	0
Marital status	Single	175	85.8
	Engaged	3	1.5
	Married	26	12.7
Education level	SPM	15	7.4
	Diploma	11	5.4
	Degree	169	82.8
	Master	6	2.9
	PHD	3	1.5
	Other	0	0
Experience to use ETS.	Yes	204	100
	No	0	0
Frequency of using ETS per year.	0-100 times	108	52.9
	101-200 times	61	29.9
	201-300 times	26	12.7
	301 times and more	9	4.4

4.3 Reliability Test

Table 5 demonstrated the Cronbach's Alpha value for the overall variables of the study. In summary, the results have an acceptable, high, good, and excellent level of reliability which shows that the survey can be undertaken by the researcher.

Table 5: Overall reliability test result

Variables	Cronbach's Alpha
Service quality	0.951
Tangibility	0.740
Reliability	0.808
Responsiveness	0.839
Empathy	0.821
Assurance	0.806
Train comfort	0.945
Noise	0.814
Vibration	0.796
Design layout	0.825
Speed	0.839
Passenger satisfaction	0.894

4.4 Normality Test

A rule of thumb of the normality of data distribution can be obtained if Skewness's z-value is somewhere between -1.96 to +1.96 as the small sample size is below 250 (Cramer, 2011). As consequence, Z-value is obtained from the statistic divided by the standard error. According to Table 5, the Z-value of skewness ranged from -2.211 to -4.865 which indicated the data is not normal. Besides, the results of the Q-Q plot shows that the overall data was also abnormal as certain points deviated from the straight line.

Table 6: Normality test

	Skewness		
	Statistic	Std. Error	Z-Value
Tangibility	-0.376	0.170	-2.211
Reliability	-0.563	0.170	-3.311
Responsiveness	-0.576	0.170	-3.388
Empathy	-0.523	0.170	-3.076
Assurance	-0.651	0.170	-3.829
Noise	-0.827	0.170	-4.865
Vibration	-0.525	0.170	-3.088
Design layout	-0.630	0.170	-3.706
Speed	-0.814	0.170	-4.788
Passengers' satisfaction	-0.536	0.170	-3.153

4.5 Descriptive Analysis

Table 7 summarized the overall results of the descriptive analysis of the study. As for service quality dimensions, assurance was the lowest mean for each dimension which was 4.6936 with the highest standard deviation of 0.99993 while, reliability was showed 4.9059 which is the highest mean with the standard deviation of 0.97038. Besides, the dimensions of train comfort in this study show that vibration has an outstanding value of 4.8002 with a standard deviation of 1.01266. Other than that, the lowest value among train comfort dimensions is scored by the speed with the standard deviation of 1.07474 and a mean of 4.6936. Moreover, the variables of passenger satisfaction such as environment, personnel service, service, tangible product, and value. The study shows that the highest mean value (5.0270) was a tangible product with a standard deviation of 1.00883. Other dimensions of passenger satisfaction also showed a high mean value with 4.9975, 4.8922, 4.9412, and 4.9436 represent to the environment, personnel service, service, and value.

Table 7: Descriptive analysis results

	N	Mean	Std. Deviation	Extent
Tangibility	204	4.8762	0.94800	Moderate
Reliability	204	4.9059	0.97038	Moderate
Responsiveness	204	4.8667	0.95756	Moderate
Empathy	204	4.8409	0.98386	Moderate
Assurance	204	4.8272	0.99993	Moderate
Noise	204	4.7243	1.03849	Moderate
Vibration	204	4.8002	1.01266	Moderate
Design Layout	204	4.7737	1.05736	Moderate
Speed	204	4.6936	1.07474	Moderate
Environment	204	4.9975	1.16232	High
Personnel Service	204	4.8922	1.08079	Moderate
Service	204	4.9412	0.98084	Moderate
Tangible Product	204	5.0270	1.00883	High
Value	204	4.9436	1.01005	Moderate

4.6 Spearman's Correlation

(a) Service Quality Towards Passengers' Satisfaction

Based on the results, the correlation of all relationships between the 5 dimensions of service quality towards passengers' satisfaction was significant (p-value<0.01 between the data sets. The test shows that empathy had the strongest relationship (rs=0.732) with passengers' satisfaction. While the second and third stronger relationships were responsiveness and assurance with the correlation coefficient values of 0.721 and 0.702. Moreover, the lowest correlation coefficient value (rs=0.575) was tangibility, and the reliability was the second-lowest value (rs= 0.649) with moderate correlation.

(b) Train Comfort Towards Passengers' Satisfaction

From the test, the relationship between train comfort including noise, vibration, design layout, and speed towards passengers' satisfaction was significant (p-value<0.01). The highest correlation coefficient value was vibration (rs=0.740), while the second-highest was design layout (rs=0.723). Noise and speed had a moderate correlation of relationship with the correlation coefficient value were 0.617 and 0.665. In summary, vibration and design layout showed that a strong correlation with passenger satisfaction thus noise and speed displayed which had a moderate relationship of the strength of correlation.

4.7 Summary Result for Hypotheses

Table 8 summarized the overall results for all the research hypotheses:

Table 8: Summary result for all hypotheses

Group	Hypotheses	Spearman Correlation (rs)	Interpretation	Inference
Service quality	H1: Tangibility > Passenger satisfaction	0.575	Moderate	Accepted
	H2: Reliability > Passenger satisfaction	0.649	Moderate	Accepted
	H3: Responsiveness > Passenger satisfaction	0.721	Strong	Accepted
	H4: Empathy > Passenger satisfaction	0.732	Strong	Accepted
	H5: Assurance > Passenger satisfaction	0.702	Strong	Accepted
Train comfort	H6: Noise > Passenger satisfaction	0.617	Moderate	Accepted
	H7: Vibration > Passenger satisfaction	0.740	Strong	Accepted
	H8: Design layout > Passenger satisfaction	0.723	Strong	Accepted
	H9: Speed > Passenger satisfaction	0.665	Moderate	Accepted

4.8 Discussions

(a) Objective 1

Objective 1 seeks to identify the most significant service quality factors that influence passenger satisfaction. The study shows that reliability gained the maximum mean value of 4.9059, while the minimum mean value was 4.8272 which is assurance. Furthermore, the other factors including tangibility, responsiveness, and empathy had a mean value of 4.8762, 4.8667, and 4.8272, respectively. Besides that, the results of Spearman's correlation showed the p-value of all the variables of service quality were 0.000 which is less than 0.01, thus five hypotheses were accepted. In addition, the variables of tangibility and reliability had a moderate correlation coefficient value which is the value between 0.40-0.69. At the same time, responsiveness, empathy, and assurance had shown a strong correlation coefficient value (rs=0.70-0.89). The findings from Kusonwattana and Liangrokapart (2020) research show the significance for each dimension as the rank of important top dimensions was responsiveness. It can prove that the result of this research also has the same finding

which responsiveness is the stronger relationship among those factors. As claimed by the results, KTMB ETS can improve the reliability of the service quality to increase passenger satisfaction. The workers of ETS should be trained with basic hazard awareness.

(b) Objective 2

The second research objective aims to investigate train comfort factors that influence passenger satisfaction on KTMB ETS railway transport. There are four factors with 16 items in Part B related to the train comfort of ETS in the questionnaire including noise, vibration, design layout, and speed. Based on the findings, the most significant factor of train comfort is vibration which gained the outstanding mean value of 4.8002, while the minimum mean value was 4.6936 which is speed. The other factors including noise and design layout had a mean value of 4.7243 and 4.7737, respectively. Furthermore, the results of Spearman's correlation showed that all variables have a p-value of 0.000 which is less than 0.01, thus four hypotheses were accepted. Other than that, the variables of noise and speed had a moderate correlation coefficient value with the value between 0.40-0.69 while vibration and design layout had shown a strong correlation coefficient value (rs=0.70-0.89). The vibration of the train is one of the factors that have been studied by many previous researchers. Freight trains produce vibration, and little is reported about the effect of vibration on human sleep as the high frequency of vibration and the noise generated by vibration. For example, the loud noise of ETS has been linked to negative impacts on passengers such as health outcomes, poor mental health, and irritability. Besides that, the previous studied stated that some of the passengers are feeling unwell and discomfort such as headache or shortness of breath. ETS seemed that many of its current passengers are unhappy with the vibrations and most of the passengers mention that the vibration affects their comfortability.

(c) Objective 3

Objective 3 seeks to examine the current level of train comfort and service quality of ETS based on perceptions of passengers. Mat *et al*. (2019) has deliberated that SERVQUAL dimensions were significantly related to passengers' satisfaction thus showed 65.8% of the variance in the perceived passenger satisfaction toward ETS. The findings from Spearman's correlation test showed that the dimensions of each variable have a positive relationship to passenger satisfaction. The descriptive analysis also highlighted that there are high central of a tendency among passenger satisfaction in term of environment, personnel service, service, tangible product, and value. The mean value of passenger satisfaction to measure the current level based on the perspective of passengers is between 4.87 and 5.03 out of 7. Hence, the current level of train comfort and service quality of ETS rail transport can be assumed as high by the passengers. However, one of the statistics results from the previous study showed the current level of train comfort and service quality is high and acceptable by passengers, but it is quite not enough to provide better service to all passengers (Ngoc *et al*., 2017). The research found clear relationships between those dimensions which are noise, vibration, design layout, and speed are significantly positive relationship that indicated attention to design for comfort was effective. Therefore, the present study indicates that there is a need for better time control of trains and for the preparation of railway personnel to be more sensitive to the requirements and needs of passengers.

5. Conclusion

The three objectives have been achieved and the nine hypotheses developed were accepted through this study. The passengers' satisfaction has a significant strong relationship with H2 (reliability), H3 (responsiveness), H4 (empathy), H7 (vibration), and H8 (design layout). Therefore, the findings of this study could help the KTMB to improve their train comfort. The findings were also aligned with the complaints and previous findings. This research used the SERVQUAL model that is

aligned with previous theories which are useful to evaluate the service quality of the rail transport system. The study showed that the relation between the SERVQUAL model and the level of satisfaction can be determined by the level of overall service quality and train comfort. Lastly, ETS should be evaluated in a wider context, not only focusing on the service quality and train comfort dimensions that were used in the current study.

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References

AlKheder, S., Abdullah, W., Al-Rukaibi, F., & Al Sayegh, H. (2019). Urban noise impact model for Kuwait new railway: impact study. International Journal of Environmental Science and Technology, 17(2), 755–764. https://doi.org/10.1007/s13762-019-02513-1

Amman, S., Meier, R., Mouch, T., & Gu, P. (2005). A Survey of Sound and Vibration Interaction. SAE Technical Paper Series. doi:10.4271/2005-01-2472

Awasthi, A., Chauhan, S. S., Omrani, H., & Panahi, A. (2011). A hybrid approach based on SERVQUAL and fuzzy TOPSIS for evaluating transportation service quality. Computers & Industrial Engineering, 61(3), 637-646. doi:10.1016/j.cie.2011.04.019

Bahari, N. A. S., Rosli, S., Suliana, A., Maniam, V., & Aziz, Z. (2017). Service quality on train services in Kuala Lumpur. University Utara Malaysia.

Cuenca García, R. (2020). Design of an ecological modular table for the improvement of train passenger comfort (Doctoral dissertation).

Czepiel, J. A. (1990). Service encounters and service relationships: Implications for research. Journal of Business Research, 20(1), 13-21. doi:10.1016/0148-2963(90)90038-f

DeFranzo, S. E. (2011). What's the difference between qualitative and quantitative research. Retrieved from SnapSurveys: https://www. snapsurveys. com/blog/qualitative-vs-quantitative-research.

Dewaele, J. M. (2018). Online questionnaires. In The Palgrave handbook of applied linguistics research methodology (pp. 269-286). Palgrave Macmillan, London.

Dumitriu, M., & Leu, M. (2018). Correlation between Ride Comfort Index and Sperling's Index for Evaluation Ride Comfort in Railway Vehicles. Applied Mechanics and Materials, 880, 201-206. doi:10.4028/www.scientific.net/amm.880.201

Fairley, T. E., & Griffin, M. J. (1986). A Test Method for the Prediction of Seat Transmissibility. SAE Technical Paper Series. doi:10.4271/860046

Fang, X., Cao, C., Chen, Z., Chen, W., Ni, L., Ji, Z., & Gan, J. (2019). Using mixed methods to design service quality evaluation indicator system of railway container multimodal transport. Science Progress, 103(1), 003685041989049. https://doi.org/10.1177/0036850419890491

Hancock, R., Mansfield, N. J., Goel, V. K., & Narayanamoorthy, R. (2017, June). Influence of vibration on workload while reading and writing on Indian trains. In Contemporary Ergonomics 2008: Proceedings of the International Conference on Contemporary Ergonomics (CE2008), 1-3 April 2008, Nottingham, UK (p. 40). CRC Press.

Imre, Ş, & Çelebi, D. (2017). Measuring Comfort in Public Transport: A case study for İstanbul. Transportation Research Procedia, 25, 2441-2449. doi:10.1016/j.trpro.2017.05.261

Isa, N. A. M., Ghaus, H., Hamid, N. A., & Tan, P.-L. (2020). Key drivers of passengers' overall satisfaction at klia2 terminal. Journal of Air Transport Management, 87, 101859.
https://doi.org/10.1016/j.jairtraman.2020.101859

Isai, K. I. A., Kadiresan, V., Jayabalan, N., Makhbul, Z. K. M., Ibrahim, M. N. A., Ching, H. S., &
Ramalingam, S. (2020). Customer Satisfaction and Commuter Service: An Evaluation of Intercity Keretapi Tanah Melayu Berhad (KTMB) Performance Delivery. Malaysian Journal of Social Sciences and Humanities (MJSSH), 5(5), 95-124.

Johanson, G. A., & Brooks, G. P. (2019). Initial Scale Development: Sample Size for Pilot Studies. Educational and Psychological Measurement, 70(3), 394–400. https://doi.org/10.1177/0013164409355692

Jomnonkwao, S., Champahom, T., & Ratanavaraha, V. (2020). Methodologies for Determining the Service Quality of the Intercity Rail Service Based on Users' Perceptions and Expectations in Thailand. Sustainability, 12(10), 4259. https://doi.org/10.3390/su12104259

Jung, E., Han, S., Jung, M., & Choe, J. (1998). Coach design for the Korean high-speed train. Applied Ergonomics, 29(6), 507-519. doi:10.1016/s0003-6870(97)00010-0

Karakasis, K., Skarlatos, D., & Zakinthinos, T. (2005). A factorial analysis for the determination of an optimal train speed with a desired ride comfort. Applied Acoustics, 66(10), 1121-1134.
doi:10.1016/j.apacoust.2005.02.006

Kotler, P., Keller, K. L., Ang, S. H., Tan, C. T., & Leong, S. M. (2018). Marketing management: An Asian perspective. Harlow: Pearson.

Krejcie, R. V, & Morgan, D. (1970). Small-Sample Techniques. The NEA Research Bulletin, 39, 99.

Krylov, V. V. (2002). Effects of the embankment topography and track curvature on ground vibration boom from high-speed trains. In Proceedings of the symposium EURODYN2002, Munich, Germany, Grundmann and Schueller, Eds., Swetz & Zeitlinger, Lisse (pp. 473-478).

Lee, J. H., Jin, B. S., & Ji, Y. (2009). Development of a Structural Equation Model for ride comfort of the Korean high-speed railway. International Journal of Industrial Ergonomics, 39(1), 7-14.

Luke, R., & Heyns, G. J. (2020). An analysis of the quality of public transport in Johannesburg, South Africa using an adapted SERVQUAL model. Transportation Research Procedia, 48, 3562–3576. https://doi.org/10.1016/j.trpro.2020.08.095

Maillard, J., Kacem, A., Martin, N., & Faure, B. (2019, September). Physically-based auralization of railway rolling noise. In Proeedings of the 23rd International Congress on Acoustics.

Masirin, M. I., Johari, N. F., Nordin, N. H., Abdullah, A. H., & Azis, M. I. (2015). A Field Study on Urban Rail Transits in City of Kuala Lumpur: Passenger Views on Train Noise and Vibration. Applied Mechanics and Materials, 773-774, 839-844. doi:10.4028/www.scientific.net/amm.773-774.839

Mat, A., Bahry, N. S., Kori, N. L., Munir, Z. A., & Daud, N. M. (2019). The Influence of Service Quality and Passenger Satisfaction Towards Electric Train Services (ETS): A PLS-SEM Approach. Foundations of Management, 11(1), 57–64. https://doi.org/10.2478/fman-2019-0005

Nassiri, P., Koohpaei, A., Zeraati, H., & Shalkouhi, P. J. (2011). Train Passengers Comfort with Regard to Whole-Body Vibration. Journal of Low Frequency Noise, Vibration and Active Control, 30(2), 125-136. doi:10.1260/0263-0923.30.2.125

Ngoc, A. M., Hung, K. V., & Tuan, V. A. (2017). Towards the Development of Quality Standards for Public Transport Service in Developing Countries: Analysis of Public Transport Users' Behavior. Transportation Research Procedia, 25, 4560–4579. https://doi.org/10.1016/j.trpro.2017.05.354

Niu, H., Yao, J., Zhao, J., & Wang, J. (2019). SERVQUAL Model Based Evaluation Analysis of Railway Passenger Transport Service Quality in China. Journal on Big Data, 1(1), 17-24. doi:10.32604/jbd.2019.05799

Oña, J. D., Oña, R. D., Eboli, L., Forciniti, C., & Mazzulla, G. (2016). Transit passengers' behavioural intentions: The influence of service quality and customer satisfaction. Transportmetrica A: Transport Science, 12(5), 385-412. doi:10.1080/23249935.2016.1146365

Orvnäs, A., Stichel, S., & Persson, R. (2010). Ride Comfort Improvements in a High -Speed Train with Active Secondary Suspension. Journal of Mechanical Systems for Transportation and Logistics, 3(1), 206-215. doi:10.1299/jmtl.3.206

Painoli, A. K., & Kukreti, A. (2020). Service Quality attributes affecting the satisfaction of the Railway passengers inside the train in the selected route of the Northern Railway (India). Sustainable Humanosphere, 16(2), 37-50.

Pakurár, M., Haddad, H., Nagy, J., Popp, J., & Oláh, J. (2019). The Service Quality Dimensions that Affect Customer Satisfaction in the Jordanian. Sustainability, 11(4), 1113. doi:10.3390/su11041113

Parasuraman, A Parsu & Zeithaml, Valarie & Berry, Leonard. (1988). SERVQUAL: A multiple- Item Scale for measuring consumer perceptions of service quality. Journal of retailing. 64(1), 12.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A Conceptual Model of Service Quality and Its Implications for Future Research. Journal of Marketing, 49(4), 41-50. doi:10.1177/002224298504900403

Qi, J., Yang, L., Gao, Y., Li, S., & Gao, Z. (2016). Integrated multi-track station layout design and train scheduling models on railway corridors. Transportation Research Part C: Emerging Technologies, 69, 91–119. https://doi.org/10.1016/j.trc.2016.05.020

Saputra, A. D. (2010). Analysis of Train Passenger Responde on Provided Services (Case Study at Kereta Api Indonesia and Statens Jarnvargar (SJ) AB, Sweden) (Dissertation). Retrieved from http://urn.kb.se/resolve?urn=urn:nbn:se:kau:diva-6663

Suki, N. M. (2014). Passenger satisfaction with airline service quality in Malaysia: A structural equation modeling approach. Research in Transportation Business & Management, 10, 26-32. doi:10.1016/j.rtbm.2014.04.001

Sullivan, G. M., & Feinn, R. (2012). Using effect size—or why the P value is not enough. Journal of graduate medical education, 4(3), 279-282.

Wisniewski, M. (2001). Assessing customer satisfaction with local authority services using SERVQUAL. Total Quality Management, 12(7), 995-1002. doi:10.1080/09544120120096151

Yoo, W., Lee, C., Jeong, W., & Kim, S. (2005). Development and application of new evaluation system for ride comfort and vibration on railway vehicles. Journal of Mechanical Science and Technology, 19(7), 1469-1477. doi:10.1007/bf03023906

Zaid, M. Z., Jamaludin, M. S., Bambale, S. A., & Ismail, M. A. (2017). How service quality affects the customer satisfaction: Case study of electric train service (ETS).

Zeithaml, V. A., Bolton, R. N., Deighton, J., Keiningham, T. L., Lemon, K. N., & Petersen, J. A. (2006). Forward-Looking Focus: Can Firms Have Adaptive Foresight? Journal of Service Research, 9(2), 168-183. doi:10.1177/1094670506293731

Zhang, Y., Liu, Q., Lei, D., Xu, X., & Zhao, J. (2016). Intercity Railway Passenger Transport Service Quality Evaluation Method Based on Passenger Satisfaction. DEStech Transactions on Economics and Management, (Iceme-ebm). doi:10.12783/dtem/iceme-ebm2016/42

Zouani, A., & Hanim, S. (2016). Overview of noise and vibration in automotive engines. International Journal of Vehicle Noise and Vibration, 12(2), 162-181. https://doi.org/10.1504/IJVNV.2016.079054