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**ASSESSING PUBLIC PERCEPTION AND SATISFACTION WITHIN
PUBLIC TRANSPORTATION SERVICES IN PENANG.**



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University Utara Malaysia

**In Partial Fulfilment of the Requirement for the Master of Sciences
Transportation and Logistics Management**



Kolej Perniagaan
(College of Business)
Universiti Utara Malaysia

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ABSTRACT

This research studied assessing public perception and satisfaction with public transportation services in Penang, Malaysia and uses the SERVQUAL model to assess service quality across multiple dimensions. Tangible, reliability, responsiveness, Assurance, empathy, and the other two variables added which are accessibility, safety, and security are all important considerations. Tangibles examine the physical components of transportation, such as the state of the facilities and vehicles. Reliability assesses the consistency and dependability of services, whereas responsiveness assesses staff willingness to serve passengers promptly. Assurance refers to employees' expertise, courtesy, and capacity to inspire trust, whereas empathy evaluates the provision of individualized attention. Accessibility refers to how easily passengers can use services, considering route availability, service frequency, and accommodations for those with disabilities. Safety and security assess the perceived and actual safety measures in place to protect passengers. This comprehensive method tries to identify strengths and problems in Penang's public transportation system by looking at quality, convenience, cost, comfort, and customer service criteria. To allow a meaningful interpretation of the results, the method used for this paper is to refer to primary data which is data collected through a questionnaire with 400 respondents, and secondary data such as government reports, journals, and academic resources. The result of this research will be useful both as a comparative and as an example of best practices for public transportation services to enhance reliability, upgrade facilities, improve customer service, increase safety measures, and expand service coverage, ultimately aiming to improve public perception and satisfaction of the public transportation services in Penang. The study suggested some recommendations that would help achieve the goal of an ideal public transportation system in Malaysia. Finally, our research results of the regression indicated that our research hypothesis supports the variables of Responsiveness, accessibility, safety, and security.

Keywords: Public transportation services, satisfaction, SERVQUAL, tangible, reliable, responsibility, assurance, empathy, accessibility, safety, and security.

ABSTRAK

Penyelidikan ini mengkaji menilai persepsi dan kepuasan orang ramai terhadap perkhidmatan pengangkutan awam di Pulau Pinang, Malaysia dan menggunakan model SERVQUAL untuk menilai kualiti perkhidmatan merentasi pelbagai dimensi. Ketara, kebolehpercayaan, responsif, Jaminan, empati, dan dua lagi pembolehubah yang ditambah iaitu kebolehcapaian, keselamatan dan keselamatan adalah semua pertimbangan penting. Tangibles mengkaji komponen fizikal pengangkutan, seperti keadaan kemudahan dan kenderaan. Kebolehpercayaan menilai konsistensi dan kebolehpercayaan perkhidmatan, manakala responsif menilai kesediaan kakitangan untuk melayani penumpang dengan segera. Jaminan merujuk kepada kepakaran, kesopanan dan keupayaan pekerja untuk memberi inspirasi kepada kepercayaan, manakala empati menilai penyediaan perhatian individu. Kebolehcapaian merujuk kepada betapa mudahnya penumpang boleh menggunakan perkhidmatan, dengan mempertimbangkan ketersediaan laluan, kekerapan perkhidmatan dan penginapan untuk mereka yang kurang upaya. Keselamatan dan keselamatan menilai langkah-langkah keselamatan yang dirasakan dan sebenar untuk melindungi penumpang. Kaedah komprehensif ini cuba mengenal pasti kekuatan dan masalah dalam sistem pengangkutan awam Pulau Pinang dengan melihat kriteria termasuk kualiti perkhidmatan, kemudahan, kos, keselesaan dan perkhidmatan pelanggan. Untuk membolehkan tafsiran keputusan yang bermakna, kaedah yang digunakan untuk kertas kerja ini adalah merujuk kepada data primer iaitu data yang dikumpul melalui soal selidik dengan 400 responden, dan data sekunder seperti laporan kerajaan, jurnal, dan sumber akademik. Hasil penyelidikan ini akan berguna sebagai perbandingan dan sebagai contoh amalan terbaik untuk perkhidmatan pengangkutan awam untuk meningkatkan kebolehpercayaan, menaik taraf kemudahan, meningkatkan perkhidmatan pelanggan, meningkatkan langkah-langkah keselamatan, dan meluaskan liputan perkhidmatan, akhirnya bertujuan untuk meningkatkan persepsi dan kepuasan orang ramai terhadap perkhidmatan pengangkutan awam di Pulau Pinang. Kajian ini mencadangkan beberapa cadangan yang akan membantu mencapai matlamat sistem pengangkutan awam yang ideal di Malaysia. Akhir sekali, hasil penyelidikan regresi kami menunjukkan bahawa pembolehubah Responsif, kebolehcapaian, keselamatan dan keselamatan disokong oleh hipotesis penyelidikan kami.

Kata kunci: Perkhidmatan pengangkutan awam, kepuasan, SERVQUAL, ketara, kepercayaan, tanggungjawab, jaminan, empati, kebolehcapaian, keselamatan dan keselamatan.

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TABLE OF CONTENT

PERMISSION TO USE	i
ABSTRACT	ii
ABSTRAK	iii
ACKNOWLEDGEMENT	iv
LIST OF TABLES	viii
LIST OF FIGURES	ix
CHAPTER 1: INTRODUCTION	1
1.1 Background of Study	1
1.2 Problem Statement.....	3
1.3 Research Questions.....	1
1.4 Research Objectives.....	1
1.5 Significance of Study.....	1
1.6 Scope of the Study.....	2
1.7 Definitions of Key Terms	1
CHAPTER 2: LITERATURE REVIEW.....	4
2.1.1 Public perception and Satisfaction in Public transportation	4
2.1.2 Tangible.....	6
2.1.3 Reliability	7
2.1.4 Responsiveness.....	8
2.1.5 Assurance	9
2.1.6 Empathy.....	10
2.1.7 Accessibility.....	11
2.2 OPERATIONAL DEFINITION.....	13
2.2.1 Public Perception.....	13
2.2.2 Public Transportation:.....	14
2.2.3 Tangibles:.....	14
2.2.4 Reliability.....	14
2.2.5 Responsiveness	14
2.2.6 Assurance.....	15
2.2.7 Empathy	15
2.2.8 Accessibility.....	15
2.2.9 Safety and Security	15
CHAPTER 3: METHODOLOGY	16

3.0 INTRODUCTION	16
3.1 RESEARCH FRAMEWORK.....	16
3.1.1 Conceptual Framework.....	16
3.2 RESEARCH HYPOTHESIS.....	17
3.3 RESEARCH DESIGN	18
3.4 MEASUREMENT OF VARIABLES	18
3.4.1 Theoretical Framework and Underpinning Theory.....	20
3.5 DATA COLLECTION.....	22
3.5.1 Survey Instruments	22
3.5.2 Development Process and Sources	22
3.6 POPULATION AND SAMPLING TECHNIQUE	25
3.6.1 Population.....	25
3.6.2 Sampling Techniques	25
3.6.3 Sample Size	28
3.7 DATA COLLECTION PROCEDURE	28
3.8 TECHNIQUES OF DATA ANALYSIS	30
3.9 SUMMARY.....	32
CHAPTER 4: DATA ANALYSIS AND FINDINGS	33
4.0 INTRODUCTION.....	33
4.1 DEMOGRAPHIC BACKGROUND.....	33
4.1.1 Gender.....	34
4.1.2 Age.....	34
4.1.3 Ethnicity	34
4.1.4 Distance from home	35
4.1.5 Types of Transport that are Used for Daily Commutes	35
4.1.6 Travel Cost.....	35
4.2 NORMALITY ANALYSIS	36
4.3 RELIABILITY ANALYSIS	37
4.4 CORRELATION	38
4.5 REGRESSION ANALYSIS	39
4.6 FACTORS THAT INFLUENCE PUBLIC PERCEPTION SATISFACTION IN PUBLIC TRANSPORTATION SERVICES IN PENANG.	41
4.7 HYPOTHESIS TESTING	41
CHAPTER 5: DISCUSSION AND CONCLUSION.....	43
5.1 CONCLUSION	43

5.2	DISCUSSIONS	44
5.2.1	Tangible	45
5.2.2	Reliability	45
5.2.3	Responsiveness	45
5.2.4	Assurance	46
5.2.5	Empathy	46
5.2.6	Accessibility	46
5.2.7	Safety and Security.....	47
5.3	LIMITATION	47
5.4	RESEARCH CONTRIBUTION	48
5.5	RECOMMENDATION	48
5.5.1	Recommendations from The Research.....	48
5.5.2	Recommendations for Future Research	50
REFERENCES		51
APPENDIX 1		55



LIST OF TABLES

Table 1 : Summary	32
Table 2: Demographic Background.....	33
Table 3: shows the skewness and kurtosis values.	36
Table 4: Reliability analysis	37
Table 5: Correlation	38
Table 6: Regression	39
Table 7: Hypothesis Testing	42



LIST OF FIGURES

Figure 1: Conceptual Framework	16
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CHAPTER 1: INTRODUCTION

This chapter started with an outline of the public perception and satisfaction with public transportation services among road users and residents in the state of Penang. It will also discuss Penang's background in addition, this chapter will discuss the research's potential advantages, problem statements, research questions, and objectives. The research scope, main definition, and study organization will all be outlined. This study will examine and analyze the case using the SERVQUAL model, a robust and widely accepted tool in the field, with the addition of two other variables.

1.1 Background of Study

Introduction

Public transportation systems are critical to the economic development and social mobility of both urban and rural areas. In many countries, public buses are a popular and economical means of transportation, providing essential services that facilitate daily commuting and access to various destinations. A reliable public bus service is particularly crucial for fostering economic growth, population expansion, and the overall development of urban and rural areas (Stenbacka, 2001).

Public satisfaction plays a pivotal role in influencing transportation decisions. It shapes how people choose travel times, modes of transport, and destinations, and overall satisfaction depends on factors such as ease of use, value for money, and service quality. However, factors like rising personal income (Abdulrazzaq, Abdulkareem, Yazid, Borhan, & Mahdi, 2020), a cultural preference for driving (Ismail & Hafezi, 2011), and societal perceptions linking car ownership to higher socioeconomic status

(Saif, Zefreh, & Torok, 2019) have led to increased private vehicle usage, particularly in urban areas.

Despite these challenges, public transportation remains a sustainable alternative to private cars, offering significant benefits such as reduced traffic congestion and lower environmental impact. Efficient public transport systems are essential for improving urban life quality, promoting social equity by providing mobility options for all, and supporting economic growth through better access to jobs and services. This need for effective public transportation solutions is especially urgent in Penang, a state in northern Peninsular Malaysia (ArnoldLoh, 2015).

However, Penang's public bus services face several challenges, including inadequate facilities, outdated fleets, low passenger volumes, and long wait times(Noor, Arshad, Jais, & Mustafa, 2014). To enhance the quality and reliability of these services, it is necessary to assess the current system's performance and identify areas for improvement

1.2 Problem Statement

Public transportation in Penang is critical to urban mobility, providing the foundation for daily commuting and economic activity. However, recent improvements in transportation infrastructure, such as the extension of the bus rapid transit (BRT) system and the introduction of additional routes, have prompted questions about the sufficiency and quality of these services. (Perez-Moron et al., 2022), While these enhancements aim to improve the overall transportation network, there is little understanding of existing public perception and satisfaction with these services. The lack of comprehensive data makes it difficult for legislators, service providers, and urban planners to make informed decisions on how to address existing issues and improve the overall user experience. (Noor, Arshad, & Jais, 2014)

Penang, as one of Malaysia's major urban centers, has experienced fast urbanization and population growth, resulting in an increasing demand for efficient and dependable public transportation. (Minhans, 2015) Despite continued efforts to improve the transportation system, several challenges remain, including service reliability, accessibility, and customer service. These difficulties have a direct influence on commuters' daily life, particularly those who rely on public transportation to go about. Service disruptions, poor coverage, and uneven customer service all lead to user discontent, which has an impact on the overall effectiveness and public acceptance of the transportation system (Ihantamalala et al., 2020).

Understanding public perception and satisfaction is important for a variety of reasons. First, it sheds light on the current transportation system's strengths and flaws, allowing service providers to identify critical areas for development (Ismail & Hafezi, 2011). Second, it enables politicians to make educated decisions that are consistent with the requirements and expectations of the public, resulting in a more efficient and user-friendly transportation system. Third, increasing public transportation services can have a broader impact on urban planning by reducing traffic congestion, lowering carbon emissions, and supporting sustainable development.

Despite the relevance of these issues, there is a significant gap in available research on public transportation satisfaction in Penang. Most studies have concentrated on larger cities such as Kuala Lumpur, creating a gap in understanding regional characteristics and the unique issues Penang's transportation infrastructure faces. (Thompson & Schofield, 2007). The present research aims to fill this gap by assessing public perception and satisfaction with Penang's public transportation services. The study will provide practical information on service reliability, coverage, accessibility, and customer service, guiding future improvements and policy development.

This study will focus on Penang's principal public transportation modalities, which include bus transport. It will also consider the viewpoints of other demographic groups, including everyday commuters, tourists, and residents of different geographical areas in Penang. The findings of this study will be useful to local governments, transportation agencies, and urban planners as they work to establish a more efficient, dependable, and user-friendly public transportation system in Penang, ultimately leading to a higher quality of life for its citizens.

1.3 Research Questions

1. What is the relationship between the tangible and assessing public perception and satisfaction within public transportation services in Penang?
2. What is the relationship between reliability and assessing public perception and satisfaction within public transportation services in Penang?
3. What is the relationship between responsiveness and assessing public perception and satisfaction within public transportation services in Penang?
4. What is the relationship between the assurance and assessing public perception and satisfaction within public transportation services in Penang?
5. What is the relationship between empathy and assessing public perception and satisfaction within public transportation services in Penang?
6. What is the relationship between accessibility and assessing public perception and satisfaction within public transportation services in Penang?
7. What is the relationship between safety and security and assessing public perception and satisfaction within public transportation services in Penang?

1.4 Research Objectives

Therefore, the general objective of the study is to investigate the relationship between assessing public perception and satisfaction within public transportation services in Penang. The specific objectives are:

1. To investigate whether Tangible influences the public perception and satisfaction towards Malaysia's public transportation services
2. To investigate whether Reliability influences the public perception and satisfaction towards Malaysia's public transportation services.
3. To investigate whether Responsiveness influences the public perception and satisfaction towards Malaysia's public transportation services
4. To investigate whether Assurance influences the public perception and satisfaction towards Malaysia's public transportation services.
5. To investigate how Empathy influences the public perception and satisfaction towards Malaysia's public transportation services.
6. To investigate whether Accessibility influences the public perception and satisfaction towards Malaysia's public transportation services.
7. To investigate whether Safety and Security influence the public perception and satisfaction towards Malaysia's public transportation services.

1.5 Significance of Study

The significance of studying public perception and satisfaction with Penang's public transportation services lies in its potential to address existing challenges, improve the quality of transportation services, and enhance the overall urban mobility experience. Furthermore. From these findings, this research will help to encourage a better understanding and improve the public transportation services hold significant importance for addressing infrastructure challenges, enhancing the user experience, promoting sustainable urban mobility, addressing social equity concerns, informing policy decisions, and contributing to economic development. By identifying factors influencing public satisfaction, SERVQUAL elements such as tangible, reliability, responsiveness, assurance, affordability, and empathy are added, along with two more factors, such as accessibility and safety. This study can guide strategic investments and improvements to infrastructure and service quality, leading to increased satisfaction among road users and a more positive perception of the transportation system.

The research also aims to provide a solution to overcome this problem for better public transportation service in the future for the well-being of the environment. It will provide relevant material for Academic Contribution to the academic knowledge base by providing empirical data on the dynamics of public perception and satisfaction. Additionally, improvements in public transportation services can encourage modal shifts from private vehicles to public transit, thereby reducing traffic congestion, air pollution, and carbon emissions, while also promoting social equity by ensuring fair access to vital services for underrepresented communities. The insights gained from this study can inform evidence-based policy decisions, attract investments, and drive

economic development, ultimately contributing to a more sustainable and inclusive urban environment in Penang, Malaysia.

1.6 Scope of the Study

This study examines public perceptions and satisfaction with public transportation services in Penang, Malaysia. Its goal is to assess the quality of services offered by significant public transport providers, particularly Rapid Penang, and how these services satisfy the requirements and expectations of consumers. (Parasuraman, Zeithaml, & Berry, 1988). The study uses the SERVQUAL model as the major analytical framework to examine numerous aspects of service quality, including dependability, safety, accessibility, responsiveness, and comfort. The study collects data from public transportation passengers via questionnaires and interviews, with an emphasis on their experiences and satisfaction levels. The geographical coverage is confined to Penang, spanning both urban and suburban regions to present a full picture of popular attitude. (Deloitte, 2023) The research also examines the effects of current efforts and improvements to public transportation systems, as well as their efficacy in resolving existing difficulties. The findings of this study will provide insights into the existing condition of public transportation in Penang, identify areas for development, and make suggestions to politicians and service providers on how to improve customer happiness and boost public transportation utilization.

1.7 Definitions of Key Terms

The following terms are defined conceptually and operationally to clarify and better understand the terms related to this study.

Public Perception: Public perception refers to how people collectively see and think about a particular service or issue. The context of public transportation services in Penang involves what passengers think about the quality, reliability, accessibility, safety, and overall performance of these services. Essentially, it is the general opinion people hold based on their experiences and the information they (Parasuraman et al., 1988).

Satisfaction: Satisfaction in the context of public transportation refers to the extent to which users feel their expectations and needs are met by the services provided. It encompasses various factors such as punctuality, safety, comfort, and convenience (Parasuraman et al., 1988).

Tangible- Tangibles are a service company's infrastructure and facilities, which include equipment, machinery, signage, and communication materials. Based on (Parasuraman et al., 1988). Customers assess the quality of intangible services based on tangible factors such as workplace ambiance, building, and layout. Customers provide detailed feedback on in-store information, product advertising, product information signage, packaging, and point-of-purchase displays. (Suki, 2014)

Reliability- Reliability in public transportation refers to the consistency and dependability of services, including adherence to schedules and minimal delays. Reliability can be measured through metrics such as on-time performance, frequency of services, and the percentage of delays or cancellations. (Parasuraman et al., 1988).

Responsiveness- Responsiveness is the ability to give prompt assistance in many settings, like a hotel's customer service system. Front-line personnel must be prepared to handle customer requests, concerns, and complaints in a timely and effective manner (Parasuraman et al., 1988).

Assurance- Assurance involves the level of confidence and trust passengers have in the safety, competence, and professionalism of the public transport service providers. It is influenced by factors such as driver behavior, vehicle maintenance, and overall service reliability (Parasuraman et al., 1988).

Empathy- Empathy in the context of public transportation refers to the service provider's ability to provide personalized attention and care to passengers, understanding and accommodating their specific needs and concerns (Parasuraman et al., 1988).

Accessibility- Accessibility refers to the ease with which all individuals, including those with disabilities, can use public transportation services. This includes ramps, elevators, priority seating, and clear signage. Accessibility can be measured through metrics such as the accessibility of ramps, escalators, priority seating, clear signage, and other features that facilitate easy access for passengers with disabilities (Parasuraman et al., 1988).

Safety- Safety in public transportation involves measures to protect passengers from accidents, injuries, and other harm while using the services. Safety can be measured through metrics such as the number of accidents or incidents, the effectiveness of emergency response procedures, and the presence of safety features like seatbelts, airbags, and emergency exits (Parasuraman et al., 1988).

Security protects passengers from crime and threats, including surveillance, security personnel, and emergency response procedures. Security can be measured through metrics such as the presence of security cameras, the number of security personnel, and the effectiveness of emergency response procedures (Parasuraman et al., 1988).

SERVQUAL Model: The SERVQUAL model is a service quality framework used to measure the gap between customer expectations and their perceptions of the actual service received. It assesses five dimensions: reliability, responsiveness, assurance, empathy, and tangibles (Parasuraman et al., 1988).



CHAPTER 2: LITERATURE REVIEW

In every research, the literature review is a vital part. From past research, a literature review is intended to familiarize the reader with the topic that has been conducted. The literature review generally shows the precision of the work and very clear information on new primary data. It can have a wide range of focuses, objectives, inclusion methodology, points of view, and audience (Schryen, Wagner, & Benlian, 2015). The focus of this study is to analyze and understand the relationship between assessing public perception and satisfaction with public transportation services in Penang.

2.1.1 Public perception and Satisfaction in Public transportation

According to (Singh & Kumar, 2014) passenger satisfaction is a critical factor in sectors such as business, marketing, and transportation. (V. Zeithaml, Bitner, & Gremler, 1996) define passenger satisfaction as a client's evaluation of whether a service meets their needs and desires. This satisfaction is influenced by various factors, including product quality, pricing, perceived fairness, and personal preferences. Passenger satisfaction, as described by (Oliver, 1996), reflects a positive response to service, encompassing both under and over-satisfaction levels. (Chen & Gursoy, 2001) suggest that customer satisfaction is essential for repeat usage and positive word-of-mouth, which contribute to a firm's success. Evaluating passenger satisfaction provides insight into an organization's performance and offerings (Manani, Nyaoga, Bosire, Ombati, & Kongere, 2013). In the public sector, it is increasingly recognized as a key metric for success

However, several issues impact public transportation satisfaction. Service reliability, particularly punctuality and frequency, is a significant concern (Tirachini, Hensher, & Rose, 2013). Accessibility challenges, especially for those with disabilities or living in remote areas, further affect satisfaction (Taylor, Miller, Iseki, & Fink, 2008). The comfort and cleanliness of vehicles also play a critical role; dissatisfaction in these areas can deter public transport use (Loukaitou-Sideris & Fink, 2008). Safety and security concerns, especially at night or in less populated areas, influence public perception (Yavuz & Welch, 2010). Environmental and economic factors, including the environmental impact of public transport and its cost-effectiveness, are also becoming important to passengers (Schryen et al., 2015). Additionally, the lack of technological integration, such as real-time tracking and digital ticketing, can lead to frustration among users (Lierop & El-Geneidy, 2016).

(Sumaedi, Bakti, & Yarmen, 2012) note that passenger satisfaction is influenced by the perceived disparity between the overall performance of public transportation services and passenger expectations. Public transportation enables individuals to connect with various destinations, including cities, workplaces, and service centers (Transport, 2022). Factors such as geographic variables, area function, and community needs influence public transportation availability, with modes including buses, taxis, ferries, and airplanes. (Fedorova, Asmus, & Ashirova) highlight that improving public transportation services enhances quality of life, reduces social tensions, and increases customer satisfaction. Finally, (Kumaran, 2022). underscores that public satisfaction is a vital element in the success of public transport systems

2.1.2 Tangible

According to (Klokkenga, 2020) tangibles refer to the physical aspects of a service, including infrastructure, equipment, personnel, and communication devices. These elements demonstrate a company's service quality to customers. Factors influencing tangible quality include the appearance of company headquarters, employee attire, and the condition of customer service and marketing materials. (Kobiruzzaman, 2020) emphasizes the importance of maintaining a clean workplace and ensuring that employees are appropriately dressed, which is crucial in public transportation where tangible indicators like cleanliness and equipment condition play a significant role.

However, several issues impact the effectiveness of tangibles in public transport. The maintenance and upgrading of infrastructure can be inconsistent, leading to dissatisfaction when facilities are outdated or poorly maintained (Jomnonkwao & Ratanavaraha, 2016). Employee appearance and behavior are also critical, as they can either enhance or detract from the overall perception of service (Klokkenga, 2020). Inadequate training and lack of uniformity in employee presentation can negatively affect customer perceptions.

(Theresia & Bangun, 2017) further note that tangibles, such as office cleanliness and the condition of physical facilities, significantly impact consumer satisfaction, which in turn affects loyalty. This is echoed by (Slack & Singh, 2020), who argue that positive customer satisfaction leads to increased loyalty, making tangibles a crucial aspect of service quality. Nonetheless, the challenge remains in consistently maintaining high standards across all tangible aspects, especially in sectors like public transportation, where resource constraints and high usage rates can quickly deteriorate physical assets.

These issues underscore the need for public transportation agencies to prioritize the upkeep of tangibles, as they are directly linked to passenger comfort and satisfaction. Addressing these challenges is essential for improving the overall quality of service and enhancing customer loyalty.

2.1.3 Reliability

Reliability is a company's ability to consistently deliver services that meet customer expectations. It encompasses maintaining commitments, delivering goods and services, resolving issues promptly, and offering competitive prices. Understanding customer expectations of reliability is crucial for all businesses. (Sam, Sam, Hamidu, & Daniels, 2017) emphasize that service reliability is vital for providing excellent bus services, where employees must deliver timely and accurate service as promised (Kobiruzzaman, 2020). According to (Shamsudin, FatiniRasol, Nayan, Esa, & Kadir, 2020) highlight that firms can enhance customer loyalty and satisfaction by delivering high-quality and dependable services. In public transportation, reliability often relates to punctuality, which is essential for ensuring client satisfaction (Ong, 2022). However, issues such as delays and service interruptions negatively impact customer satisfaction, creating inconvenience and diminishing trust

In terms of measurement, reliability is evaluated based on the consistency of outcomes over repeated assessments, indicating stability over time (Omar, Lamin, & Osman) and (Bates, Polak, Jones, & Cook, 2001) argue that the reliability of transportation, as a public utility, should be evaluated in terms of social justice, emphasizing the need for services that are convenient, safe, and affordable. (Parasuraman et al., 1988) describe reliability as the ability to provide consistent, accurate service as promised. (Mahajan, 2020) stresses the importance of consistent and predictable service in meeting client expectations, with reliability being a key component of service

excellence. A negative initial experience can deter customers from using the service again, making it crucial for providers to ensure reliability through efficient service delivery and orderly procedures (M. K. Brady & Cronin, 2001).

Research by (Beirão & Cabral, 2007). suggests that reliability and travel duration significantly influence people's choice of transportation. Consistent and reliable services enhance commuter satisfaction and confidence, while poor service drives users away. (Aslam, Tariq, & Arif, 2019). found that many passengers prefer rail travel due to the reliability of automated services, which are less prone to errors compared to manual operations.

2.1.4 Responsiveness

Responsiveness refers to the willingness to serve customers with respect and the ability to deliver timely services to meet their needs. This aspect of service quality emphasizes two key elements: willingness and punctuality. According to (Kobiruzzaman, 2020) responsiveness involves a company's ability to provide timely services, ensuring that customer feedback, complaints, and issues are acknowledged, investigated, and resolved promptly. Even if customers are slow to respond, personnel must address their concerns swiftly.

However, several issues can hinder responsiveness in service delivery. Staff training and empowerment are critical factors. Without adequate training, employees may lack the skills or authority to address customer issues effectively, leading to delays and frustration (Klokkenga, 2020). Additionally, workload and resource constraints can impede a company's ability to be responsive. High demand with limited resources can stretch staff thin, resulting in slower response times and reduced customer satisfaction.

Empathy, closely related to responsiveness, involves understanding and addressing customer needs with personalized attention. (Liu, Fadilah, Ridzuan, & Firdaus, 2014).emphasize that empathy is a key factor in ensuring customer satisfaction, as customers feel valued when companies prioritize their interests. However, maintaining a high level of empathy can be challenging, especially in high-volume service environments where standardization is often prioritized over personalization. Balancing empathy with efficiency is a common issue, as companies must meet the diverse needs of their customers without compromising on service quality.

2.1.5 Assurance

Assurance refers to an employee's ability to establish trust and confidence with customers, which is crucial for service delivery. (Kobiruzzaman, 2020) highlights the importance of technical expertise, effective communication skills, civility, trustworthiness, and professionalism in building this trust. Trusting a service provider's ability to deliver is particularly vital for services that customers may find complex or difficult to evaluate. The marketing department plays a key role in representing trust and confidence, acting as the intermediary between customers and the organization. Understanding customer needs and building their trust is essential for maintaining loyalty.

However, several issues can undermine assurance in service delivery. Employee training and consistency are critical; without proper training, employees may struggle to convey competence, especially in high-pressure situations. Furthermore, communication breakdowns can erode trust, particularly if information is not conveyed clearly or if employees fail to address customer concerns adequately. (Parasuraman et al., 1988) define assurance as the employees' ability, knowledge, and

manners in building client trust. Employees must maintain professionalism and respond quickly to emergencies to make passengers feel secure in their physical, financial, and privacy aspects. Previous research (Fillianie, 2013) shows a positive correlation between assurance and customer satisfaction with express bus services in Kuantan. (Cavana, Corbett, & Lo, 2007) also found that assurance significantly influences customer satisfaction with rail services. Despite these findings, cultural differences and expectations can affect how assurance is perceived. What instills confidence in one demographic may not have the same effect on another, suggesting that service providers must tailor their approach to different customer segments to maintain high levels of assurance.

2.1.6 Empathy

Empathy, as described by (Meng & Md Sidin, 2021), is the ability to understand another person's ideas and feelings, playing a crucial role in service delivery. (Klokkenga, 2020) defines empathy as an organization's personal and caring approach to customers, showcasing the company's ability to provide services that reflect an understanding of clients' needs. Empathy is especially vital for customer service workers, who must handle diverse customers while representing the organization humanely and effectively (Meng & Md Sidin, 2021)

However, several challenges can hinder the effective demonstration of empathy in service contexts. Cultural differences can lead to misunderstandings, as expressions of empathy may be perceived differently across cultures. Moreover, workload and time constraints often prevent employees from offering the personalized attention that customers value, reducing the perceived empathy in service interactions. Empathy enhances consumer trust, confidence, and loyalty, directly impacting customer

satisfaction when their needs are met. Customers feel valued when companies prioritize their interests and offer personalized attention (Liu et al., 2014). Yet, standardization of services can sometimes conflict with the need for empathy, as rigid protocols may limit employees' ability to tailor their approach to individual customer needs.

2.1.7 Accessibility

According to (Ihantamalala et al., 2020), access is defined as the capacity that can be reached at a specific location, while accessibility refers to the ease with which individuals can reach desired destinations and services within a particular geographical area. Accessibility has a positive impact on passengers' perceptions and satisfaction with public transportation services. (Duchateau, 1998) notes that accessibility hinges on two possibilities: the location itself and the capability of individuals to reach that location. (Ismail & Hafezi, 2011) further define accessibility in terms of the ease of accessing tickets and bus stations, suggesting that decreased accessibility can lead to traffic bottlenecks but also help control undesirable conditions like vehicle noise.

However, several challenges can impact accessibility in public transportation. Infrastructure limitations can severely restrict the ease with which people can access transportation services, particularly in rural or underdeveloped areas. Socioeconomic factors also play a role, as lower-income individuals may have fewer transportation options, affecting their ability to reach necessary destinations.

(Thompson & Schofield, 2007). found that accessibility significantly enhances customer satisfaction, particularly when transit services are located conveniently near consumer locations. Yet, they also noted that concerns like time and safety become

secondary to accessibility—highlighting how safety issues at transit locations can deter usage despite geographical proximity.

Furthermore, accessibility is determined by the convenience enjoyed by individuals in the surrounding area, but urban planning and zoning issues can create disparities in how accessible public transportation is across different regions, leading to unequal service distribution and potential dissatisfaction among users.

2.1.8 Safety and Security

According to (Piètre-Cambacédès & Chaudet, 2010), safety is achieved when the surroundings are not dangerous and do not cause harm or loss, whether intentionally or unintentionally. similar (Matsika, Ricci, Mortimer, Georgiev, & O'Neill, 2013) emphasize that safety involves protection against unintentional system malfunctions. (Freilich & White, 1990) describe safety as a fundamental concept in transportation, encompassing measures and practices aimed at minimizing risks, preventing accidents, and ensuring the well-being of passengers, personnel, and the public.

However, there are significant challenges in maintaining safety in public transportation. Infrastructure limitations can lead to accidents or unsafe conditions, particularly in areas where maintenance is neglected. Additionally, technological failures can compromise safety, as reliance on outdated systems or insufficiently tested innovations can lead to unforeseen hazards. The challenge of addressing human error also remains significant, as the unpredictability of human behavior can introduce safety risks despite the best engineering controls.

(Williams, 2014) defines security as both physical and emotional safety, relating it to the perception of safety or personal sensation. (Redman, Friman, Gärling, & Hartig,

2013) and (Savage, 2013) discuss how vehicle safety depends on features like locks, airbags, and crashworthiness, highlighting that security refers to the risks associated with accidents, while safety involves the risk of becoming a victim of crime. (Shokouhyar, Safari, & Mohsenian, 2018) found that improving product safety increases public satisfaction, loyalty, and revenue. However, perception gaps between actual and perceived safety can impact public confidence, particularly when passengers feel unsafe despite the presence of safety measures. In the aviation industry, as noted by (Samidi, 2021), public satisfaction is closely linked to safety and security, with airlines like Zagros Aviation emphasizing these aspects to maintain customer trust.

2.2 OPERATIONAL DEFINITION

2.2.1 Public Perception

Public perception: refers to the collective opinions and attitudes held by the public toward a specific service, product, or entity. In the context of public transportation, it encompasses how passengers and the general public view the quality, reliability, safety, and accessibility of transport services. Perception is influenced by factors such as personal experiences, societal norms, and media representations. Understanding public perception is crucial for service providers as it shapes usage patterns and public support for transportation initiatives (Loukaitou-Sideris & Fink, 2009).

2.2.2 Public Transportation:

Public transportation is the degree to which public services, including transportation, meet or exceed the expectations of the public. It reflects how well a service fulfills the needs and desires of its users. In public transportation, satisfaction is often measured through indicators such as timeliness, convenience, comfort, safety, and customer service. High levels of public satisfaction are linked to increased service use, positive word-of-mouth, and support for the public (Wang, 2021).

2.2.3 Tangibles:

Tangibles refer to the physical aspects of service delivery, including the appearance of physical facilities, equipment, personnel, and communication materials. These elements shape the customer's first impressions and contribute to their overall service experience (Parasuraman et al., 1988).

2.2.4 Reliability

Reliability is defined as the ability of a service provider to deliver the promised service dependably and accurately. It involves consistency in performance, such as providing timely services without errors (Parasuraman et al., 1988).

2.2.5 Responsiveness

Responsiveness refers to the willingness and readiness of employees to help customers and provide prompt service. It includes the ability to address customer queries, complaints, and service requests effectively and efficiently (Parasuraman et al., 1988).

2.2.6 Assurance

Assurance encompasses the knowledge, competence, and courtesy of employees, as well as their ability to convey trust and confidence to customers. It is crucial for services where customers perceive higher levels of risk (Parasuraman et al., 1988).

2.2.7 Empathy

Empathy is the degree to which service providers care for their customers and provide individualized attention. It involves understanding customer needs and addressing them in a personalized manner (Parasuraman et al., 1988).

2.2.8 Accessibility

Accessibility refers to the ease with which customers can use public transportation services, including the availability of routes, ease of obtaining tickets, and proximity to bus stops and stations. It also considers the physical and financial ability of individuals to access services (Ismail & Hafezi, 2011).

2.2.9 Safety and Security

Safety refers to the protection from harm caused by accidents or malfunctions within the transportation system, while security concerns the protection from intentional harm such as crime or violence. Both are critical in ensuring a trustworthy and secure environment for passengers (Piètre-Cambacédès & Chaudet, 2010).

CHAPTER 3: METHODOLOGY

3.0 INTRODUCTION

This chapter covers in detail the research methodologies used in the study. The researchers describe how the data and information needed to address the research objectives and questions were gathered, presented, and analyzed. They also explain and justify the study's design, instruments, data sources, data collection procedures, data visualization tools, and analytical methods.

3.1 RESEARCH FRAMEWORK

3.1.1 Conceptual Framework

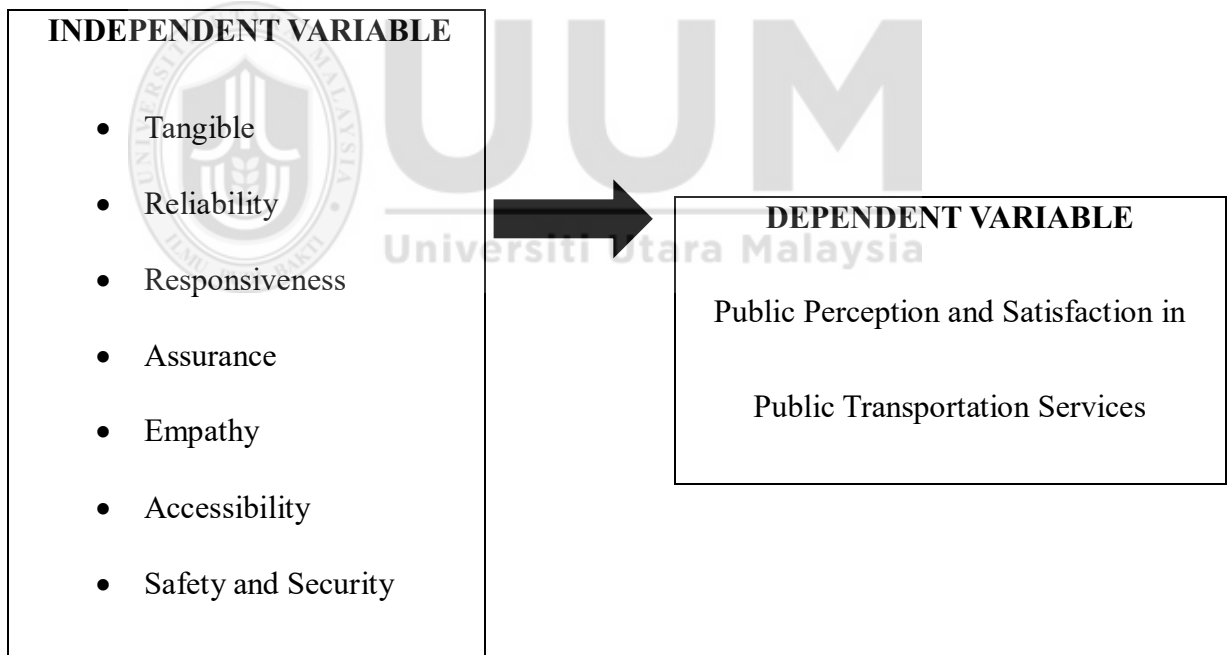


Figure 1: Conceptual Framework

3.2 RESEARCH HYPOTHESIS

H1: There is a positive relationship between tangible and assessing public transportation services within public satisfaction in Penang.

H2: There is a positive relationship between the reliability and assessing public transportation services within public satisfaction in Penang.

H3: There is a positive relationship between responsiveness and assessing public transportation services within public satisfaction in Penang.

H4: There is a positive relationship between the assurance and assessing public transportation services within public satisfaction in Penang.

H5: There is a positive relationship between empathy and assessing public transportation services within public satisfaction in Penang.

H6: There is a positive relationship between accessibility and assessing public transportation services within public satisfaction in Penang.

H7: There is a positive relationship between safety and security and assessing public transportation services within public satisfaction in Penang.

3.3 RESEARCH DESIGN

Research design is a kind of study that is being planned and what kind of results are aimed at (Van Wyk, 2015) It is also a detailed outline for gathering and analyzing data and information based on research questions and objectives. This research studies the public perception and satisfaction with public transportation services in Penang. Quantitative data is characterized by numerical values that can be measured and analyzed statistically as and Quantitative type of research study. As cited by SIS International Research," Quantitative research is a methodical way of collecting and evaluating data gathered from multiple sources, using computational, statistical, and mathematical methods to derive results." Furthermore, it is a descriptive-survey type of quantitative research because it only discusses and assesses the description of the respondents' responses to public perception and satisfaction with public transportation services in Penang.

3.4 MEASUREMENT OF VARIABLES

I. Dependent Variable

This research's dependent variable is public perception and satisfaction with Penang's public transport services. It reflects the overall evaluation and subjective experience of those who use transport services in the region.

II. Independent Variables.

According to (Ann, Anyanwu, Nnamocha, & Ugwuegbu, 2019) The First Independent Variable is Tangible, which refers to physical, measurable, and concrete components of the transportation system's performance and outcomes. The second Variable is

Reliability, which refers to the Reliability in public transportation refers to the consistency and dependability of services, including adherence to schedules and minimal delays. It includes factors such as schedule adherence, service frequency, and travel time predictability. (Geurs & van Wee, 2004).

The third variable of Responsiveness refers to a service's capacity to handle passenger requests quickly and efficiently. Service quality, frequency, and accessibility are all important considerations when considering a response. Improving operational responsiveness can increase ridership, customer happiness, and overall service quality. The fourth variable of Assurance refers to employees' civility and capacity to build trust and confidence with customers. The fifth variable is empathy, which is the ability to comprehend and share the feelings of others. It entails putting oneself in someone else's shoes and experiencing the world through their eyes. The sixth variable of Accessibility in public transport refers to the ease and convenience of reaching and using transportation services by individuals, considering factors like service coverage, frequency, service hours, and reliability.

The Final variable is Safety and Security. Safety and security in public transportation services encompass the measures and conditions that protect passengers from accidents, injuries, and criminal activities, including physical safety, personal security, passenger perceptions, emergency preparedness, and infrastructure security." (Loukaitou-Sideris & Fink, 2008).

3.4.1 Theoretical Framework and Underpinning Theory

III. Theory of Service Quality: SERVQUAL Model

SERVQUAL is a multidimensional research technique that assesses customers' perceptions and expectations. SERVQUAL's diagnostic value is supported by models that provide a conceptual framework for scale development. As previously stated, it is based on the anticipation/disconfirmation paradigm. According to (Darling-Hammond, Flook, Cook-Harvey, Barron, & Osher, 2020), the instrument is the most widely used measurement scale for assessing service quality in various contexts and cultures. Despite the academic critique, context-specific applications remain popular among enterprises. (S. Brady, Kearsey, Monigatti, Sindel, & Tsui-Po, 2009).

(Parasuraman et al., 1988) Designed the SERVQUAL model in 1988, with the initial goal of building quality systems in American enterprises (Robinson, 1999). At the time, service measurement was challenging to define and seemed ambiguous. The model grew in popularity and significantly impacted the US market in the early 1990s, giving it a competitive advantage. The SERVQUAL model is a reliable qualitative analysis technique that assesses observed quality utilizing environmental and generic components. (Panda & Das, 2014). Perceived quality is distinct from objective quality, which is tested against predetermined standards. (V. A. Zeithaml, 1982).

Concerning Penang's public transportation systems, the SERVQUAL model is not just a tool but a cornerstone for analyzing the service quality elements that influence public perception and satisfaction. The unique challenges and opportunities in Penang's public transportation landscape make choosing an appropriate theoretical framework essential, and the SERVQUAL model's comprehensive framework for measuring

service quality aligns perfectly with the study's goal of enhancing public transportation in Penang. (Laisak, Rosli, & Sa'adi, 2021). The complexity of public transportation service quality in Penang cannot be overstated. It comprises a wide range of factors that significantly influence passenger experience, making the role of the SERVQUAL model in this study crucial. (de Oña, Estévez, & de Oña, 2020) They established five dimensions for safety, cleanliness, comfort, information availability, and personnel conduct. This study uses the SERVQUAL paradigm to examine how these characteristics affect public perception and satisfaction with Penang's public transportation services.

The SERVQUAL paradigm, as applied in Penang, allows for an organized assessment of service quality across the main dimensions. It enables the assessment of reliability, accessibility, safety, and security, all of which are significant considerations for Penang's public transportation users. By investigating these factors within the local context, this study intends to identify areas for improvement and influence policy decisions to improve the overall quality of public transportation services in Penang. The SERVQUAL methodology compares customer expectations and perceptions, identifying gaps in service quality (Parasuraman et al., 1988).

The results usually show specific regions with significant variations between expected and perceived service levels. Passengers are likely to anticipate higher levels of reliability (e.g., schedule adherence), suggesting room for improvement (de Oña et al., 2020). By studying the relationship between service quality variables and overall satisfaction, the study shows how each dimension affects public perception and satisfaction with Penang's public transportation. According to (de Oña et al., 2020), improved service quality, such as reliability, accessibility, safety, and security, leads

to higher overall satisfaction. The findings of this research can potentially influence policy decisions, leading to tangible improvements in Penang's public transportation services.

3.5 DATA COLLECTION

3.5.1 Survey Instruments

Data-collection tool that is designed to be completed by a respondent without an interviewer's assistance. It can be presented on online platforms(Google Forms). A self-administered questionnaire has some benefits, such as reducing interviewer bias, saving time and cost, and increasing respondent privacy. Questionnaires were sent by researchers to respondents on Penang residents' road users. The researchers selected this method and there are many advantages of the questionnaire. Questionnaires are useful for gathering a large amount of information from many responders in a short period. Aside from that, the questionnaire results are usually easy for the researchers to count. Furthermore, rationalists believe that quantitative data might assist in developing new theories or hypotheses.

3.5.2 Development Process and Sources

The development process and sources for this analysis are we employ the Likert Scale, which is one of the most popular scale types in survey research. Respondents are asked to rate their level of agreement or disagreement with a set of propositions, which normally range from "strongly disagree" to "strongly agree." It is simple but may lack hardness when compared to other scale types. Finally, analyze the data. After gathering responses, examine the data using proper statistical approaches to reach useful findings and insights. Validation of questionnaire: Assess the reliability and validity through statistical analyses and comparisons with established measures, if applicable.

These questions are designed to be completed independently by participants. The survey questionnaire has been categorized into two (2) categories, namely: Part A – Demographic Information/Profile of the Respondents, and Part B Perception-based and satisfaction questions of variables towards Public Transportation Services, which is aligned to the research problem and objective and the questions regarding the independent variable of 7 variables.

Part A: Demographic characteristics/Profile of Respondents- This section includes questions regarding the personal characteristics of road users, such as age, gender, ethnicity, distance from home, accessibility to the Hub/travel destination, and travel costs. The respondents' age choices were based on the Road Transport Act (JPJ) 1987, which states that the minimum age for applying for a Goods Vehicle Driving License (GDL) is 21 years old or older and that only Competent Driving License holders aged 18 and up are eligible to apply for an International Driving Permit. The selections and their related descriptions are as follows:

The Age Group is as below:

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65 and above 75 years old above

The gender is as below:

- Male
- Female

Distance from home:

- < 500 meters
- 2 km – 3 km
- 4 km – 5 km
- > 5 km

Accessibility to the Hub/Travel Destination:

- Driving
- Motorcycle
- Public transport
- Private Car: Grab, Taxi, In-drive or others

Travel Cost

- Less than RM5
- More than RM5



Part B: Perception-based and satisfaction questions of variables towards Public Transportation Services and more questions related to the seven variables of independent variables. In this study, the 5 Likert Scale was used to measure. This will be used to allow the respondents to express how much they agree or disagree with a questionnaire. For it to be clear, see the criteria below:

- 1 Strongly Agree
- 2 Agree
- 3 Neutral
- 4 Disagree
- 5 Strongly Disagree

The interpretation guide above will be used for the item measuring the public perception and satisfaction of road users in public transportation services in Penang.

3.6 POPULATION AND SAMPLING TECHNIQUE

3.6.1 Population

The population of the study is defined as a small number of target population members that also could be a useful method for testing questionnaires. (Deusa-López, Cuenca-Martínez, Sánchez-Martínez, & Sempere-Rubio, 2024). This study's population comprises Penang Road Users and residents who utilize public transportation services. This includes a diverse group of people, such as daily commuters, occasional users, and students who rely on public transportation services for mobility. Then, the researchers administered a validated questionnaire to the respondents, road users in Penang.

3.6.2 Sampling Techniques

I. Sampling Frame

The sampling frame for this research is road users and residents and it could be passengers, lorry, car, or bus drivers, students, or residents in Penang who are experienced in traveling and were chosen intentionally with the condition that the passenger respondents should meet the following qualifications:

- a) 18 years old and above.
- b) Using public transportation services
- c) Reside in Penang or Daily Road users in Penang

II. Sampling Method

The sampling method used in this study is convenience sampling, a type of non-probability sampling. This strategy was chosen due to its simplicity and efficiency in gathering data from a readily available and willing population of respondents. The Convenience sampling was chosen for a few reasons which is Accessibility: Respondents are chosen according to their availability and willingness to participate. Which makes data collection more efficient. Furthermore, Cost-effectiveness: This method is less costly than probability sampling procedures, which need more resources and time to establish vast sampling frames and choose respondents. Given time, resource, and personnel constraints, convenience sampling is the most feasible method for gathering a large amount of data in a short period. Lastly, Exploratory in nature, this survey aims to investigate public opinions and satisfaction levels, therefore the convenience sample is appropriate for producing initial insights and finding trends.

The process of convenience sampling involves several steps in which the questionnaire is distributed in public transportation hubs, such as bus stations, important bus routes, and transit stops, which have been recognized as key locations for contacting potential respondents. We also distribute via Online platforms (Google Forms), such as social media groups, and community forums which are also noted as active among Penang residents and road users. Participation is completely voluntary. Respondents are informed about the purpose of the research, ensured their confidentiality, and allowed to withdraw at any moment without penalty. The data collection is carried out over a predefined period, allowing enough time to reach a broad population of respondents to collect a representative sample of public transportation users.

Advantages:

Speed and Efficiency: Rapid data collecting enables fast analysis and reporting and it is Low cost when compared to more complicated sample procedures, fewer financial and logistical resources are required. Ease of Implementation: Simple and straightforward to administer, particularly for online distribution.

Limitations: Sampling Bias: The non-random nature of convenience sampling may introduce bias, as certain segments of the population may be underrepresented or over-represented. Limited Generalization: Findings from a convenience sample may not be generalization to the entire population of Penang Road users and residents due to the lack of random selection. Over-reliance on freely accessible respondents may result in overlapping responses, especially in online environments.

This study used non-probability sampling, specifically convenience sampling. Non-probability sampling is a sampling method in which not all persons in the population are given an equal opportunity to participate in the study.

This strategy is commonly employed when the population's characteristics are unknown or when probability sampling is problematic. Rationale for non-probability sampling

It is used for the following reasons: Cost and Time Efficiency: It takes less time and money than probability sampling. Feasibility: It is appropriate for exploratory study where the goal is to gain preliminary insights rather than statistical representation. Specific Contexts: Suitable for research in which an accurate understanding of a specific phenomenon, method, or group is more important than generalization.

3.6.3 Sample Size

The sample size of this research is about 400 respondents was determined to be adequate for this study. This number allows for a reasonable degree of confidence in the results while being manageable within the constraints of time and resources. A sample is referred to as a small subset of a population.

3.7 DATA COLLECTION PROCEDURE

Data collection is the process of gathering and measuring information about certain variables in research, allowing one to answer pertinent questions and interpret the results. The data is collected via self-administered questionnaires. Researchers distribute questionnaires to respondents on Penang's roads using Google Forms. The researchers chose this strategy, and the questionnaire has numerous advantages. Questionnaires are useful for gathering a large amount of information from many respondents in a short period. Aside from that, the questionnaire results are usually easy for the researchers to count. Furthermore, rationalists believe that quantitative data might assist in developing new theories or hypotheses.

A sample is a manageable section of a population, but its elements have common characteristics (Yaya, 2014). As the study is interested in generalizing the findings to the whole population, the most suitable design for this study is probability sampling. Road users are divided into two categories pedestrian and vehicle drivers (which can be private or public transport users). Furthermore, the Time Horizon for this research is cross-sectional research. Cross-sectional research is the research where the data is collected just at one time. In this study, data will be gathered once and analyzed utilizing a questionnaire

3.7.1 Pilot Study

Online Google Forms conducted a Pilot Test among the twenty-five (25) prospective respondents. These prospective respondents may still be part of the primary data collection process. Prospective cohort studies were conducted while the survey questionnaire was administered, using secondary data to study the Pilot test.

The pilot testing – Conduct a draft survey based on the categories provided (demographic information, behavioral and knowledge-related questions. The respondents were given the privilege to ask for clarifications about the survey questionnaire and to identify questions that may be too vague or difficult to answer. The primary study will be conducted by sending the survey via the online survey tool. After answering the survey questionnaire, they were asked how they understood each question and response choice. Gather responses and monitor for any technical issues with the online tool or confusion about instruction.

The pilot test findings were tested for internal validity using Cronbach's Alpha. IBM Statistical Package for the Social Sciences or SPSS Software was utilized to calculate and analyze Cronbach's Alpha Test. This was done by encoding the responses concerning the questions and the reactions of the other respondents. It uses the following formula for the formulation of these:

Here's a breakdown of the formula:

$$\alpha = \frac{n}{n-1} \left(1 - \frac{\sum V_i}{V_t} \right)$$

Where:

- α : Cronbach's alpha
- n : The number of items in the test or scale
- $\sum V_i$: The sum of the variances of each item
- V_t : The variance of the total scores (the variance of the sum of all items)

3.8 TECHNIQUES OF DATA ANALYSIS

Data analysis is an essential element of any research project because it allows researchers to make sense of the obtained data and reach useful findings. This section describes how the data was analyzed for the study on public perception and satisfaction with Penang's public transportation services. The data analysis for this study was conducted through the Statistical Package for Social Science software, or SPSS version 25. Quantitative research studies use a variety of statistical tools to examine data and reach conclusions. Before conducting any statistical analysis, the collected data was prepared through data entry and coding the questionnaire responses were entered into statistical software (such as SPSS and Excel). Each response was numerically coded to aid analysis. For example, responses on the Likert scale were coded as follows: 1 means strongly disagree, 2 means disagree, 3 means neutral, 4 means agree, and 5 means strongly agree.

Furthermore, the quantitative statistical software programs will be used to address the descriptive analysis to describe the demographic background of respondents, including the gender of students, age, nationality, ethnicity, religion, and types of road users. Descriptive analysis involves defining and describing the main features of a dataset, utilizing measures such as mean, median, mode, standard deviation, and frequency distributions to characterize variables' central tendency, variability, and distribution.

Normality analysis was used to evaluate whether the data followed a normal distribution, which is assumed by many parametric statistical tests. Skewness and kurtosis were calculated for each variable. Values ranging from -2 to +2 were regarded as acceptable, indicating that the data was normally distributed.

Reliability and Validity Testing is to confirm the reliability and validity of the survey method. The following tests were performed: Cronbach's Alpha: This statistic was used to determine the questionnaire's internal consistency. A Cronbach's alpha value of 0.7 or above was deemed satisfactory, indicating that the questions inside each SERVQUAL dimension accurately measured the same underlying construct. Construct Validity: Factor analysis was used to ensure that the questionnaire items matched the expected SERVQUAL dimensions. This helps to guarantee that the survey instrument accurately measured the desired constructs.

Inferential statistics were applied to conclude from the sample data to the larger population. The following techniques were used: Correlation Analysis: Correlation analysis examines the relationship between variables, employing tools like the Pearson correlation coefficient for linear relationships between continuous variables and Spearman's rank correlation coefficient for non-linear or ordinal associations. Regression analysis: Multiple regression analysis was used to assess the impact of each SERVQUAL dimension on overall satisfaction. This research helped to determine which dimensions were the most significant predictors of satisfaction. These methods collectively aid researchers in understanding the relationships, patterns, and predictive capacities within their datasets, facilitating the generation of meaningful insights and conclusions

3.9 SUMMARY

Table 1 : Summary

Research Design	• Numerical data • Quantitative Research • Descriptive survey type
Data Collection (Survey Instrument)	• Self-administered questionnaire
Data Collection (Development process and sources)	• 5 Likert Scale • Scale type: Strongly disagree to Strongly Agree • Reliability and Validity
Population	• Penang Road Users and Residents who utilize public transportation services
Sampling Method	• Convenience Sampling • Non-Probability sampling
Sample Size	• 400 respondents
Data Collection Procedure	• Self-administered questionnaire • Distributed through Google Forms and social media Platforms • Time Horizon: Cross-sectional research
Pilot Study	• Twenty-five (25) prospective respondents.
Technique of Data Analysis	• Statistical Package of Social Science (SPSS) • Normality Analysis • Reliability and Validity Testing • Correlation Analysis • Regression Analysis

CHAPTER 4: DATA ANALYSIS AND FINDINGS

4.0 INTRODUCTION

Chapter 4 presents the conclusions of the data analysis and contains a detailed interpretation of the data. The data is analyzed using the Statistical Package for Social Sciences (SPSS).

4.1 DEMOGRAPHIC BACKGROUND

The study's demographic profiles, based on Table 1, include gender, age group, ethnicity, distance from home, religion, the types of transport used, and transport cost. The sample profiles showed more male (221) respondents than female (179) respondents, representing 55.3% and 44.80%, respectively. The rest of the demographic variables are described in Table 1 below.

Table 2: Demographic Background

Gender					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Male	221	55.3	55.3	55.3
	Female	179	44.8	44.8	100.0
	Total	400	100.0	100.0	

Age Group					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	18-24	140	35.0	35.0	35
	25-34	120	30.0	30.0	65
	35-44	72	18.0	18.0	83
	45-54	46	11.5	11.5	94.5
	55-64	22	5.5	5.5	100.0
	Total	400	100.0	100.0	

Ethnicity					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Malay	92	23.0	23.3	23.0
	Chinese	106	26.5	26.5	49.5
	Indian	190	47.5	47.5	97.0
	Others	12	3.0	3.0	100.0
	Total	400	100.0	100.0	

Distance from home					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<500	114	28.5	28.5	28.5
	2km-3km	136	34.0	34.0	62.5
	4km-5km	92	23.0	23.0	85.5
	>5km	58	14.5	14.5	100.0
	Total	400	100.0	100.0	

What types of Transport are you using for your daily commute?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Buses	136	34	34.0	34.0
	Train	73	18.3	18.3	52.3
	Own Transportation	111	27.8	27.8	80.0
	Private Car	80	20	20	100.0
	Total	400	100.0	100.0	

Travel Cost					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than RM5	205	51.3	51.3	51.3
	More than RM5	195	48.8	48.8	100.0
	Total	400	100.0	100.0	

4.1.1 Gender

As depicted in Table 2, most respondents are male (55.30%), and the remaining are female (44.80%).

4.1.2 Age

As depicted in Table 2 most of the respondents are between 18 and 24 years old (35%), the second is from 25 to 34 (30%), the third is between 35 and 44 years old (18%), and the least is from 45 to 54 years (11.5%) and 55 and 64 years old (5.50%).

4.1.3 Ethnicity

As depicted in Table 2, most respondents are Indians (47.50%). The second majority of ethnicities is Chinese (26.50 %) and Malay (23%), and the remaining respondents are from other ethnicities (3%).

4.1.4 Distance from home

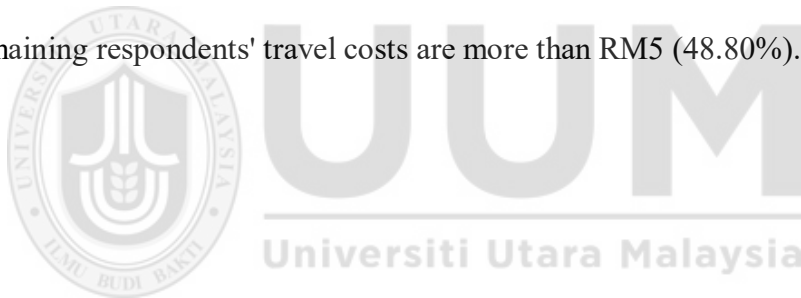
As depicted in Table 2, most respondents are chosen 2 km- 3km (34%). The second majority is <500 km (28.5%) and 4 km-5km (23%), and the remaining respondents are from chosen >5km (14.50%).

4.1.5 Types of Transport that are Used for Daily Commutes

As depicted in Table 2, most respondents use buses (34%). The second majority of users use their Own transportation (27.80%) and train (18.30%), and the remaining respondents are from chosen private cars (20%).

4.1.6 Travel Cost

As depicted in Table 2, most respondents' travel costs are less than RM5 (51.30%), and the remaining respondents' travel costs are more than RM5 (48.80%).



4.2 NORMALITY ANALYSIS

The study's primary constructs are examined to have a better understanding of the findings. This includes displaying the mean and standard deviations for each construct. In addition, the scale point rank and progression of degree are displayed. A normality test was also performed to confirm that the data distribution was equal. George and Mallery (2010) observed skewness and kurtosis values in the ± 2 range.

Table 3: shows the skewness and kurtosis values.

Descriptive Statistics						
Variable	Skewness			Kurtosis		
	Statistic	Std. Error	Z-Value	Statistic	Std. Error	Z-Value
DV_PTS	0.481	0.122	3.9426	-0.909	0.243	-3.7407
IV_T	0.453	0.122	3.7131	-1.026	0.243	-4.2222
IV_R	0.487	0.122	3.9918	-1.057	0.243	-4.3497
IV_RPS	0.467	0.122	3.8278	-1.031	0.243	-4.2428
IV_A	0.285	0.122	2.3360	-0.596	0.243	-2.4526
IV_E	0.453	0.122	3.7131	-1.145	0.243	-4.7119
IV_ACS	0.483	0.122	3.9590	-0.959	0.243	-3.9465
IV_SS	0.254	0.122	2.0819	-0.535	0.243	-2.2016

Table 3 shows that the dependent variable of public transportation services' Z-value is not normally distributed because it is Not between the range of ± 2 ; and then the independent variable of tangible, reliability, Responsiveness, Empathy, and Accessibility is not normally distributed because it is also not between the range of Z-value ± 2 and variables of assurance and safety and security only normally distributed because it's between the range of ± 2 .

4.3 RELIABILITY ANALYSIS

Table 4 shows that the Cronbach alpha values for each variable ranged from 0.956 to 0.770. Nunnally (1978) defines good alpha values as those equal to or better than 0.70, while excellent alpha values as those larger than 0.9. Thus, the dependable variable of public transportation services and reliability are excellent, and other variables are good.

Table 4: Reliability analysis

Variables	No of items	Cronbach's Alpha	Status
Public transportation services	4	0.915	Excellent
Tangible	4	0.770	Good
Reliability	5	0.956	Excellent
Responsiveness	4	0.895	Good
Assurance	4	0.783	Good
Empathy	2	0.870	Good
Accessibility	2	0.862	Good
Safety and Security	4	0.770	Good

4.4 CORRELATION

In this research, the researcher used Pearson correlation analysis to identify the relationship between dependent and independent variables According to Kanazawa (2018) A high correlation for this study is between 0.925 and 0.754, and we did not have a medium or low correlation.

Table 5: Correlation

	Correlations							
	Public Transportation services	Tangible	Reliability	Responsiveness	Assurance	Empathy	Accessibility	Safety and Security
Public Transportation Services	1							
Tangible	.795**	1						
Reliability	.784**	.826**	1					
Responsiveness	.925**	.876**	.887**	1				
Assurance	.754**	.925**	.765**	.820**	1			
Empathy	.793**	.918**	.920**	.921**	.858**	1		
Accessibility	.782**	.980**	.826**	.873**	.943**	.921**	1	
SafetyAnd Security	.760**	.937**	.760**	.801**	.981**	.829**	.924**	1

** . Correlation is significant at the 0.01 level (2-tailed).
N: 400

Table 5 demonstrates the correlation between dependent and independent variables factors. All correlations are significant at the 0.01 level, indicating strong relationships between the variables. Public transportation services have a significant relationship with responsiveness ($p < 0.01$) and have a high correlation ($r(400) = 0.925$) suggesting that responsiveness is a critical factor in user satisfaction. The second is that tangible also has a high correlation with public transportation services ($r(400) = 0.795$) indicating its importance in public transportation services., and the third high correlation variable is empathy ($r(400) = 0.793$) and the fourth high correlation variable is reliability ($r(400) = 0.784$) shows a strong correlation with public satisfaction. The analysis indicated that the responsiveness of the public transportation services in Penang has a highly significant correlation.

4.5 REGRESSION ANALYSIS

As depicted in Table 6, the F-statistics (532.029) is large, and the corresponding p-value is highly significant ($p = 0.000$, $p < 0.05$). This indicates that the slope of the estimated linear regression model line is not equal to zero, confirming a linear relationship between public transportation services in Penang. The model summary is excellent since the R-squared of 0.951 implies that the seven predictor variables explain about 95.10% of the variance in public transportation services. This is quite a good and respectable result.

Table 6: Regression

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.951 ^a	.905	.903	.31588

a. Predictors: (Constant), IV_SafetyandSecurity, IV_Reliability, IV_Responsiveness, IV_Accessibility, IV_Empathy, IV_Tangible, IV_Assurance

b. Dependent Variable: DV_Publictransportationservices

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	371.605	7	53.086	532.029	<.001 ^b
	Residual	39.114	392	.100		
	Total	410.719	399			

a. Dependent Variable: DV_Publictransportationservices

b. Predictors: (Constant), IV_SafetyandSecurity, IV_Reliability, IV_Responsiveness, IV_Accessibility, IV_Empathy, IV_Tangible, IV_Assurance

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	-.064	.055		.241
	IV_Tangible	-1.492	.216	-1.580	<.001
	IV_Reliability	-.257	.055	-.270	<.001
	IV_Responsiveness	1.344	.045	1.340	<.001
	IV_Assurance	-2.082	.262	-1.920	<.001
	IV_Empathy	.052	.086	.056	.550
	IV_Accessibility	1.139	.180	1.214	<.001
	IV_SafetyandSecurity	2.292	.264	2.089	<.001

a. Dependent Variable: DV_Publictransportationservices

Seven dimensions: tangible, reliability, responsiveness, empathy, accessibility, and safety and security. Tangible influence negatively on public transportation services ($p = 0.000$, $t = -6.905$), reliability also influences negatively on public transportation services ($p = 0.000$, $t = -4.719$), responsiveness influence significantly by ($p = 0.000$, $t = 29.884$), and assurance influence negatively on public transportation services ($p = 0.000$, $t = -7.941$), and empathy not statically significantly because it's more than ($p > 0.05$) which is ($p = 0.000$, $t = 0.599$), and accessibility influence significantly on public transportation services ($p = 0.000$, $t = 6.339$), and for safety and security influence significantly on public transportation services ($p = 0.000$, $t = 8.674$). The highest contribution for this study is the variable of safety and security (Beta= 2.089) and the lowest contribution is variable reliability (Beta=-0.270).

4.6 FACTORS THAT INFLUENCE PUBLIC PERCEPTION SATISFACTION IN PUBLIC TRANSPORTATION SERVICES IN PENANG.

A positive relationship exists between the safety and security aspects of public transportation services and overall public satisfaction in Penang.

In the Google form, eight variables were suggested in the questionnaire. Based on the data collected, the respondents strongly agree that safety and security mean the most satisfaction for the public transportation services in Penang. Out of 400 responders, the majority strongly agree with the four points included in the questionnaire under Tangible. The remaining respondents were the chosen neutral, and few disagreed with the factor. As a result, safety and security contribute to high public perception and satisfaction with the public transportation services in Penang.

4.7 HYPOTHESIS TESTING

The following subsections provide detailed explanations of the study's hypotheses and testing outcomes.

Multiple Regression analysis was performed to test the following hypothesis.

H1: There is a positive relationship between tangible and assessing public transportation services within public satisfaction in Penang.

H2: There is a positive relationship between the reliability and assessing public transportation services within public satisfaction in Penang.

H3: There is a positive relationship between responsiveness and assessing public transportation services within public satisfaction in Penang.

H4: There is a positive relationship between the assurance and assessing public transportation services within public satisfaction in Penang.

H5: There is a positive relationship between empathy and assessing public transportation services within public satisfaction in Penang.

H6: There is a positive relationship between accessibility and assessing public transportation services within public satisfaction in Penang.

H7: There is a positive relationship between safety and security and assessing public transportation services within public satisfaction in Penang.

Table 7: Hypothesis Testing

HYPOTHESIS	STATISTICS	RESULTS
H1: Tangible	P=0.000, T=-6.905	Not Supported
H2: Reliability	P=0.000, T=-4.719	Not Supported
H3: Responsiveness	P=0.000, T=29.884	Supported
H4: Assurance	P=0.000, T=-7.941	Not Supported
H5: Empathy	P=0.000, T=0.599 (P>0.05)	Not Supported
H6: Accessibility	P=0.000, T=6.339	Supported
H7: Safety and Security	P=0.000, T=8.674	Supported

CHAPTER 5: DISCUSSION AND CONCLUSION

This chapter explains and summarizes the project's research findings and conclusions, which are based on the research objectives and hypothesis. It also includes recommendations, future research directions, and limitations.

5.1 CONCLUSION

This study, which focused on SERVQUAL and its elements and added two other variables: accessibility, safety, and security, has significant implications for public transportation services in Penang. The data, gathered at random via a questionnaire and examined from 400 respondents, provided helpful insights. The study successfully achieved its objective of determining the relationship between independent variables and dependent variables. The analysis indicated that assessing public perception and satisfaction correlates highly significantly with all the independent variables: Tangible, reliability, Responsiveness, Assurance, Empathy and safety, and security significantly influence public transportation services. Moreover, the reliability analysis found that all study variables are Excellent and Good. The regression indicated that the variables of responsiveness, accessibility, and Safety and Security supported the hypothesis findings, and other variables did not support the hypothesis findings. The study also identified the limitations of the research and provided suggestions for future study, thereby paving the way for further research and improvements in public transportation services in Penang.

5.2 DISCUSSIONS

This research's primary objective is to investigate whether the independent variables of Tangible, reliability, responsiveness, empathy, assurance, accessibility, and safety and security influence the public perception and satisfaction towards Penang's public transportation services. This question is essential to public transportation services and our understanding of the factors that shape public perception and satisfaction. The research framework explains that the Tangible, reliability, responsiveness, empathy, assurance, accessibility, and safety and security impact public perception and satisfaction, which is significant in public transportation services.

This study's independent variables (IV) are Tangible, reliability, responsiveness, empathy, assurance, accessibility, and safety and security. In contrast, the dependent variable (DV) is Penang's public perception and satisfaction with public transportation services. Specifically, this study has examined how public perception and satisfaction impact public transportation services.

5.2.1 Tangible

Based on results from regression analysis (refer to Table 5), the result shows a negative and significant relationship between Tangible and public transportation services ($p = -0.000 < \alpha$). This result shows that tangible aspects, such as cleanliness, comfort, and availability of seats, are not up to the users' expectations, it can lead to a lower overall satisfaction. High expectations not met by the actual condition can result in a negative perception.

5.2.2 Reliability

Regression analysis (Table 5) indicates a substantial negative link between reliability and public transportation services ($p = -0.000 < \alpha$). The results show that reliability which includes timely service and consistent performance, negatively impacts public satisfaction. This might suggest that inconsistency or perceived unreliability is a major issue for users.

5.2.3 Responsiveness

Our research findings, as revealed by the regression analysis (refer to Table 5), underscore the positive relationship between Responsiveness and public transportation services ($p = 0.000 < \alpha$). This result emphasizes the pivotal role of Responsiveness in public transportation services in Penang, a finding that aligns with previous studies. For instance, (Kobiruzzaman, 2020) Highlighted that Responsiveness is significant public transportation services for public transportation services in Penang. These findings not only validate our research but also underscore its importance.

5.2.4 Assurance

Our research, as revealed by the regression analysis (refer to Table 5), confirms that its a negative relationship between Assurance and public transportation services ($p = -0.000 < \alpha$). The negative effect of assurance might be unexpected, but it could stem from a lack of trust in the competency and courtesy of the service providers. If users do not feel confident in the safety, competence, or courtesy of the transportation staff, it can significantly diminish their overall satisfaction.

5.2.5 Empathy

Regression analysis (Table 5) indicates a significant negative between empathy and public transportation services ($p = -0.000 < \alpha$). The results show that Empathy, which includes caring and individualized attention provided to customers, negatively affects public satisfaction. This could indicate that a perceived lack of empathy is a concern for users.

5.2.6 Accessibility

According to regression analysis (refer to Table 5), there is a significant relationship ($p = 0.000 < \alpha$) between accessibility and public transportation services in Penang. If public transportation is easily accessible and convenient, it significantly improves the user experience and overall satisfaction.

5.2.7 Safety and Security

Regression analysis (Table 5) reveals a significant positive relationship between safety and security and public transportation services ($p = 0.000 < \alpha$). The findings suggest that safety and security are critical components of Penang's public transportation system. This finding is consistent with earlier studies. (Williams, 2014) Safety and security play an important role in the efforts of public transportation services in Penang. The findings of the prior study lend credence to this research purpose.

5.3 LIMITATION

The researcher faced some limitations in completing this research. Respondents to this research have limited information regarding public transportation services, which will affect the respondents' contribution to this research. Besides that, there is a lack of previous studies in the research area. The researcher faces limitations in finding previous studies on our research topic. Therefore, it has become a limitation to identify the scope of works for literature review findings. Finally, consider the time constraint. The researcher finds it difficult to utilize SPSS to examine the data from 400 respondents. The complex nature of utilizing SPSS makes it take longer to examine the data and complete this research.

5.4 RESEARCH CONTRIBUTION

The study generates valuable knowledge to understand better public transportation services, SERVQUAL, and its elements. Its findings provide more information to others about the accessibility, safety, and security of the transportation infrastructure. Our findings will be useful in future studies on approaches to public transportation services, as well as in assisting and proposing appropriate solutions to overcome public transportation issues.

5.5 RECOMMENDATION

5.5.1 Recommendations from The Research

Based on the study of public transportation services in Penang, several recommendations are proposed to enhance public perception and satisfaction, grounded in the SERVQUAL dimensions and supported by relevant research. Regularly upgrading and maintaining the public transportation ensures they are clean, modern, and comfortable. This includes investing in new vehicles, refurbishing older ones, and improving facilities like bus stops, terminals, and real-time information displays. Fisal and Sukor (2021) suggest that improving tangible aspects significantly boosts public satisfaction and competes effectively with private automobiles.

Increasing reliability is another critical factor. Implementing strict adherence to schedules to minimize delays and ensuring buses arrive and depart on time are essential steps. Optimizing routes to reduce travel time and ensure efficient coverage of critical areas in Penang can also enhance reliability. (Kamba, Rahmat, & Ismail, 2007). Emphasize that reliability encourages the use of public transportation and reduces traffic congestion. Improving responsiveness involves providing customer service

training for staff to enhance their responsiveness to passenger inquiries and complaints and establishing robust feedback mechanisms to promptly gather and respond to passenger concerns. (Minhans, 2015) Found that improving responsiveness can significantly increase public satisfaction.

Boosting assurance requires implementing comprehensive safety measures to ensure passenger security, such as surveillance systems and well-lit stops, and enhancing trust through consistent communication and reliable service. (Transport, 2022) Highlighted the importance of assurance in building user confidence. Increasing empathy can be achieved by offering personalized services to cater to the needs of different passenger groups, such as the elderly and disabled, and training staff to be more empathetic towards passengers' needs and concerns. (Noor, Arshad, & Jais, 2014), underscores that empathy from service providers can significantly enhance user satisfaction.

Improving accessibility involves expanding public transportation coverage to underserved areas to ensure more comprehensive accessibility and implementing affordable pricing strategies to make public transportation more accessible to all income groups. (Yeoh, 2014) It stresses the importance of accessibility in improving the overall effectiveness of public transportation systems. Lastly, enhancing safety and security includes conducting regular safety audits to identify and mitigate potential hazards and employing security personnel at critical locations to ensure passenger safety. (Chee & Fernandez, 2013) Safety and security are significant concerns for public transportation users, and addressing these can lead to higher satisfaction rates.

5.5.2 Recommendations for Future Research

Future studies should be conducted over a longer period than current studies. We were unable to dig deeper into this topic or get more expertise because the three-month length to complete the entire project was insufficient, and this time constraint also prevented us from learning anything about it. Therefore, extending the project time is crucial.

Because the respondents in these studies were limited to Penang Road users, which does not accurately reflect the general people's perception and level of satisfaction with public transportation services in Malaysia, the next research should only focus on 400 more respondents. Others may have different perspectives on this topic. Finally, this research should be funded so that researchers can collect data from various locations.



REFERENCES

- Abdulrazzaq, L. R., Abdulkareem, M. N., Yazid, M. R. M., Borhan, M. N., & Mahdi, M. (2020). Traffic Congestion: Shift from Private Car to Public Transportation. *Civil Engineering Journal*.
- Ann, I., Anyanwu, P., Nnamocha, O., & Ugwuegbu, C. (2019). TANGIBLES AND EMPATHY DIMENSIONS (OF SERVPERF MODEL) AND CUSTOMER SATISFACTION IN THE USE OF ATMs.
- ArnoldLoh. (2015). Through the wheels of time.
- Aslam, W., Tariq, A., & Arif, I. (2019). The Effect of ATM Service Quality on Customer Satisfaction and Customer Loyalty: An Empirical Analysis. *Global Business Review*, 20, 1155 - 1178.
- Bates, J. J., Polak, J. W., Jones, P., & Cook, A. (2001). The valuation of reliability for personal travel. *Transportation Research Part E-logistics and Transportation Review*, 37, 191-229.
- Beirão, G., & Cabral, J. A. S. (2007). Understanding attitudes towards public transport and private car: A qualitative study. *Transport Policy*, 14, 478-489.
- Brady, M. K., & Cronin, J. (2001). Some New Thoughts on Conceptualizing Perceived Service Quality: A Hierarchical Approach. *Journal of Marketing*, 65, 34 - 49.
- Brady, S., Kearsey, K., Monigatti, M., Sindel, T., & Tsui-Po, N. (2009). *Customer service excellence in the self-service public library*.
- Cavana, R. Y., Corbett, L. M., & Lo, Y. L. (2007). Developing zones of tolerance for managing passenger rail service quality. *International Journal of Quality & Reliability Management*, 24, 7-31.
- Chee, W. L., & Fernandez, J. L. (2013). Factors that Influence the Choice of Mode of Transport in Penang: A Preliminary Analysis☆. *Procedia - Social and Behavioral Sciences*, 91, 120-127.
- Chen, J. S., & Gursoy, D. (2001). An investigation of tourists' destination loyalty and preferences. *International Journal of Contemporary Hospitality Management*, 13, 79-85.
- Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97-140. doi:10.1080/10888691.2018.1537791
- de Oña, J., Estévez, E., & de Oña, R. (2020). Perception of Public Transport Quality of Service among Regular Private Vehicle Users in Madrid, Spain. *Transportation Research Record*, 2674(2), 213-224. doi:10.1177/0361198120907095
- Deloitte. (2023). "Future of Mobility: Disruptive Trends in Transportation." Deloitte Insights.
- Deusa-López, P., Cuenca-Martínez, F., Sánchez-Martínez, V., & Sempere-Rubio, N. (2024). Maternal outcomes using delayed pushing versus immediate pushing in the second stage of labour: An umbrella review. *International Journal of Nursing Studies*, 152, 104693. doi:<https://doi.org/10.1016/j.ijnurstu.2024.104693>
- Duchateau, H. (1998). Mobility and Accessibility — The Case of Brussels. In M. Labbé, G. Laporte, K. Tanczos, & P. Toint (Eds.), *Operations Research and Decision Aid Methodologies in Traffic and Transportation Management* (pp. 84-103). Berlin, Heidelberg: Springer Berlin Heidelberg.
- Fedorova, T., Asmus, A., & Ashirova, M. LEVEL OF SATISFACTION WITH PUBLIC TRANSPORT SERVICES (BUSES) IN ALMATY (RESULTS OF MARKETING RESEARCH).
- Fillianie, A. N. (2013). *A study on service quality in relations towards customer satisfaction among express bus customer in Kuantan*.

- Freilich, R. H., & White, S. M. (1990). Transportation Congestion and Growth Management: Comprehensive Approaches to Resolving America's Major Quality of Life Crisis. *Loy. LAL Rev.*, 24, 915.
- Geurs, K. T., & van Wee, B. (2004). Accessibility evaluation of land-use and transport strategies: review and research directions. *Journal of Transport Geography*, 12(2), 127-140. doi:<https://doi.org/10.1016/j.jtrangeo.2003.10.005>
- Ihantamalala, F. A., Herbreteau, V., Révillion, C., Randriamihaja, M., Commins, J., Andréambeloson, T., . . . Garchitorena, A. (2020). Improving geographical accessibility modeling for operational use by local health actors. *International Journal of Health Geographics*, 19(1), 27. doi:10.1186/s12942-020-00220-6
- Ismail, A., & Hafezi, M. H. (2011). Analyzing of Bus Operation to Obtain Regular Frequency for Neo-mission. *Australian journal of basic and applied sciences*, 5, 1275-1284.
- Jomnonkwao, S., & Ratanavaraha, V. (2016). Measurement modelling of the perceived service quality of a sightseeing bus service: An application of hierarchical confirmatory factor analysis. *Transport Policy*, 45, 240-252.
- Kamba, A. N., Rahmat, R. A. O. K., & Ismail, A. (2007). Why Do People Use Their Cars: A Case Study In Malaysia. *Journal of Social Sciences*, 3(3). doi:10.3844/jssp.2007.117.122
- Klokkenga. (2020). How to measure the 5 dimensions of service quality.
- Kobiruzzaman. (2020). Five dimensions of service quality- Servqual model of service quality. .
- Kumaran. (2022). Improve public transport: New straits times, NST Online.
- Laisak, A., Rosli, A., & Sa'adi, N. (2021). The Effect of Service Quality on Customers' Satisfaction of Inter-District Public Bus Companies in the Central Region of Sarawak, Malaysia. *International Journal of Marketing Studies*, 13, 53. doi:10.5539/ijms.v13n2p53
- Lierop, D., & El-Geneidy, A. (2016). Enjoying loyalty: The relationship between service quality, customer satisfaction, and behavioral intentions in public transit. *Research in Transportation Economics*, 59. doi:10.1016/j.retrec.2016.04.001
- Liu, Y., Fadilah, S., Ridzuan, D. M., & Firdaus, I. M. (2014). *SERVICE QUALITY AND CUSTOMER SATISFACTION: RAPID KUANTAN IN KUANTAN ROUTE, MALAYSIA*.
- Loukaitou-Sideris, A., & Fink, C. (2008). Addressing Women's Fear of Victimization in Transportation Settings: A Survey of U.S. Transit Agencies. *Urban Affairs Review*, 44(4), 554-587. doi:10.1177/1078087408322874
- Loukaitou-Sideris, A., & Fink, C. (2009). Addressing Women's Fear of Victimization in Transportation Settings: A Survey of U.S. Transit Agencies. *Urban Affairs Review*, 44(4), 554-587. doi:10.1177/1078087408322874
- Mahajan, G. (2020). What Is Customer Value and How Can You Create It? *Journal of Creating Value*, 6, 119-121. doi:10.1177/2394964320903557
- Manani, T. O., Nyaoga, R. B., Bosire, R. M., Ombati, T. O., & Kongere, T. O. (2013). Service quality and customer satisfaction at Kenya Airways Ltd. *European Journal of Business and Management*, 5, 170-179.
- Matsika, E., Ricci, S., Mortimer, P., Georgiev, N., & O'Neill, C. (2013). Rail vehicles, environment, safety and security. *Research in Transportation Economics*, 41(1), 43-58. doi:<https://doi.org/10.1016/j.retrec.2012.11.011>
- Meng, A., & Md Sidin, S. (2021). The Effect of Expectations and Service Quality on Customer Experience in the Marketing 3.0 Paradigm. 2020.
- Minhans, A. (2015). Assessment of Bus Service-Quality using Passengers's™ Perceptions. *Jurnal Teknologi*, 73(4). doi:10.11113/jt.v73.4290
- Noor, N. M., Arshad, A. K., & Jais, I. B. M. (2014). An Analysis of User Satisfaction on Public Transport Terminal Based on Users Survey. *InCIEC 2013*, 369-376.

- Noor, N. M., Arshad, A. K., Jais, I. B. M., & Mustafa, M. (2014, 2014//). *An Analysis of User Satisfaction on Public Transport Terminal Based on Users Survey*. Paper presented at the InCIEC 2013, Singapore.
- Oliver, R. L. (1996). *Satisfaction: A Behavioral Perspective On The Consumer*.
- Omar, A., Lamin, F., & Osman, M. R. *Bus Rapid Transit in Malaysia, a Review on Recent Developments*.
- Ong, J. (2022). Service Quality and Customer Satisfaction: A Study of MyRapid in Malaysia. *International Journal of Tourism & Hospitality in Asia Pasific*, 5, 117-130. doi:10.32535/ijthap.v5i3.1904
- Panda, T. K., & Das, S. (2014). The Role of Tangibility in Service Quality and its Impact on External Customer Satisfaction: A Comparative Study of Hospital and Hospitality Sectors. 13, 53-69.
- Parasuraman, A. P., Zeithaml, V., & Berry, L. (1988). SERVQUAL: A multiple- Item Scale for measuring consumer perceptions of service quality. *Journal of retailing*.
- Perez-Moron, J., Madan, S., Cheu, J., Kee, D., Cheong, L., Chin, R., . . . García, A. (2022). Effect of Service Quality and Customer Satisfaction on Customer Loyalty: A case study of Starbucks in Malaysia. *International Journal of Tourism and Hospitality in Asia Pasific*, 5. doi:10.32535/ijthap.v5i1.1402
- Piètre-Cambacédès, L., & Chaudet, C. (2010). The SEMA referential framework: Avoiding ambiguities in the terms "security" and "safety". *International Journal of Critical Infrastructures Protection*, 3. doi:10.1016/j.ijcip.2010.06.003
- Redman, L., Friman, M., Gärling, T., & Hartig, T. (2013). Quality attributes of public transport that attract car users: A research review. *Transport Policy*, 25, 119–127. doi:10.1016/j.tranpol.2012.11.005
- Robinson, S. (1999). Measuring Service Quality: Current Thinking and Future Requirements. *Marketing Intelligence & Planning*, 17, 21-32. doi:10.1108/02634509910253777
- Saif, M. A., Zefreh, M. M., & Torok, A. (2019). Public Transport Accessibility: A Literature Review. *Periodica Polytechnica Transportation Engineering*, 47(1), 36-43. doi:10.3311/PPtr.12072
- Sam, E. F., Sam, E. F., Hamidu, O., & Daniels, S. (2017). SERVQUAL analysis of public bus transport services in Kumasi metropolis, Ghana: Core user perspectives. *Case Studies on Transport Policy*, 6, 25-31.
- Samidi, S. (2021). The Influence of Service Quality and Price on Customer Satisfaction: Case Study of PT. Lion Mentari Airlines. *International Journal of Business Studies*.
- Savage, I. (2013). Comparing the fatality risks in United States transportation across modes and over time. *Research in Transportation Economics*, 43, 9–22. doi:10.1016/j.retrec.2012.12.011
- Schryen, G., Wagner, G., & Benlian, A. (2015). *Theory of Knowledge for Literature Reviews: An Epistemological Model, Taxonomy and Empirical Analysis of IS Literature*.
- Shamsudin, M. F., FatiniRasol, N. E., Nayan, S. M., Esa, S. A., & Kadir, B. (2020). The Effect of Service Quality on Customer Satisfaction Towards Myrapid Bus Services. *SSRN Electronic Journal*.
- Shokouhyar, S., Safari, S., & Mohsenian, F. (2018). Improving candy industry competitiveness: Retailers' perception regarding customer satisfaction. *Journal of Food Products Marketing*, 24(6), 761-783. doi:10.1080/10454446.2017.1389666
- Singh, B., & Kumar, D. (2014). *CUSTOMER SATISFACTION ANALYSIS ON SERVICES OF DELHI METRO*.
- Slack, N. J., & Singh, G. (2020). The effect of service quality on customer satisfaction and loyalty and the mediating role of customer satisfaction. *The TQM Journal*.

- Stenbacka, C. (2001). Qualitative research requires quality concepts of its own. *Management Decision*, 39(7), 551-556. doi:10.1108/EUM0000000005801
- 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:<https://doi.org/10.1016/j.rtbm.2014.04.001>
- Sumaedi, S., Bakti, G., & Yarmen, M. (2012). The empirical study of public transport passengers' behavioral intentions: The roles of service quality, perceived sacrifice, perceived value, and satisfaction (case study: Paratransit passengers in jakarta, indonesia). *International Journal for Traffic and Transport Engineering*, 2, 83-97.
- Taylor, D. B., Miller, D., Iseki, H., & Fink, C. (2008). Nature and/or nurture? Analyzing the determinants of transit ridership in urbanized areas. *Transportation Research Part A*, 43, 60-77.
- Theresia, L., & Bangun, R. (2017). Service quality that improves customer satisfaction in a university: a case study in Institut Teknologi Indonesia. *IOP Conference Series: Materials Science and Engineering*, 277(1), 012059. doi:10.1088/1757-899X/277/1/012059
- Thompson, K., & Schofield, P. (2007). An investigation of the relationship between public transport performance and destination satisfaction. *Journal of Transport Geography*, 15, 136-144.
- Tirachini, A., Hensher, D. A., & Rose, J. M. (2013). Crowding in public transport systems: Effects on users, operation and implications for the estimation of demand. *Transportation Research Part A-policy and Practice*, 53, 36-52.
- Transport, M. o. (2022).
- Van Wyk, B. E. (2015). A review of commercially important African medicinal plants. *Journal of Ethnopharmacology*, 176, 118-134. doi:<https://doi.org/10.1016/j.jep.2015.10.031>
- Wang, H., Zhang, Y. (2021). High-Speed Rail: Innovations and Policy Implications." *Transportation Research Part A: Policy and Practice*, 143, 1-15.
- Williams, S. M. a. M. (2014). Bristol, Blue Ridge Summit: Multilingual Matters.
- Yavuz, N., & Welch, E. (2010). Addressing Fear of Crime in Public Space: Gender Differences in Reaction to Safety Measures in Train Transit. *Urban studies (Edinburgh, Scotland)*, 47, 2491-2515. doi:10.1177/0042098009359033
- Yeoh, D. T. a. W. (2014). Penang's growing pains, The Star. doi:<https://www.thestar.com.my/lifestyle/features/2014/08/22/penangs-growing-pains/>
- Zeithaml, V., Bitner, M. J., & Gremler, D. D. (1996). *Services Marketing: Integrating Customer Focus Across the Firm*.
- Zeithaml, V. A. (1982). Consumer Response to In-Store Price Information Environments*. *Journal of Consumer Research*, 8(4), 357-369. doi:10.1086/208876

APPENDIX 1

ASSESSING PUBLIC PERCEPTION AND SATISFACTION WITHIN PUBLIC TRANSPORTATION SERVICES IN PENANG.

I am a final-year Master of Science (Transportation and Logistics Management) research student at the School of Technology Management and Logistics at Universiti Utara Malaysia. This survey aims to gather information regarding public perception and satisfaction with public transportation services in Penang.

Your participation in this survey will greatly contribute to the success of my research project. I genuinely appreciate your willingness to take part. There are no right or wrong answers, and all responses will be kept confidential.

Thank you for your kind participation.

Poovaneswary Murugasan

Universiti Utara Malaysia

* Indicates required question

Section A

Demographic Information

1. Gender *

Mark only one oval.

☐ Male

☐ Female

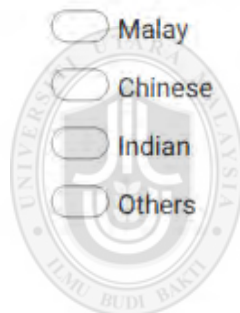
2. Age Group *

Mark only one oval.

- ☐ 18-24
- ☐ 25-34
- ☐ 35-44
- ☐ 45-54
- ☐ 55-64
- ☐ 65 and above 75 years old above

3. Ethnicity *

Mark only one oval.



- ☐ Malay
- ☐ Chinese
- ☐ Indian
- ☐ Others

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4. Distance from home *

Mark only one oval.

- ☐ < 500 meters
- ☐ 2 km – 3 km
- ☐ 4 km – 5 km
- ☐ > 5 km

5. Accessibility to the Hub/Travel Destination *

Mark only one oval.

- ☐ Driving
- ☐ Motorcycle
- ☐ Public transport
- ☐ Private Car: Grab, Taxi, In-drive or others

6. Travel Cost *

Mark only one oval.

- ☐ Less than RM5
- ☐ More than RM5

Section B

The following statements are regarding the public perception and Satisfaction with public transportation services in Penang. There are 5 questions needed to answer.

Instructions: Please use this scale provided below to answer the following question by the most appropriate answer.

7. What types of transportation do you prefer to use for your daily commute in Penang? *

Mark only one oval.

- ☐ Buses (Rapid Penang/CAT Penang)
- ☐ Ferries
- ☐ Train (KTMB)
- ☐ Own Transportation (Car/Motorcycle)
- ☐ Private car(Taxi, Grab)

8. Public transportation services *

Check all that apply.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I satisfied with the public transportation services in Penang.	☐	☐	☐	☐	☐
The public transportation services in Penang are punctual and reliable.	☐	☐	☐	☐	☐
The public transportation vehicles in Penang are clean and comfortable to travel.	☐	☐	☐	☐	☐
I feel safe and secure when using public transportation in Penang.	☐	☐	☐	☐	☐

9. Tangible *

Check all that apply.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The physical facilities of the transportation service are visually appealing.	☐	☐	☐	☐	☐
The vehicles are clean and well-maintained	☐	☐	☐	☐	☐
The staff are neat and professional in appearance.	☐	☐	☐	☐	☐
The informational materials (schedules, maps, etc.) are clear and easy to understand.	☐	☐	☐	☐	☐

10. Reliability *

Check all that apply.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The Real-time information (such as schedules and delays) for public transportation in Penang is readily available and accurate to the public.	☐	☐	☐	☐	☐
The transportation service provides its services at the times it promises to do so.	☐	☐	☐	☐	☐
I experience minimal delays when using public transportation in Penang.	☐	☐	☐	☐	☐
The service keeps accurate records (e.g., of tickets and passenger information).	☐	☐	☐	☐	☐
Public transportation in Penang is reliable for	☐	☐	☐	☐	☐

11. Responsiveness *

Check all that apply.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The service provides prompt service to passengers	☐	☐	☐	☐	☐
The employees are always willing to help passengers.	☐	☐	☐	☐	☐
The service responds quickly to passenger requests and complaints.	☐	☐	☐	☐	☐
The employees are available to answer passengers' questions.	☐	☐	☐	☐	☐

12. Assurance *

Check all that apply.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The behavior of employees instills confidence in passengers.	☐	☐	☐	☐	☐
Passengers feel safe during their travel.	☐	☐	☐	☐	☐
The employees are consistently courteous.	☐	☐	☐	☐	☐
The service has knowledgeable employees who can answer passenger questions.	☐	☐	☐	☐	☐

13. Empathy *

Check all that apply.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The service gives passengers individual attention.	☐	☐	☐	☐	☐
The employees understand the specific needs of their passengers.	☐	☐	☐	☐	☐
The service has the passengers' best interests at heart.	☐	☐	☐	☐	☐
The service operates at convenient times for passengers.	☐	☐	☐	☐	☐

14. **Accessibility ***

Check all that apply.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Public transportation services in Penang are easily accessible for individuals with mobility challenges, such as wheelchair users or those with limited mobility.	☐	☐	☐	☐	☐
The design of public transportation vehicles and infrastructure in Penang takes into consideration the needs of passengers with disabilities, providing features such as ramps, priority seating, and audible announcements.	☐	☐	☐	☐	☐
Public transportation stops and stations in Penang are conveniently located and designed to facilitate easy	☐	☐	☐	☐	☐

15. **Safety and Security ***

Check all that apply.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I feel confident in the safety and security of public transportation in Penang.	☐	☐	☐	☐	☐
Public transportation services in Penang prioritize passenger safety.	☐	☐	☐	☐	☐
Security measures on public transportation in Penang contribute to passenger safety.	☐	☐	☐	☐	☐
Public transportation in Penang is a safe mode of travel.	☐	☐	☐	☐	☐
Emergency response procedures on public transportation in Penang are adequate.	☐	☐	☐	☐	☐