DETERMINING FACTORS TO USE URBAN RAIL TRANSPORT IN GREATER KUALA LUMPUR: A BEHAVIORAL FRAMEWORK

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BY

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ABSTRACT

Maryam Kalhoro

Greater Kuala Lumpur is experiencing significant urbanization, resulting in increased road congestion and air pollution. The study's focus on urban rail transport usage is crucial to improve traffic congestion and reduce vehicle emissions, ultimately improving air quality and public health. As cities expand, promoting sustainable modes of transportation becomes imperative. City rail systems are generally more environmentally friendly than private vehicles, contributing to a reduction in greenhouse gas emissions and aligning with sustainable urban mobility goals. Urban rail systems encourage compact and efficient urban development, limiting the environmental impact associated with urban spread. Effective urban rail systems can boost economic activities by improving accessibility and reducing transportation costs for citizens. Understanding the factors that influence city rail transport usage can help optimize these economic benefits. By delving into the factors influencing people's decisions to use or not use urban rail transport, the study could provide valuable behavioral insights. These insights can inform targeted interventions and policies to encourage greater adoption of sustainable transportation options. Previous studies have explored this topic, especially considering the global emphasis on sustainable transportation solutions. Researchers often investigate factors such as convenience, accessibility, cost, and attitudes toward public transportation. However, this research addresses the gap by unraveling the complexities of urban rail transit usage within Greater Kuala Lumpur. Building on the foundation of existing literature and recognizing the uniqueness of the local context, this study is driven by the question: "What are the determinants influencing public behavior towards urban rail transport usage in Malaysia, and how do they collectively contribute to a sustainable transportation framework?".

The city rail transport usage such as the LRT (Light Rail Transit), MRT (Mass Rapid Transit), and KTM Komuter could reduce Green House Gases emissions in Greater Kuala Lumpur, Malaysia. In this present reign of climate change, health and environmental issues need efficient planning to ensure mobility and service quality to satisfy the passengers for higher usage.

The study aims to delve into the elaborate relationship among different variables i.e., attitude (AT), subjective norm (SN), behavioral intention (BI), and perceived behavioral control (PBC) with city rail transport usage (USE), customer satisfaction, environment concern (EC), health concern (HC) and social concern (SC) that shape individuals' decisions to use or not use urban rail transit systems in the Malaysian context. While urban rail transit usage and its determinants have been explored to some extent in various regions, the unique socio-cultural, economic, and geographical factors specific to Malaysia have likely created a distinct landscape for public transportation usage.

By focusing on Malaysia's context, this research seeks to uncover insights that might not have been extensively addressed in previous studies. It aims to identify the critical determinants that either encourage or hinder people from utilizing urban rail transit systems in Greater Kuala Lumpur, contributing to a more comprehensive understanding of the complex interplay of factors shaping public transportation behavior in the region. The goal is to provide actionable insights for policymakers, urban planners, and transportation authorities to optimize urban rail systems, enhance their accessibility and attractiveness, and potentially drive a positive shift towards sustainable and efficient transportation choices.

A comprehensive research methodology was employed to gather primary data through a closed-ended questionnaire from a diverse urban commuter sample i.e., the federal territory of Kuala Lumpur, Selangor, and Negeri Sembilan. The sample size of 729 participants was thoughtfully selected through convenient sampling method to ensure broad representation of Greater Kuala Lumpur. The demographic analysis, facilitated by SPSS version 22-0 and for the measurement model analysis and path coefficient, Smart-PLS

software was used, explores relationships between key variables and user behavior towards urban rail transit. Key findings from the analysis suggest that all the variables, i.e., EC, HC, AT, SC, PBC, and BI, positively correlate with user behavior. Whereas SN has neither a direct nor indirect relationship with user behavior, and customer satisfaction does not moderate the relationship of BI and USE, play pivotal roles in shaping public behavior towards urban rail transit usage. These insights, when considered alongside the local dynamics, offer novel pathways to encourage sustainable rail transport strategies in Greater Kuala Lumpur.

In essence, this study not only contributes to academic literature but also provides tangible recommendations for policymakers and urban planners seeking to enhance city rail transit usage. Through a carefully constructed framework, it illuminates the interplay of factors that motivate public behavior towards sustainable transportation choices, ultimately fostering a greener and more efficient urban landscape. Furthermore, this study concludes that environmentally friendly behaviors can positively promote city rail transit usage. City rail transport usage also has multiple positive effects, directly improving regional environmental quality, health, and economy in Malaysia.

Keywords: City Rail Transit; Usage Behavior; Attitude; Subjective Norm; Perceived Behavior Control; Behavioral Intention; Customer Satisfaction; Service Quality; Environmental Concern; Health Concern, Social Concern; Greater Kuala Lumpur.

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SUBMISSION OF DISSERTATION

It is hereby certified that **MARYAM KALHORO (ID No: 20ABD05883)** has completed this dissertation entitled **"DETERMINING FACTORS TO USE URBAN RAIL TRANSPORT IN GREATER KUALA LUMPUR: A BEHAVIORAL FRAMEWORK"** under the supervision of **Dr. AU YONG HUI NEE** (Supervisor) from the Department of Economics, Faculty of Business and Finance and **Dr. CHARLES RAMENDRAN SPR SUBRAMANIAM**(Co-Supervisor) from the Department of Business, Faculty of Business and Finance.

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DECLARATION

I MARYAM KALHORO hereby declare that the thesis is based on my original work except for the quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

MARYAM KALHORO
Dated: August 2023

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LIST OF ABBREVIATIONS

CNG	Compressed Natural Gas
EV	Electric Vehicles
GHG	Green House Gases
GDP	Gross Domestic Product
HDV	Heavy-Duty Vehicles
ITS	Intelligent Transportation System
LDV	Light-Duty Vehicles
LRT	Light Rail Transit
MRT	Mass Rapid Transit
MCO	Movement Control Order
NSC	National Security Council
NTP	National Transport Policy
NFC	Near Field Communication
OECD	Organization for Economic Co-operation and Development
PCB	Perceived Behavioral Control
PLS	Partial Least Square
SDG	Sustainable Development Goals
SEM	Structural Equation Modeling
SN	Subjective Norm
SOPs	Standard Operating Procedures
SBST	Stage Bus Services Transformation
SPSS	Statistical Packages for Social Science
SERVQUAL	Service Quality
TPB	Theory of Planned Behavior

TDM	Transportation Demand Management
TOD	Transport-Oriented Development
UNNFCCC	United Nations Framework Convention on Climate Change

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Chapter one addresses the background of this research to find the relations among the factors of environmental concern, health concern, attitude, social concern, subjective norms, and perceived behavioral control. Behavioral intention is the mediator, whereas customer satisfaction is the moderator. To protect the environment in Malaysia, the researcher highlighted and examined all the factors to find the effect on city rail transport usage. The historical perspectives about city rail transport in Malaysia, along with the current national transport policies, sustainable development goals indicating the city rail transport usage, and impacts on the environment presented to show the authenticity of the problem of this research. This research then addresses the problem statement followed by the gaps in the knowledge in the existing studies. The present study's primary proposition is to determine the factors/ variables affecting the user behavior of the public towards the said transit usage in Malaysia. The finding will help understand mobility behavior as the main issue for socio-environment sustainability through the lens of the theory of TPB and SERVQUAL model.

1.2 Background of the Study

City Rail transport helps increase sustainable development by facilitating the people with rapid and adequate mobility of men and material resources. The health facilities, education, job, shopping, and other regular purchase of essential goods and services are crucial concerns for residents in cities which cannot be ignored.

The feasibility of accessing these basic facilities can only be possible through the applications of a sustainable city rail transport system. The sustainable city rail transits provide easy accessibility for goods and services without deteriorating the environment and health. Furthermore, the city rail system should be safe, affordable, accessible, and efficient, minimizing carbon and other poisonous gas emissions as indicated by the Sustainable Development Goals agenda SDGs (2030). Sustainable public transportation is not presented as stand-alone in SDGs also can achieve different SDGs' agendas through good health and well-being, sustainable cities and communities, clean and affordable energy usage, responsible consumption and production, and climate action. Due to population growth and travel patterns, public transportation demand rapidly increasing in urban regions. By 2020, the entire urban population will have increased to 75% (Ghani et al., 2022). The rise in travel demand is predicted to be driven by (Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia, 2016). The automobile travel demand was also observed, which increased by 3.73 % each year from 31.2 million in 2019 to 32.4 million in 2020. (Kementerian Pengangkutan Malaysia, 2021). Malaysian CO_2 emissions were recorded at 250 million tonnes in 2019, with an average of 8 tonnes per capita. Compared to 2010, when CO_2 emissions were 216 million tonnes, and 233 million tonnes in 2015, CO_2 emissions have grown (Ritchie & Roser, 2020). In 2016, the transportation sector produced 62.8 million tonnes of CO_2, second only to the energy sector, accounting for 25.5 % of the country's total CO_2 emissions of 246.7 million tonnes (Ritchie & Roser, 2020)

Given the predicted considerable rise in travel and CO_2 emissions, the government should prioritize policies consistent with and in line with worldwide rail transportation policy to promote sustainability and reduce congestion problems.

Megacities in developed countries have a higher population with good public transport service and efficient utilization of the resources (i.e., land, labor, capital, and entrepreneurship), which satisfy their people to use public transportation more as compared to private vehicles (Mallqui & Pojani (2017). A comfortable, reliable, and flexible transit system helps shift this trend from personal vehicles to public transit. The services perceptions of city rail transport provision vary among advanced and rising nations due to changes in their environment, history, geography, economy, society, and politics (Martin & Sunley, 2017; Ingvardson & Nielsen, 2019).

The developed and developing worlds are experiencing more traffic congestion due to increased automobile mobility, posing environmental issues for megacities (Hizam et al., 2021). Motor vehicles and motorbikes account for roughly 90% of the population in Greater Kuala Lumpur, Malaysia, resulting in inefficient resource usage, congestion, infrastructural, environmental, health, and psychological impacts in cities (Abdulrazzaq et al., 2020; Shafie & Mahmud, 2020).

Malaysia's urban mobility management is still developing integrated rail transport networks. Eleven of the transits are rail transit networks. Two are Komuter, five are rapid transit lines (LRT, MRT, KL monorail), and two are airport rail services to KLIA and Subang Airport (KLIA Transit and KLIA Express) (Ministry of Transport Malaysia, 2020).

This city rail network and KTM Komuter service connect 865,713 localities in Kuala Lumpur, Selangor, Negri Sembilan, and Johor with frequent commuters (Ministry of Transport, Malaysia, 2020a). LRT Ampang, LRT Kelana Jaya, MRT Sungai Buloh-Kajang, and KL Monorail are four rapid rails covering 75% of the Klang Valley, with MRT and LRT carrying 91% of people (Ministry of Transport, Malaysia 2020c). In 1966, the LRT became the first city rail in Malaysia, connecting the Ampang and Sentul urban areas to the Kuala Lumpur City Centre.

MRT was under construction in 2015 and 2016 but fully functional in 2017. In 2015 LRT Kelana Jaya Line had the highest number of passengers with 82,144,674. In contrast, the LRT Ampang line has the second-highest passengers, 62,809,412, compared to KL Monorail and Express KLIA. It maintains the position with a slight change in the numbers of passengers from the year 2017 to 2019. In the year 2017 LRT Kelana Jaya line had slightly less but used by the highest number of passengers 79,002, 829 in Klang Valley compared to others. In 2018, MRT services also played a part with the passengers 51,314,240, but the LRT Kelana Jaya showed an upward trend with 87,216,597 passengers. In 2019 number of passengers increased compared to other years, as shown in figure 1. In 2020 due to the COVID-19 pandemic, a ban on tourism and other social activities had caused a sudden colossal downfall in the number of passengers. Also, freight transport stipulated financial loss to the economy. The present endemic has started public transit mobility. The Government of Malaysia and the CEO of the MRT company have taken an excellent step toward go-green sustainability through high accessibility like MRT 3 (50 km long circle line) in the Greater Kuala Lumpur (Times Strait News Malaysia, 2022). After the approval of MRT3, the CEO announced that such

constructions enhance the well-being of the Malaysian family and prioritize local contractors, Bumiputera players, for creating business and employment opportunities.

The number of passengers also depends on the high accessibility, high service quality, and usage intention. The data shows that around 35% of the passengers used city rail transport during regular days, although approximately 75% were automobile users. Customers' satisfaction increases the retention of the existing passengers, while its ineffective provision can also attract passengers. Sustainability in the cities of Malaysia is only possible through the control the automobile riders and motivate them to use city rails. However, the lack of accessibility of the current city rail transport results in wastage of time and money, which has discouraged the public from its usage. Though accessibility of city rail passengers in Greater Kuala Lumpur for 9.4 million population is less for the urban cities and automobile congestion is more challenging (Friman, Lattman, and Osslon et al., 2020; Ngah et al., 2020; De Oña, 2020; Isai et al., 2020). Different dimensions of public transport services cater to the people's daily personal mobility practices in the urban region of Klang valley (De Oña, 2020; De Oña, Estévez, and de Oña, 2021).

Consequently, rail transport industries try to fulfill the expectations through quality services per customers' perceived demand (Hamerska et al., 2022; Bigdeli & Bigdeli, 2018; Chang & Phang, 2017). There is a need to find out different aspects of quality services for public transportation, increasing customer satisfaction. In most Asian countries, women face insecurity issues in city rail transport (Nayak & Benazeer, 2017; Hoor-Ul-Ain, 2019). In the case of Malaysia, the people are not

much satisfied with the city rail transit services (Ojo, 2019). In most countries, the city rail transport is still underfunding and does not provide quality services. As a result, people are reluctant to give up on their comfort through private vehicles, and their minds are prepared to face the traffic congestion issues in Malaysia.

Europe, America, and China have adopted intelligent urban public transportation through digital technologies, navigation systems, and big data, which has increased safety and security services (De Gruyter et al., 2017).

Examples provide helpful information about the arrival and departure of rail transits, electronic collection of fares and automated schedules of vehicles, luggage tracking systems, and sharing of shared flexible transport like dial-a-ride taxi services (Abduliabbar et al., 2019). European countries also tried to reduce the pollution and congestion increases daily due to automobile usage. Around 196 developed member states signed the Paris agreement in 2016 for climate change issues. Private vehicles are among the topmost polluters and an increasing threat to climate change by the emission of greenhouse gases, i.e., Nitric Oxide (NO_2) and Carbon Dioxide (CO_2) (Sequeira & Reis, 2019). The generalized solution to cope with the present situation is to provide quality mass transportation services in cities.

In this present reign of climate change, health and environmental issues need efficient planning to ensure mobility and accessibility for the residents with safety and cleanliness (Zhang & Witlox, 2020). The increase in mobility trends leads to an increase in congestion and pollution. The traffic problems also increase road accident rates (Attard, 2020). In Malaysia primary mode of transportation is private cars. According to Musa et al. (2020), approximately 55% of the 1067 accident

cases were involved in fatalities in federal territories. The cars were the notable vehicles involved in the accidents (nearly 59%). Kondo (2018) also supported that the fatality rate in Malaysia occurred due to the maximum usage of cars. Kondo, in his report, elaborated that about 24 fatalities were measured from 100,000 populations in the federal territories of Malaysia. In environmental sustainability, the more the use of public transport, the lesser would-be toxic gas emissions (Salimbene & Wiggins, 2020; Tirachini & Antoniou, 2020). City rail transport usage also has multiple positive effects. It improves regional environmental quality and health, but it also affects consumer expenditures; it efficiently increases productivity, creates employment, and saves resources for the public. Thus, the sustainable transportation in the country is further needed to determine the factors that influence general usability behavior. Therefore, this study aims to find the relation between the attitude (AT), subjective norm (SN), behavioral intention (BI), and perceived behavioral control (PBC) with city rail transport usage (USE), where customer satisfaction (CS) moderates the relationship between BI and USE. Although environment concern (EC) and health concern (HC) are the antecedents of AT, social concern (SC) is examined as the antecedent of SN. The study was conducted with the theoretical lens of the TPB and SERVQUAL model for significantly increased city rail transport usage, improving the country's environmental condition.

1.3 City Rail Transport Usage Issues in Malaysia

Developing countries face many issues establishing sustainable public transportation systems in their megacities. Increased population, income, growth, and urbanization have increased travel demand. The major problem is that intention

and behavior of the people in Malaysia are not much adoptive for city rail transport usage (Adnan et al., 2017). There are several reasons for their negligence towards the city rail transport like as the services provided to them are not as per customers' perceived demand. Rail transport in Malaysia lacks service qualities like low flexibility, less accessibility, inefficient, insecure/ unsafe traveling. Malaysian transportation systems have failed their operations due to inefficient resource mobilization planning and design (Borhan et al., 2019).

People of Malaysia prefer to use personal cars and motorcycles than rail transport modes because of the high fair price (Mayo & Taboada, 2020). If this usage behavior is ignored more, motorized vehicles can create environmental and health complications (Agaton et al., 2020). Almost every person has a vehicle, raising congested roads, air pollution, and environmental and health issues. According to Ghani et al. (2022), Malaysia's present urban population growth rate, with an estimated 75% of the people residing in cities, has increased travel demand. The consistent change in social structure, population inflow from rural to urban areas, and weak law enforcement could be the significant reasons for crime, reducing public transport (Sham, 2018). The wastage of premium time is the factor for the traveler to judge the rail transportation services (Borhan et al., 2019). People travel through rail transport primarily for fun and social activities, to share their negative experiences with others, and reduce usage (Ojo, 2019).

Malaysia is one of the British colonized countries; its infrastructural development started during colonization. In 1957, after the independence of Malaysia, the urbanization speed was negligible, and it started to grow after 1970 (Hassan, 2017). Since 1987 due to the economic expansion, motorization and urbanization have

improved. Kwan et al. (2017) further elaborated that the road and rail networks, Light Rail Transit (LRT), Mass Rapid Transit (MRT), and monorails improved for the public. Nowadays, traffic congestions, environmental pollution, accidents, death, health issues, parking issues are serious concerns (Brohi et al., 2018). The low service quality of rail transportation in Malaysia, specifically in urban regions, has flourished private vehicle usage at its peak (Jais & Marzuki, 2020). The city rail transportation is established in a country that lacks service quality demotivating the public to increase city rail transport usage (Dahalan et al., 2017).

During the COVID-19 MCO, states tried to force the public for social distancing and reducing travel. Public transit services were not available, but they also positively impacted environmental pollution, reducing traffic issues. Still, there is a need to reduce the congestion caused by personal vehicles as a single person at once performs a journey. During this pandemic issue of COVID-19, there is an inclination to work from home and purchase groceries online. Most of the employees are adaptive to this changing nature of work from home. People faced difficulties due to this inefficient online system and a lack of knowledge and skills to operate the system. This adaptive change of work nature also indirectly reduces congestion and social gatherings on roads, platforms, and transport. The study conducted at the University of Sydney found that this pandemic issue decreases trips, entertainment, collaborations, and social interactions. The public transport SOPs (standard operating procedures) are issued to every individual and organization to make them feasible and safe for use (Nelson, 2020). The European countries already have a strong proposition for city rail transport usage for

environmental and social benefits, even in pandemic situations (Maier & Brockmann, 2020).

During the movement control order (MCO) in Malaysia, there was a reduction in air pollution, CO_2 & NO_2 emissions, and road fatalities (Naderipour et al., 2020). According to Abiad et al. (2020), bounce-back strategies and frameworks are established to avoid unnecessary travel and protect transport staff, passengers, and their health by considering the long-term sustainable development goals (Asian Development Bank, 2020). Thus, this COVID-19 outbreak is challenging for future research in every field.

1.3.1 The Environment Issues and City Rail Transport Usage

Transport sustainability defines any means of transportation with a more negligible environmental effect (Tian et al., 2020). Private vehicles are the main factor for air contamination and emit more greenhouse gases. The city rail transportation helps to reduce traffic problems, air pollution, health problems, and costs. Further, it increases physical activities, social interactions, local business support, regional economic stabilizes, and improves the public's quality of life and health (Dwiatmoko et al., 2022; Khreis, 2020).

Petroleum and other fuel consumption are estimated to increase by 2030 in Malaysia. Private transport mostly depends on petroleum renewable energy share, leading to less business expansion. The government of Malaysia must optimize the planning for behavioral changes to optimize mobility patterns with adequate technology planning and design and interactive rail transportation. In 2015, the transport sector consumed 90% of energy at the national level and 45.2% of the

energy consumed by land transport (Energy Commission, 2015). The second most prominent reason for emitting CO_2 is the transportation industry. It adds pollution globally through Green House Gases (GHG) and weakens the ozone layer. GHG gases are very poisonous and deemed dangerous for life. The climate change effect also impacts society and the economy.

In 2018, motor vehicles accounted for 95.6 % of CO emissions in Malaysia (Mohd Shafie et al., 2022). The Malaysian ambient air quality guidelines RMAQG, 2017/2018 (Recommended Malaysian Air Quality Guidelines) set limitations for pollutants like PM_{10}, CO, NO_2, SO_2, and O_3 that hurt the population's overall health (Department of Environment Malaysia, 2018). PM_{10} is the most common air pollutant in Southeast Asia's cities and suburbs (Sahak et al., 2022).

Malaysian ranking in environmental management is declining daily (Azam et al., 2018). Malaysia is in 26th ranking for greenhouse gas emissions in the overall world. According to a World Bank report total population of Malaysia is more than 32 million, and every year, there are 7.27 tons of carbon dioxide emissions per head (Noor & Eng, 2020). Carbon dioxide emission in Malaysia has amounted to 95% due to more usage of private vehicles, shown in figure 1.1.
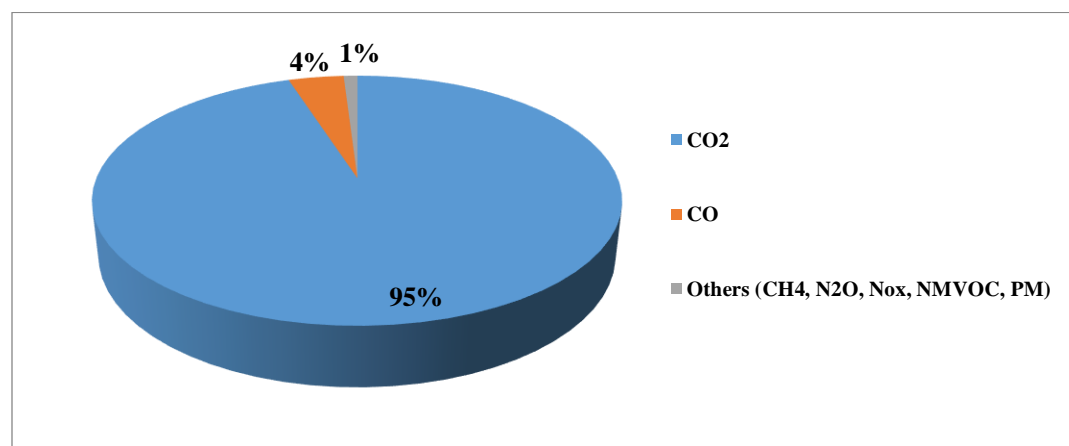
Figure 1.1 Contribution of different GHG elements in Malaysia
Source: World Bank report (2021)

UNNFCCC (United Nations Framework Convention on Climate Change) in December 2015 reported that most of the contributors to CO_2 emissions are road vehicles. Motor vehicles contribute approximately 59% of greenhouse gas emissions in Malaysia. For carbon dioxide, at least 3% contribution is from buses, 17% is from HDV (Heavy-Duty Vehicles), and 10% is from LDV (Light-Duty Vehicles), as shown in figure 1.2.
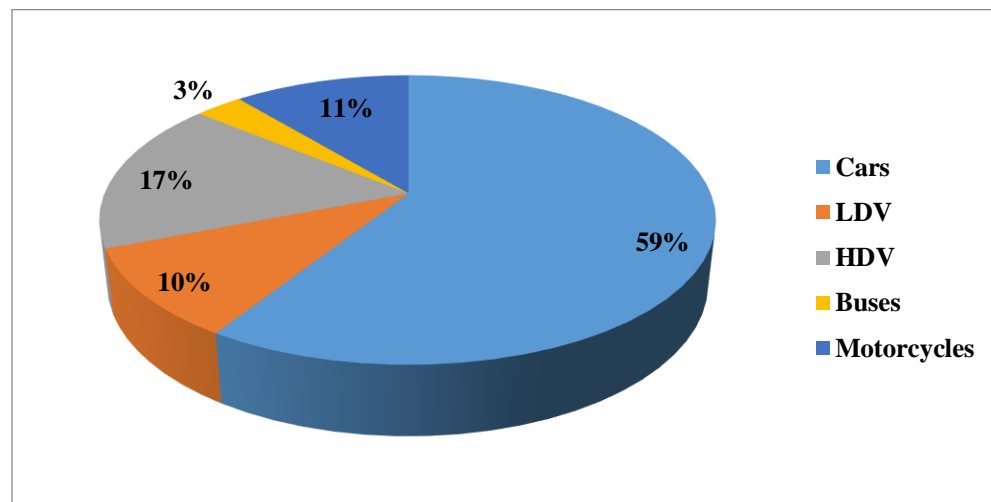
Figure 1.2 Road vehicles contribution of GHG emission in Malaysia
Source: World Bank Report (2021)

1.3.2   Health Impacts and City Rail Transport Usage

Health issues caused by automobile vehicles are prominent but negligible to service quality provision and rail transport usage in cities (Culver, 2018). Reducing automobile usage is about the increasing rate of injuries and death due to road accidents (Martin et al., 2018). Those who use public transport can keep themselves healthy and happy compared to those driving their car (Avila-Palencia et al., 2018).

High residential standards and densely populated urban regions that cater to environmental changes are uncertain for pedestrians. Accidents and pollution can harm people's health due to the high ratio of personal cars on roads in densely populated regions (Barnes et al., 2019).

Khreis et al. (2017) also supported that active travel through rail transport can reduce injuries and harms air. The mortality and morbidity impact of specific transport policies have been summarized (Khreis et al., 2017).

Exposure to high levels of pollutants is responsible for 7.6% of all fatalities worldwide, with 6.7 million deaths linked to air pollution in 2019 (WHO, 2016). In addition, according to a new study on the effects of air pollution on newborn newborns, approximately 500,000 children died in the first month after birth because of ambient air pollution in 2019, primarily in Sub-Saharan Africa and Asia (HEI 2020). Different studies show that an increase in motor vehicles increases crashes and injuries (Bener et al., 2017; Flannagan et al., 2018). Cardiovascular and respiratory diseases are the top cause of mortality in Malaysia, and the principal source of the said disease is traffic issues (Sofwan et al., 2021). In Asia, a 10 g/m3 increase in PM_{10} concentrations and increase in CO could increase mortality by 0.27 % each day (Dastoorpoor et al., 2021) and raise the risk of premature death and death from asthma (Mohad Shafie,2022). The link between air pollution in major cities and the risk of exposure can have an economic impact on the population by raising treatment costs and limiting access to quality healthcare.

Presently, the city rail transport policies have been revised for the post pandemic, and people can travel by following SOPs for COVID-19.

1.4 National Transport Policy (NTP) in Malaysia 2019-2030

Currently, just 20% of the Malaysian population uses public transport. The Land Public Transport Commission, now known as Agensi Pengangkutan Awam Darat (APAD), expects travel to increase from 40 million trips in 2010 to 133 million trips in 2030, with an average annual growth rate of 6.19 %, which is higher than the 0.6 % population growth rate in Malaysia in 2019 (Hamid, 2020). Transport Minister Datuk Seri Wee Ka Siong reported that the previous government has targeted to achieve a 40% rail transportation share within the coming ten years by launching the National Public Transportation Policy from 2019 to 2030. However, the overall proportion of Malaysians using rail transportation is among the lowest in large cities, at 17.1% in 2015, compared to private vehicles (The World Bank, 2015). However, due to the infrastructure development and the expansion of the rail transportation network, the urban transportation system has increased to 25% by 2020, which is still low compared to the NKRA (National Key Results Areas) aim of 40% mode share 2030 (HSS Engineering, 2020). To promote connectivity and accessibility, the Malaysian government has begun the construction of a comprehensive urban train network system to boost connectivity and promote economic expansion (Ghani et al., 2022). Therefore, city rail transportation is trying to improve service quality for the customers, considering the standard operating procedures SOPs presented by the National Security Council (NSC) to promote sustainability.

A country constructs a general transport policy to strengthen a high-income nation by 2025. The National Transport Policy vision is to increase economic growth, social welfare, and environment-friendly activities. NTP aims to strengthen rail

transport sectors which can help to achieve sustainability. There are eight future trends discussed by the Ministry of Transport Malaysia (2020): increase in the aging population, growing urbanization, advances in information and real-time digitization, the expansion of the e-commerce market, moving toward sustainable transportation, moving toward ships/ consolidation, and containerization, increase in customer travel, and the cost-efficient carriers and last is the proliferation of new technologies. The Ministry of Economic Affairs (2020) reported an increase in mobility trends causing increased congestion and pollution, causing a reduction of 1.1% to 2.2% of GDP per capita recorded in 2016, equivalent to RM 6,144.

This transport policy presents living standards for Malaysians, increases connectivity accessibility through rail transportation, facilitates proliferation digitization, and develops modern transportation systems in Malaysia's sustainable development goals (SDG, 2030). The strategies and plans (refer to appendix A) from NTP 2019-2030 strengthen enforcement to ensure compliance with regulations and laws to improve safety, quality of service, and reliability through city rail transport.

1.4.1   Public Transportation Budget in Malaysia (2021)

The transportation ministry has received RM 6.05 billion under budget 2021 under consideration of public benefits. The budget relaxation to the public-facing problems during the COVID-19 pandemic is also allocated. The $ 150 million reserved for the Stage Bus Services Transformation (SBST) program will be extended to Johor, Kuching, Kota Kinabalu, and Kuantan in the 2021 to 2023 phase. This program has planned to ensure punctuality services so that commuters can rely

on that service without any fear. People in Klang valley and Penang can use the MyRapid bus services in touch and go with the My30 incentive card issued to students below 12.

Railway operators' and developers' use of the country's rail network allocates the resources with adjacent countries. New rail projects are underway, and others are still in the planning stages. The RTS Link is a new 4km cross-border railway that connects Johor Bahru's Bukit Chagar Station and Singapore's Woodlands North Station. During peak periods, the RTS Link will use an independent Light Rail Transit (LRT) system with a capacity of up to 10,000 people per hour in each direction. The RTS Link aims to provide an efficient public transportation system that connects Malaysia and Singapore. This combined project of the RTS Link construction started in 2021 and is to complete in December 2026.

DMIA is now leading the Klang Valley Double Tracking (KVDT) project, which spans 160 km of the electrified double-track network from Port Klang to Sentul-Batu Caves, and from Rawang to Seremban, alongside its partner Lembaga Tabung Angkatan Tentera. The 640 km rail network is to be operational in 2026.

Former Prime Minister Tun Dr. Mahathir Mohamad expressed the notion of liberalizing the country's rail tracks, particularly ferry cargo, during the inauguration of the National Transport Policy (NTP) 2019-2030 in year 2021, indicating that it would begin with the KTMB line. By lowering the number of large dangerous trucks on the road and allowing KTMB to obtain access fees with the services offered, KTMB tracks can increase track utilization and reduce serious road accidents.

Meanwhile, My50 and My100 cards would benefit more than two million commuters. Budget 2021 for public transportation is more committed to environmental considerations (Hui, 2020). Special considerations for school students and disabled persons who use the KTM bus service have a monthly pass cost of RM 5. The incentive for KTM Komuter service to 2,500 students at the school and 760 disabled can be benefited from Klang valley, KTM northern Komuter to Inner town train between Kuala Lumpur and Tumpat Sabah train in the Beaufort Tenom line. The task assigned to the road transport department was to place the Kiosks for helping the public with different traffic services like e-hailing services. Sales taxes to purchase the buses are exempted for two years, from January 2021 to December 2022. East Coast Rail Link is under consideration and soon will be complete, and the best route for the public will be announced soon.

1.5 Problem Statement

Many transportation strategies have been established to encourage the public behavioral shift toward rail transportation in response to rising greenhouse gas emissions and environmental pollution from urban motor vehicles. Several studies have also recommended using rail transportation to enhance a city's population health (Mueller et al., 2015; Greaves et al., 2022).

Even though the people of Malaysia avoided using rail transport in Greater Kuala Lumpur and were motivated to use a personal car, the mobility through cars has affected Malaysian cities, resulting in environmental and health problems (Khreis et al., 2016; Nieuwenhuijsen & Khreis, 2016; Ghani et al., 2022). This environmental pollution has led to climate change difficulties, increasing greenhouse gas (CO, CO_2, NO_2) emissions, traffic congestion, and death rates due

to accidents. Public behavior does not accept city rail transport which is also a significant concern for the future. This study identifies and analyzes the factors that affect people's behaviors toward using public transport.

Mobility mechanism through vehicles is the second-largest contributor to climate change. Green House Gases (GHG) are hazardous causes of global warming and weaken the ozone layer. Malaysia ranks 26th in terms of greenhouse gas emissions, and it has 7.27 tons of CO_2 (Carbon Dioxide) emissions per person with a population of 32 million (World Bank report, 2019). As per this World Bank report, 2019 the country Malaysia was listed as Asia's 49th most congested country after the Philippines.

In Malaysia, road vehicles/land transport is the primary source of carbon dioxide emissions. Around 59% of total GHG emissions are from motor vehicles, and 3% are from buses. It has been found that the total fatality rate in Malaysia due to road congestion is 67%. According to the UNNFCCC (2015), around twenty-four persons died due to traffic accidents in a sample of 100,000 people.

Public transit passengers are happy with the services and can increase their usage, reducing GHG emissions and traffic congestion. In New Straits Times Malaysia (2015), it was reported that road congestion increases costs to the economy by roughly around RM 20 billion each year. Moreover, congestion increases gasoline expenses and wastes prime time. The government tries to provide sustainable programs like tax-free bus purchases, touch-and-follow reward cards, park-and-ride, and many more; however, changes are required in megacities like Kuala Lumpur.

One significant reason for the reduction in public transportation usage is the rapid growth in urbanization and inadequate policies, which increases the power of the public to purchase cars in Malaysia. Malaysia has onshore crude oil reserves also sufficient gas reserves to make cheap complimentary products for automobiles (Ministry of Transport Malaysia, 2020). Inefficient pricing mechanisms, taxes, and trade policies promote automobile usage within the country (Mustapa & Bechet, 2018). Other factors influence the residents to mostly use cars for their daily routines because of independence, easiness, steadfastness, impression, power, command, class, authority and superiority, safety, and access to every destination. People are dissatisfied with public transit due to a lack of services and convenience compared to public transportation. Accordingly, convincing those passengers to use transport instead of driving is challenging. The dearth of quality service rendered to the passengers can be one of the reasons that people avoid taking public transport (Kwan et al., 2020). For more people to use the city rail transport, there should be ampler availability, security, affordability, hygiene, dependability, convenience, and timeliness in the services provided (Dell'Olio et al., 2011). The KTM Komuter, LRT, and MRT rapid train services are incredibly efficient, but they are not accessible, safe, and affordable to the public of Greater Kuala Lumpur (Adilah et al., 2019; Mukhopadhyay, 2017). During the survey, the residents of Greater Kuala Lumpur also complain about the safety, security, air conditioning, and other quality services. Few passengers belong to the workers, and private sector employees complained that the fare for the city rails is too high, that is why they travel by driving motor vehicles. Thus, there was a need to increase awareness among the transportation business and improve services and society to increase the

environmentally friendly and healthy usage behavior for travel. In Malaysia, the government is working to boost the use of public transportation, particularly in urban areas. Many urban rail infrastructure development projects are currently undertaken in the Kuala Lumpur metropolitan area to create an integrated public transportation system. There are numerous positive effects of city rail transportation utilization in Greater Kuala Lumpur on effect overall country's sustainability.

1.5.1 Research Gap

The bulk of the literature review (Jawed et al., 2019; Ercan et al., 2017; Brohi et al., 2021; Irtema et al., 2018; Ibrahim et al., 2019; Yusliza et al., 2020; Kaffashi & Shamsudin, 2019) available on the public transit usage behavior. Policy papers show the importance of stimulating city rail transport usage, but car usage is observed more in practice. TPB theory (Ajzen,1991) presented the attitude, behavioral control (constraints), and social pressures impact actual behavior (Bakti et al., 2020; Fishman, 2016; Miletic et al., 2017 & Hall et al., 2017). However, this study has highlighted that if people are concerned about their health (Khreis et al., 2017) and the environment (Tian et al., 2020), it can stimulate a positive attitude towards the city rail transport usage in Greater Kuala Lumpur, Malaysia.

Modes of city rail transport like LRT, MRT, and KTM Komuter are the most favorable model shifts for Malaysia's environmental sustainability. However, most people are still not diverted towards its services because of the lack of accessibility, affordability, and many other quality services issues perceived by the public in Greater Kuala Lumpur, Malaysia (Mukhopadhyay, 2017).

From 2015 till the present, World Bank has highly recommended resolving current rail transport issues as a top priority for economic growth and environmental sustainability.

Previous studies (Abdulrazzaq et al., 2020; Pal & Sengupta, 2019) also argued that increased personal automobile usage increases the traffic problem, dirty air and noisy atmosphere, and accident rates (Grise et al., 2018). The number of automobile users measured at 90% in Malaysia, and the ratio is to reach 100% for a long-lasting period. In policy papers, the Government of Malaysia is trying to stimulate the people towards public transport usage, but those facts are not available in practice. This study finds the factors behind the issues. Why are still people of Malaysia not using public transport and are indirectly diverted towards the usage and purchase of cars. Thus, there is a need to identify the factors influencing the public's behavioral change towards city rail transport usage in Greater Kuala Lumpur, Malaysia, which is still undercover. Public behavior is needed to be studied more so that rail transport use can be encouraged in urban regions to reduce pollution and congestion.

There is an urgent need to analyze the factors to know the behavioral intentions for public transport usage in Malaysia. The theory of planned behavior (Ajzen, 1985) is the most prominent theory needed to measure user behavior through the factors, i.e., attitude, subjective norm, perceived behavioral control, environmental concern, health concern, intention, and customer satisfaction. The central idea behind the TPB is to determine the actual usage behavior through behavioral intention, which is a function of three constructs, i.e., attitude, subjective norm, and perceived behavioral control. According to the theory of Planned Behavior,

subjective norms are the social pressure on customers to use public transport (Bakti et al., 2020). If people are more concerned and careful about their health (Khreis et al., 2017) and the environment (Tian et al., 2020), they show a more positive attitude. Perceived behavioral control reflects the constraints like age, gender, and income over the targeted behaviors (Fishman, 2016, Miletic et al., 2017; Hall et al., 2017).

Customer satisfaction is vital to the usage behavior (De Oña et al., 2020; De Oña, 2021; Parasuraman et al., 1985; Zeithaml et al., 1996; Fu and Juan, 2016 and 2017). The previous studies justified that perceived customer satisfaction positively affects behavioral usage intention and usage behaviors (De Oña et al., 2015; van Lierop et al., 2018; Allen et al., 2019; Machado-Leon et al., 2016; De Oña, 2021). The concepts of behavioral consequences of service quality (Parasuraman et al., 1985 Zeithaml et al., 1996), customer satisfaction and behavior intention (Fu & Juan, 2016), usage behavior, and interrelations have been discussed widely in previous studies but are still unclear. Fu and Juan (2017) have integrated the TPB and Satisfaction theory to discover the noticeable mediating effect of intention on the relationship of attitude, subjective norm, and perceived behavioral control towards the usage. Service quality and customer satisfaction are interchangeable in increasing public transport usage (Soltanpour et al., 2020; Lien et al., 2017). However, customer satisfaction also has high significance in the literature for usage intention. Relevant variables of customers satisfaction like service quality and customer loyalty are studied as a moderator (Chen et al., 2019); thus, it is found that customer satisfaction as a moderator can also play a vital role in increasing usage behavior, which is also the research gap of this study. Thus, it was necessary

to analyze the collective impact of TPB and SERVQUAL-Customer satisfaction variables to highlight the multiple issues and factors that influence user behavior.

Using rail transportation for environmental concerns is becoming a mode preference factor (Ibrahim et al., 2022). In this study, environmental health concerns substantially impacted attitude and intention, in contrast to another study in Malaysia that revealed no significant effect on bus commuting (Ibrahim et al., 2022). According to the findings, environmental health issues have a more direct impact on the attitude. Furthermore, when compared to environmental impact and climate change, the influence of health concerns on intention was minimal (Kwan et al., 2020).

Previously, the predictive choice model for transportation has been explored from two perspectives: utility, such as time and restrictions, and behavior, such as perception (Ben-Akiva et al., 2002). Using Ajzen's (1991) theory of TPB, which consists of attitude, subjective norm, and behavioral control, the modal choice between private vehicles and public transportation has been extensively researched (Heath & Gifford, 2002). Behavioral intentions have been recognized as the most accurate predictor of actual behaviors in TPB (Ajzen, 1991). We used three components in the behavioral framework of rail transportation in this study: attitude (environmental health concern), perceived behavioral control, and subjective norm (social concern).

To predict the behavioral intention as a mediator attitude is the strongest component of the TPB in comparison to the subjective norm and perceived behavioral control. Behavioral intention is the most strongly associated mediating factor in determining

the usage of the city rail transit (Zailani et al., 2016). The factors that influence private automobile users' behavior to utilize rail and the moderating impact factor of customer satisfaction among passengers in the Greater Kuala Lumpur. Customer satisfaction is crucial in behavioral shifts away from private vehicles, which is feasible if high-quality services are given. Due to its subjective nature, service quality has been interpreted in various ways involving tangible and intangible aspects such as comfort, safety, accessibility, reliability, and convenience (Beiro et al., 2007; Sumaedi et al., 2014). Customer satisfaction directly and positively impacts and boosts its usage behavior; thus, it is necessary to include customer satisfaction to see the moderator effect (Grujicic, 2013). Sumaedi et al. (2014) and Fu and Juan (2016), on the other hand, revealed that behavioral intention acts as a mediator.

Thus, to examine all the factors (Environmental concern & health concerns as an antecedent of attitude, social concern as the antecedent of subjective norms, perceived behavioral control towards the behavioral intention, and city rail transport usage whereas customer satisfaction is used to moderate the effect on the relationship of behavioral intention and usage), the collective impact has been analyzed through this study.

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1.6 Research Questions and Objectives

The main research question of this study is:

To analyze people's pro-environment behaviors to increase public transport usage in Malaysia's context, integrating the theory of planned behavior (Ajzen 1985) and SERVQUAL theory (de Ona, 2021; Fu and Juan, 2017) for customer satisfaction. Following are the research questions of this study derived from the related extensive literature review:

1. Does attitude have a significant positive effect on city rail transport usage?

   1a. Does environmental concern is positively and significantly related to an attitude?

   1b. Does health concerns are positively and significantly related to an attitude?

2. Does subjective norm positively and significantly affect city rail transport usage?

   2a. Does social concern have a significant positive relationship with the subjective norm?

3. Does perceive behavioral control is related to city rail transport usage?

   4a. Does behavioral intention mediate the relationship between attitude and city rail transport usage?

   4b. Does behavioral intention mediate the relationship between subjective norm and city rail transport usage?

   4c. Does behavioral intention mediate the relationship between perceived behavioral control and city rail transport usage?

5. Does behavioral intention significantly relate to city rail transport usage?

6. Does customer satisfaction moderate the relationship between Behavioral intention and city rail transport usage?

Following are the objectives to achieve the aim of this study:

1. To examine whether an attitude has a significant effect on city rail transport usage.

   1a. To examine whether the environmental concern is positively and significantly related to an attitude.

   1b. To examine whether the health concerns are positively and significantly related to an attitude.

2. To find whether subjective norm has a positive and significant effect on city rail transport usage.

   2a. To examine whether the social concern has a significant positive relationship with the subjective norm.

3. To identify the positive and significant relationship between perceived behavioral control with city rail transport usage.

   4a. To examine whether behavioral intention mediates the relationship between attitude and city rail transport usage.

   4b. To examine whether behavioral intention mediates the relationship between subjective norm and city rail transport usage.

   4c. Find whether behavioral intention mediates the relationship between perceived behavioral control and city rail transport usage.

5. To analyze whether there is a positive and significant relationship between behavioral intention and city rail transport usage.

6. To examine whether customer satisfaction moderates the relationship between behavioral intention and city rail transport usage.

1.7 Hypotheses of the Study

H1 There is significant and positive relationship of Attitude and City Rail Transport Usage.

H1a. There is significant and positive relationship of Environmental Concern and Attitude.

H1b. There is significant and positive relationship of Health concern and Attitude.

H2. There is significant and positive relationship of Subjective Norm and City Rail Transport Usage.

H2a. There is significant and positive relationship of Social Concern and subjective norm.

H3. There is significant and positive relationship of Perceived behavioral control and city rail transport usage.

H4a. There is significant and positive mediating relationship of Behavioral Intention among Attitude and City Rail Transport Usage.

H4b. There is significant and positive mediating relationship of Behavioral Intention among Subjective Norm and City Rail Transport Usage.

H4c. There is significant and positive mediating relationship of Behavioral Intention among Perceived Behavioral Control and City Rail Transport Usage.

H5. There is significant and positive relationship of Behavioral Intention and City Rail Transport Usage.

H6. There is significant and positive moderation effect of Customer Satisfaction on relationship of Behavioral Intention and City Rail Transport Usage

1.8 Scope of the Study

The focus of this study is to increase city rail transport users in Malaysia (particularly in the federal territory of Kuala Lumpur, Selangor, and Negeri Sembilan states). There is different public transport system in mega-cities of Malaysia, i.e., Light Rail Transit (LRT) (or Monorail), Mass Rail Transit (MRT), BRT (Bus Rapid Transit, e.g., Sunway line and others.), National and regional rail system (KTM Komuter, KTM intercity), Taxi/Cabs functional in urban regions of Kuala Lumpur. This study focuses on Rapid rail, MRT, LRT, and KTM Komuter in the more significant Kuala Lumpur new geographical name of Klang Valley. The Greater Kuala Lumpur is the urban conglomeration in Malaysia centered in Kuala Lumpur, where other cities and towns adjoin the Selangor state (Malaysia Vision Valley (MVV-2-0), 2018). The commuters should be above 18 years of age and have experienced public transport. The data was collected in the year, 2021. The demographic and descriptive data were analyzed through SPSS version-22-0. The measurement and structural model analysis was performed through Smart PLS. The results were interpreted and presented in the year 2022.

This study determined the factors that affect the public's behavior towards the usage of city rail transits. Several studies (Brohi et al., 2021; Jia et al., 2018; Septiani et al., 2017; De Oña, 2021) found that behavioral intention and usage are related and followed by attitude, subjective norms, and perceived behavioral control. This study identifies the different antecedents, i.e., environmental concern, health concern, social concern, and their effects on the public's attitude and subjective norm. Substantial studies (De Oña, 2020; Bambale et al., 2020; Yazid et al., 2020; Zen et al., 2018; da Silva et al., 2019) show that customer

satisfaction is an essential variable that has direct as well as mediating effects between services qualities dimensions (tangible, reliable, responsiveness, empathy, and assurance) and customer loyalty of the public transports. Thus, customer satisfaction also has a significant role in positive intention and usage behavior, and customer satisfaction strongly influences user behavior. Therefore, this study further investigates the gap to find the moderating effect of customer satisfaction on intention and usage. Sustainability in city rail transport should diminish traffic jams, emission of CO_2 (Carbon Dioxide), NO_2 (Nitric Oxide), and other poisonous gases, climate change, health issues, and resource utilization. The research studies have evidenced that policies and funds were reserved but failed to produce a successful strategic plan for public transportation in Malaysia.

1.9 Significance of the Study

This study determined the factors which affect the behavioral intention of the people to use public transport in Malaysia.

The application of city rail transport is implicitly present to achieve different Sustainable Development Goals 2030 presented by United Nations in 2015. Those five SDGs 2030 indicating transport-related problems provided importance to constructing sustainable public transport systems in countries, i.e., health and well-being, climate change action, sustainable cities and communities, industry, innovation and infrastructural development, affordable & clean energy, responsible consumption, and production. The first goal of health and well-being is to increase the safety measures for reducing death rates and injuries caused due to road accidents. Reduction in air pollution and congestion are needed to curtail other fatal

diseases of the lungs, heart, and brain. Road facilities are provided to the public residing within 2 km on season roads among the industry, innovation, and infrastructural development goals. States should control the proportion of passengers and freight on different modes of transport. Sustainable cities and communities should have resilient public transport to facilitate the public and reduce GHG gas emissions. Public transportation is the indicator for achieving affordable & clean energy along with efficient consumption and production. Efficient, responsible consumption and production for fuel expenditure and productivity are needed.

The high mobility of private cars in urban regions has enhanced the environmental problems of greenhouse gas emissions. If public transport system accessibility were higher, people would increase public transport usage and lesser would-be issues like traffic jams and environmental issues. Green private vehicles have electric motors rather than diesel engines, reducing pollution, but increasing traffic congestion. Like as compressed natural gas (CNG) can produce less CO_2. Service qualities of public transport and fewer private vehicles will lead to a long-lasting reduction in congestion, health problems, environmental and financial problems. Provision of perceived service qualities to the customers can satisfy them to feel like they feel in their car.

The strategy of this study is to develop environmentally friendly behavior of the residents, i.e., to adopt the usage of urban rail transport rather than private cars. This study helps the local and federal governments show efficiencies (through ordinances, laws, policies, & subsidies) to prevent the public from private car usage and satisfy them for positive behavior towards the city rail in Greater Kuala

Lumpur. Also, this study provides knowledge to the transport industries and companies to improve service quality in different dimensions, i.e., tangibility, reliability, assurance, empathy, and responsiveness for customer loyalty through the provision of quality services. All the factors should be considered during decision-making because demographic factors such as age group, gender, ethnicity, and income have also impacted user behavior. The transportation department, environmentalists, agencies, institutions, officials, and leaders to raise this environmental awareness for city rail transport usage. Hence, positive user behavior is the crucial factor toward public transits that can improve sustainability in Malaysia.

The study helps understand the commuter's behaviors to develop a feasible public transportation model to increase its usage. This study will contribute to the knowledge and provide an extended theory of planned behaviors with moderating effect on customer satisfaction to develop positive usage behaviors towards public transport through an effective mechanism.Develop effective communication awareness and educate the community to develop a behavioral change in sustainable transport choices to accelerate low-carbon mobility initiatives.

1.10 Operational Definitions of the Variables

The independent variables of this study are attitude, subjective norms, perceived behavioral control, whereas environment concern and health concern are the antecedents of attitude. Behavioral intention is the mediating variable, and customer satisfaction is the moderating variable and city rail transport. The operational definitions for the variables of this study are given in table 1.1 below.

Table 1.1 Operational Definitions of this study

	Variables	Definition	Reference
1	Attitude	It is a positive and negative feeling of the individuals based on individuals' beliefs, consequences, and concerns towards a particular behavior. If belief is positive, the attitude towards the behavior is also positive.	(Ajzen, 2001)
A	Environment Concern	The public's awareness of environmental problems is considered, indicated by the attitude and response towards environmental pollution.	(Russell and Joan, 1978) (Kollmuss and Agyeman, 2002) (Wu et al., 2019)
B	Health Concern	It is a belief of vulnerability towards the personal feeling of being at risk of health towards behavior.	(Janz and Becker, 1984) (Leventhal & Cameron,1987)
2	Subjective Norm	The subjective norm is the social pressure, i.e., coercion from family, friends, and other essential people on individuals to perform a particular task.	(Ajzen, 1991)
A	Social Concern	A social concern refers to a topic, issue, or problem that affects individuals, communities, or society. These concerns often have ethical, moral, or practical implications, and they may lead to discussions, debates, and actions aimed at addressing or resolving the issue.	(Macionis and Plummer, 2018)
3	Perceived Behavioral Control	PBC is the perceived ease or difficulty controlling and showing an attitude towards particular action and pressures to perform conduct.	(Ajzen, 1991)

4	Behavioral Intention	Behavioral intention indicates the person's readiness to perform a particular behavior or is also denoted as the direct antecedent of the behavior.	(Bagozzi et al., 1989)
5	Usage Behavior	The evident response to using a product/service in a particular situation is the behavioral assessment accumulated for the whole context to produce a broader measure of behavior.	(Davis,1989) (Dekker and Nyce, 2009)
6	Customer satisfaction	Relaxed and inner motivation towards the product/service past experiences and the company's service quality records.	(Parasuraman et al., 1988)
A.	Service quality	The provision of the standard services as perceived by the customers to become satisfied is based on the five dimensions, i.e., tangibility, reliability, assurance, responsiveness, and empathy.	(Parasuraman et al., 1985)
7	City Rail Transport	Intraurban and intraregional transportation systems established for the usage of everyone (public) who pays the stipulated fare for those services.	(Vuchic, 2007)

1.11 Summary

Transportation is linked with an individual's daily life and improving the quality of life is the right of individuals in this world. Those individuals are the customers playing a significant role in using or recommending public transport. Services quality, environment, health, social concern are the variables that impact the behavioral intention to use public transport more than cars. At the same time, customer satisfaction mediates the relationship between environmental concern,

health concern, social concern, and quality services towards the behavioral intention of using public transport.

There are extensive research papers and literature reviews on the impacts of 'urban public transportation. At present, researchers should focus more on the other aspects of public transport like environmental issues, climate change, land reforms, efficiency, reduction in death rates and injuries due to accidents, technology involvement, quality services, innovative replacement of diesel engines into electric engines, physical exercises through walk and ride cycle, customer satisfaction, motivation behaviors and issues of the public to use public transit. The related literature review is presented in the next chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature review has the most significant part of the research because available data support the assumptions and the results. It presents deep knowledge to set scope framework and to find the novelty of any problem. The literature review sets the foundation for this research study.

This chapter helps extract research hypotheses, methods, and findings from supportive secondary data. It helps to find out the research gap of the study. The literature review highlights the recent aspects and previously studied rail transportation domain.

This study will communicate the solution by investigating the different factors that impact the public's behaviors to increase city rail usage and avoid using cars. The research studies have evidenced that policies and funds were reserved but failed to produce a successful strategic plan for rail transits in Greater Kuala Lumpur, Malaysia. Thus, different variables and concepts related to this study are discussed in detail below:

2.2 Constructs of this Study

The central aim of this study with the lens of the theories and model (Theory of TPB and SERVQUAL) and support of a broader review of the literature contribute to finding the relation between the attitude, subjective norm, behavioral intention,

perceived behavioral control with the usage of the city rail transport where customer satisfaction moderates the relationship between behavioral intention and city rail transport usage. Several studies have suggested increasing city rail transport usage because it will contribute to environmental sustainability in Malaysia. Establishing efficient rail public transportation in cities should diminish problems of traffic jams, emission of CO, CO2, NO2, and other poisonous greenhouse gases emission, climate change, health issues, and resource allocation (Shafie and Mahmud, 2017 and 2020; Brohi et al., 2018). Suppose an economy avoids public behavior towards transport use. In that case, decisions can negatively affect the country's social, environmental, and economic development, like a rapid increase in the automobiles and motor vehicles supply, occupying the roads and highways (Saharan et al., 2020). Excessive private automobiles purchase contributes to pollution, climate change, global warming, and health issues (Brand et al., 2021). Traffic issues in urban regions decline the mobility of goods and services, leading to declining economic growth (Jin & Rafferty, 2017).

Therefore, a behavioral framework is needed to determine the factors of attitude, subjective norm, and perceived behavioral control (PBC) are independent variable constructs. The moderating variable is customer satisfaction, while the mediating variable is behavioral intention. Environment and health concerns are antecedents of attitude; the social concern is an antecedent of the subjective norm; perceived ease and obstacle are antecedents of PBC; and service quality dimensions (i.e., tangibility, reliability, assurance, empathy, and responsiveness) are antecedents of

customer satisfaction. The following are in-depth critical and descriptive literature review of the variables:

2.2.1 Attitude

Understanding public attitudes towards city rail usage in Malaysia is pivotal for enhancing urban mobility and sustainable transportation. The existing literature reveals critical insights into various aspects that influence individuals' attitudes towards using city rail systems in the Malaysian context.

Attitude is the constant acknowledgement of an individual's psychological perspective or belief based on their likes/dislikes toward using things or services (Borhan et al., 2019). However, an *individual's attitude* can also be defined as their evaluative response to using rail transportation (Widjaya & Ardi, 2020). People's choice of public transportation is because of their views, feelings, and attitudes, which are in keeping with the standards for travel behavior (Ahmed et al., 2021). Ahmed et al. argued that low-income students' viewpoints are more persuasive for using public transportation. According to the theory of planned behavior, the attitude toward usage behavior is a sign of overall behavioral performance. In the context of urban rail usage, attitudes reflect passengers' cognitive and affective evaluations of rail services, comfort, convenience, and overall experiences. These attitudes are central to influencing the decision to opt for city rail transport.

Research by Mohamad et al. (2020) highlights how attitudes are shaped by perceived benefits and challenges associated with city rail transport. Positive attitudes are often linked to perceived advantages such as reduced congestion,

environmental friendliness, and cost-effectiveness. Conversely, negative attitudes can stem from issues like overcrowding, inconvenience, and lack of accessibility.

Furthermore, attitudes are founded on an individual's ideas, consequences, and worries that are required to complete a task. Environmental and health concerns are also considered the antecedents of the attitudes toward using city rail transit. The findings revealed that positive or negative attitudes could be determined by whether they use public transit frequently, less, or just not responsible people are inclined to use public transportation (Golbabaei et al., 2020). Similarly, people concerned about their fitness and health are more likely to use rail transit in cities (Friman et al., 2020; Andersson, 2020). Two key variables are needed to promote people's positive attitude toward public transportation: the environment and health. There is a scarcity of research and data illustrating how health affects people's attitudes toward using city rail transport in Malaysia.

2.2.1.1 Environmental Concern

The several complexities of globalization have also led to the damage of the environment slowly and gradually; therefore, environmental awareness must also be equally increased to reduce the damage to the world. (Wang et a., 2017).

The work of Tan et al. (2018) delves into the influence of environmental concerns on attitudes towards rail usage. As Malaysia seeks to address environmental challenges, individuals who hold strong pro-environmental attitudes tend to favor city rail transport due to its lower carbon footprint and potential contributions to reducing air pollution. Furthermore, people who are more aware of environmental-

friendly usage show a positive attitude towards any issue. The awareness can be indicated by attitude and response toward the environmental issues (Russel & Joan, 1978; Moták et al., 2017). According to Redondo and Puelles (2016), environmental education has not resulted in significant improvements in the public's attitude and conduct toward the subject of environmental destruction of our planet. Furthermore, they argued that every new generation is more known for environmental education. Simple information about the environment is unnecessary but should be promoted pro-environmental behaviors more than knowledge.

Minton and Rose (1997) have also supported that environmental concern is significantly related to the public's environmentally friendly attitude and behavior. In line with that concept, people who are more concerned about the environment are willing to use public transport and avoid purchasing diesel cars (Wu et al., 2019). When people use public transport, their perception of the environment is more intensive than ever (Fu et al., 2017).

Studies revealed that environmental concern is positively and significantly related to attitude and usage intention (Wang and Zhao., 2017). Further, he argued that autonomous electric vehicles are also environmentally friendly and positively influence electric cars. However, the congestion problem again cannot be controlled. Therefore, people who are more concerned about environment-friendly product usage show positivity towards the public transport systems.

Everyone has an idea that eco-friendly environmental activities are one of the most crucial needs of Malaysia. However, infrastructure development for using more public transport and green transport can reduce air pollution (Sun et al., 2018). In Malaysia, the people's attitude has advanced urban regeneration; promoting "the return to cities" concepts can only be possible if the quality of the environment should focus more (Eni et al., 2017). Malaysian people also want to use public transportation services, but the public transport services provision is negligible in-country (Usmani et al., 2020). sustainable green transportation should resolve environmental congestion issues. The study tries to communicate and determine the factors' impact on the attitude and behaviors encountered the city rail transport usage.

2.2.1.2 Health Concern

The relationship between health concerns and individuals' attitudes towards city rail transport usage is a significant aspect of urban mobility research. This literature review provides insights into the interplay between health-related factors and attitudes, shedding light on how health considerations influence the adoption of city rail transport. Research by Adams and White (2020) emphasizes the health implications of transportation choices. Attitudes towards city rail transport usage are shaped by individuals' awareness of the associated health benefits, such as reduced exposure to air pollutants and improved physical activity due to walking to and from rail stations. Studies like Lim et al. (2019) delve into the impact of air quality on city rail transport usage attitudes. Individuals' attitudes are influenced by concerns over air pollution in urban areas and the potential respiratory health

benefits of using rail transport, which is perceived as a cleaner alternative to private vehicles. Researchers like Tan et al. (2021) explore the nexus between environmental sustainability and personal health in influencing attitudes towards rail usage. The perceived alignment of city rail transport with both environmental conservation and individual health aspirations can foster positive attitudes among users.

The citizens anxious about their health have a high preference for travelling through city rail transits. Wong et al. (2017) surveyed China and supported that the public must be aware that people are aware that city rail transport usage can reduce pollution, increase physical fitness, provide access to basic needs, and reduce accidents, fatalities, and congestions; their attitude towards city rail will become intensely positive. Public transport is the factor that helps to lay out the city's infrastructure. However, the only thing needed is the knowledge and awareness of usage impact on health and prevent the public from 20% of accidents (Khreis et al., 2017). The health issues caused due to automobiles should be prominently communicated to the public; thus, awareness is necessary for the public to develop their attitude toward public transport (Kheris et al., 2016; Nieuwenhuijsen, 2016).

Further, it is criticized that the public's attitude should be intended for public transport to avoid personal injuries and death (Brown et al., 2017). De Vos et al. (2019) elaborated that using rail transportation, walking, and cycling keeps people healthy and happy than those driving their cars. The health benefits of active travel through public transport greatly outweigh the harms from injuries and air pollution (Whitfield, 2017). A positive attitude towards public transport users can control

health issues related to city rails (Gossling, 2016). The health issues related to transportation are discussed below:

A. Traffic Crashes

Traffic crashes cause injuries and deaths, impacting the public's attitude. Previous research by Al-Adhoobi et al. (2017) signifies that the motorist's security plans like seat belt risks, unlicensed drivers, increases in vehicle travel, increased crashes, and general (not targeted at high-risk driving) vehicle travel reductions do little to increase safety. Most travel injuries are because by numerous automobiles, and huge travel through public transportation can reduce extra accidents by decreasing traffic congestion, frequency, and vehicle interactions (Hammad et al., 2019). Further, Ngoc et al. (2017) further argued that countries could reduce traffic accidents through the positive behavior of the public to use public transport. Thus, the most comprehensive strategic planning for transportation is needed to increase security/ safety.

B. Transport Related Pollution

The second important factor for transport-related health issues is pollution caused by the emission of greenhouse gases, which directly affects the attitude to use public transport or not use it.

Automobiles produce different pollutants; they can be sources of health issues and natural and environmental damage like climate change (Zhang & Witlox, 2020). While powerful technologies are developed to reduce poisonous emissions per km, motor vehicles significantly negatively impact health (Sharma & Strezov, 2017).

People are still unaware of the use of rail transport even if they know the damage to cars. Sohrabi et al. (2020) also argued that even motor vehicle pollution could take thousands of lives early, like accidents. Still, they are not diverted towards city rail transport due to lack of quality services due to unawareness.

C. *Physical Fitness and Activities*

Another significant health concern factor is the long-term plans to choose activities that affect physical fitness (Nieuwenhuijsen et al., 2020). Most health administrators are more concerned about the decline in physical fitness, weight gain, and diseases like diabetes, lungs, and heart failure declining physical fitness due to the present transport usage policies. It influences the public's attitude (Sohrabi & Khreis, 2020). There are several methods to remain fit, like using the gym, walking, cycling, and sports exercises. The research elaborates that the automobile journey has a significant positive relationship with inactive and overweight people (Liao et al., 2020). Concerning this, the progress of using public transport accompanied by walking and cycling can reduce high blood pressure and diabetes (Zhang et al., 2020). Most public transport comprises walking tracks to link other public transport, so automatically, physical activities are increased due to public transport usage (Lanza et al., 2020).

D. *Accessibility to Healthcare Facilities*

Accessibility to healthcare facilities like hospitals, medical stores, and trauma centers also affects public attitudes toward using public transport. Access to health facilities should be a significant factor in improving the public's health, which can

be made possible through public transportation usage (Guimarães et al., 2019). High accessibility of health goods and services for the most public is possible through providing this quality service by public transportation (Ma et al., 2019). Only affordability is not required, but strategy to provide high access to health services and products is most significant.

E. Mental Health Impacts

The mental health of the public can be affected by traffic congestion and driving fatigue can increase road accidents. Increasing walking and cycling towards public transport can improve mental health (Lucchesi et al., 2020). While using city rail transport, people can increase their social circles and share ideas, enhancing the community's mental health (Litman, 2017). Therefore, communities using rail transport were observed with fewer symptoms of depression and less stress than driving personal vehicles.

2.2.2 Subjective Norm

The subjective norm (SN) is a set of societal and personal values that motivate people to take city rail transport or not (Ajzen, 1991). This variable is wholly tied to the expectations of other important people, and it is favorably and strongly associated with the behavioral intention to utilize public transportation (De Oa, 2020). The subjective norm is the social standard that individual social concerns and ideas adhere to. Local leadership, personalities, friends, and family encourage them to use the bus or train since it is suitable for the environment and health (Van Lierop et al., 2018). The public is under social pressure to use rail transportation to conserve the environment and address health concerns (Al-Rashid et al., 2021).

Services quality rail transits are offered to everyone without prejudice, allowing society to reach its goals without squandering the expense and time of megacities (Li et al., 2020). The study indicated that due to subjective norms, people are supposed to rely on public transport than the subjective norm (Tiznado-Aitken et al., 2021; Luoma-Halkola et al., 2020). Although purpose have little impact on social norms and public transit use, people are impacted by the people in their lives when they go by rail transportation. Public views and social standards have been shown in several studies to significantly impact individual behaviour (Wang et al., 2016). People generally use public transportation because their family and friends do so (Luoma-Halkola et al., 2020). Personal and normative beliefs are two types of beliefs that obey subjective norms. As a result, the social norm is the belief system and notion of social obligation that most individuals anticipate adhering to or deviating from. The fear of social permission to behave or not act is a normative belief. As a result, an *individual's intention* is defined by his or her motivation to fulfil and fear of social punishments (Li et al., 2020). Individuals are more likely to act if their opinions about public transportation use indicate social pressure or family expectations.

2.2.2.1 Social Concern

The people of Malaysia need to prioritize city rail transport services over private vehicles for pro-environment behavior. Liu et al. (2017) supported that the public, if they make their life principles for using rail transport services, shows a positive attitude towards the usage. Levin (2019) stated that the more socially active people involved in recreational activities show a positive attitude toward using city rail

transport. Most customers involved in recreational activities use public transportation (Julsrud & Denstadli, 2017).

There is social pressure on citizens to use rail transport as friends, family, and other loved ones pressure the people, showing a solid attitude towards using public transport (Hine & Mitchell, 2019). The public is under social pressure to use city rail transport to conserve the environment and address health concerns (Dargin & Mostafavi, 2020).

2.2.3   Perceived Behavioral Control (PBC)

PBC has emerged as a significant determinant of individuals' decisions to use city rail transport systems in Malaysia. Rooted in Ajzen's Theory of Planned Behavior (Ajzen, 1991), PBC reflects individuals' beliefs about their ability to overcome obstacles and successfully engage in a behavior. In the context of rail usage, PBC encompasses factors such as ease of use, familiarity with the system, and self-confidence in navigating the transportation network.

PBC is based on perceived ease and uses controllability, whereas perceived ease of use is the degree of the product or services used and learned. People always prefer to use transportation services that are easily accessible and easy to use (Davis, 1989). There is a positive effect on rail transport for short-distance city travel if customers are provided with easy accessibility and affordability and vice versa. Simultaneously, Mahmud and Hine (2016) assert that perceived ease has a minimal influence on public transit intentions. This decision might be based on age, gender, income, and other variables. Several socio-demographic parameters significantly

impact public transportation awareness, including age, educational status, and income (Segert & Brunmayr, 2020). If a person is more focused on the means of transport, for example, he will have a positive experience. The people's opinion of perceived behavioral control can sustain an exceptional environment, and health can be improved by using public transit. Self-evaluation is another term for perceived behavioral control over elements affecting one's health, the environment, and other issues that cause congestion and pollution (Gelb & Apparicio, 2021). During their survey, Zhao and Ghao (2022) observed that the public's expensive fare, season, and age could be the contents of the public for choosing the transportation mode.

2.2.4 Behavioral Intention

The examination of BI is a pivotal aspect in understanding individuals' decisions to use city rail transport systems in Malaysia. The literature underscores the significance of behavioral intention as a key determinant of actual transportation choices and how it's influenced by a variety of factors. The people who always say optimistic about the public transport services used rail transport more than a car. People's attitude always influences travel behavior and intention towards usage (Ibrahim et al., 2020 and Liébana-Cabanillas et al., 2020).

TPB has been extensively employed to investigate the relationship between behavioral intention and city rail usage. Ajzen (1991) proposed that behavioral intention, shaped by attitudes, subjective norms, and perceived behavioral control, significantly influences actual behaviors, including choosing city rail systems. The

attitudes individuals hold towards city rail systems play a pivotal role in shaping behavioral intentions. Positive attitudes, stemming from factors such as comfort, convenience, and environmental consciousness, correlate with a higher likelihood of intending to use rail transport (Borhan et al., 2019).

Subjective norms, defined as perceptions of social pressures and approval from significant others, contribute to behavioral intention. Research by Widjaya and Ardi (2020) emphasizes how perceptions of social support or encouragement from peers, family, or colleagues influence the decision to use city rail systems.

Perceived behavioral control, which includes factors such as ease of use and personal competence, affects behavioral intention. Individuals with higher perceived control are more likely to intend to use city rail transport due to their confidence in navigating the system (Chong et al., 2017). Cultural factors also influence behavioral intention. In the Malaysian context, cultural norms, values, and preferences impact the decision to use city rail systems (Tan et al., 2018). Economic considerations, such as fare affordability and perceived value for money, are linked to behavioral intention. Individuals are more likely to intend to use city rail transport if they perceive it as a cost-effective option (Ahmed et al., 2021).

People who care about the environment, their health, and societal pressures always have a positive attitude, which leads to a stronger desire to behave in a certain way (Beck and Ajzen, 1991; Yuriev et al., 2020).

2.2.5 City Rail Transport Usage

The examination of city rail transport usage in Malaysia holds significant implications for urban mobility planning, sustainability, and transportation policy. A synthesis of critical literature reveals insights into factors that influence individuals' decisions to use city rail systems in the Malaysian context.

Usage is the actual behavior of the public who is practically involved in any task or performing a specific behavior (Moták et al., 2017). Furthermore Moták et al. emphasizes the pivotal role of perceived convenience in shaping city rail usage. Individuals who perceive rail systems as accessible, well-connected, and time-efficient are more likely to choose them for their daily commutes. The work of Ibrahim et al. (2019) delves into the impact of economic factors on rail usage. Fare affordability, in relation to alternative modes of transportation, influences commuters' choices, with cost-effectiveness playing a significant role in mode selection.

Environment and health concerned persons always actively use environment-friendly transportation services, i.e., city rail transport services. Customers who are content with their health, the environment, and income are more likely towards city rail transportation usage in developed countries (Liu et al., 2017). Furthermore, they explained that the public in developing countries, like in Asian public, is concerned about the costly fare, safety, and security. Individual attitudes appear to influence actual conduct, according to empirical research. According to the theory of planned behavior, the reasonable intention standard/framework combined with user choice can predict how people would utilize rail transportation (Ajzen, 1991). The current

transportation infrastructure has been enhanced due to the rapid expansion in population and economic growth. Highways, railways, waterways, and airplanes are several forms of transportation. The bus, cab, railway, train, and aircraft are the most frequent modes of public transportation in Malaysia. In Malaysia, public transportation has gradually become an indispensable means of transportation for social humanism. Health concerns (Khreis et al., 2017) and environmental concerns (Tian et al., 2020) are showing a more positive attitude toward public transport usage, which have not been explored before.

Cultural norms and social perceptions significantly influence rail usage. Miletic et al. (2017) argue that communal values and social norms can influence individuals' decisions to use public transportation, including city rail systems. Public safety and security perceptions play a role in rail usage attitudes. Khreis et al. (2017) demonstrate that effective safety measures, well-lit stations, and visible security personnel contribute to enhanced rail system acceptance. The behavioral determination for the increased usage of city rail transport is essential for the academic world to study more as possible to increase the awareness among the stakeholders. Studies by Lee and Lim (2020) emphasize the importance of last-mile connectivity. Seamless integration between rail stations and final destinations, facilitated by pedestrian pathways and feeder services, can impact rail system adoption. Effective policies are crucial for encouraging rail usage.

2.2.6 Customer Satisfaction

Customer satisfaction is the inner motivation or feeling of the individual towards any product or service. Satisfaction is the outcome of the customers' judgment of the services, the client's intention, and usage behavior (Lien et al., 2017). Rather et al. (2019) have supported that customer satisfaction is the direct and vital antecedent of the intention. Research also confirmed that customer satisfaction is the qualitative service predecessor (De Ona et al., 2020). Service quality and customers are pertinent for knowing the intention of the individuals. Although customer satisfaction has a prominent relationship with public transport usage behavior, the relationship between intention to use and actual use of the public transport can be moderated by the satisfied customers. Customer satisfaction mediated public transport and behavioral intention; if the quality of the perceived service provided to the customers, satisfaction level increases, and user behavior intended (Yazid et al., 2020; Parasuraman et al., 1988). The study of Fu and Juan (2017) has integrated the theories of TPB and customer satisfaction to predict user behavior. Their study argued that subjective norms and behavioral control are influenced by public transport services, which increases the customer's satisfaction to shows positive intention.

In the city rail transport context, satisfaction is defined as the consumers' emotional state found from the difference in the expectations with the performance of the services. Perceived service quality can positively influence satisfaction, particularly in public transport (Liu & Lee, 2016). Thus, we must discuss the following essential dimensions of service quality below.

2.2.7 Service Quality Dimensions

Services and customer satisfaction are replaceable terminologies (Parasuraman et al., 1985). Efficient city rail transport services influence economic conditions by increasing opportunities, reducing fuel and other costs, and reducing greenhouse gas emissions. Though many issues are related to the city rail transport services such as limited facilities, low-quality facilities, the use of low-quality trips, long waiting, and inconvenience usage for depart and arrival, many trips on road increase traffic congestions, cover more space on roads and the make inadequacy in facilities of the rail transportation (Chong et al., 2020). Hence, low time consumption for the trips with a high frequency of rail transport can reduce the traffic volume, and congestion also increases the facilities.

The city rail transportation's tangible services are associated with delivering services by personnel, external/ physical facilities, equipment, and information required by the customer (Parasuraman et al., 1985). Mugion et al. (2018), during their study, revealed that empathy is needed in city rail transportation services, defined as the willingness of every customer. Customers constantly desire to be assisted and treated well with every dimensional service's responsiveness (Srivastava & Srivastava, 2019). Increasing perceived benefits and reducing perceived costs can lead to the customers' perceived value.

The behavioral intention of using city rail transport is positively influenced by the quality of the service provided as perceived satisfaction (De Ona et al., 2020; De Ona et al., 2021). It is found from the literature that there is a lack of measuring quality services provision model to increase the city rail transport services for high

usage. The service's quality includes affordability, communicability, easiness, availability, integration with other transports, responsiveness, safety, cleanliness, and speed. According to the customers' needs, following five-dimensional factors (Parasuraman et al., 1985, 1988 and 1990) for the services, provision is necessary to consider customer satisfaction: tangibility, reliability, assurance, empathy, and responsiveness, as discussed under:

A. Tangibility (Physical Environment Quality)

The city rail transport services should ensure the crowds and not reach a high level on peak and off periods to handle the issues. Standing and sitting arrangements are needed. 50% seat availability is necessary for satisfaction and provides comfort to the customers at the majority level. Bakti et al. (2020) suggested that city rail transport should be in good condition, attractive, and equipped with modern technological facilities (like air conditioning, charging ports, Wi-Fi, and others.). The rail transport should have adequate resources and capacity or space (for parking, sitting, and luggage) and uses attractive materials for the tickets, seats, and other facilities. The rail transit design in cities should be comfortable and easily accessible for the disabled. There should ensure cleanliness at the city rail transport terminals and stops (Hussain et al., 2018). On city rail transport, customers need cool temperatures because many people travel in an uncomfortable environment (Abdulrazzaq et al., 2020).

B. Reliability

The customers need punctual timing; even if transits have 10 minutes late, it should announce loudly through audio announcements on platforms because it creates dissatisfaction in customers waiting for a long time without any reason. The city rail transport should always arrive and depart on time. Customers always want to purchase a ticket easily for their journey. As (Isai et al., 2020) supported that, city rail transport staff should satisfy customers' requests right the first time as they need services at the promised time for higher usage of their services. Birago et al. (2017) found that services supplied, and frequency must always match the customers' demand. Frequency also creates a problem for the clients to miss the timely assistance, and customers always wait to go towards the residents. Customers will be more satisfied and provided with helpful knowledge to plan their journey.

C. Assurance

When the customers feel safe performing their transactions is called assurance. If the public transport service is used, it should be convenient and safe to feel safe and secure in their journey (Bakti et al., 2020). Employees should have in-depth occupational knowledge and be well trained for their jobs at public transport/stations, and their behavior should inspire trust and safety in the customers. Coppola and Silvestri (2020) concluded from the study that public transport should also offer individual safety from criminal dangers and accidents at their terminal, stops, and journeys. Customers should provide safe, secure, and fair services.

D. Empathy

Workers of the city rail transport always try to provide according to the best interests of their customers. City rail transport platforms should be easily accessible. Employees should always use easy language with the customers for communication. In their study, Chowdhury et al. (2018) concluded that city rail transport would lose its financial resources if fewer customers existed (Cats et al., 2017). The fewer the interchanges, the more will be satisfied customers. Customers will be more confident if they avail themselves of the direct services to their residents. If covered within a few minutes, long-distance can make customers more long-lasting. More customers will be happy if they feel not tired during their journey (Mugion et al., 2018).

E. Responsiveness

When customers are getting information about public the facilities and services of public transport quickly, city rail transport is quickly more responsive. City rail transport operators provide immediate response with polite/ courteous behavior on required information of the users (Bakti et al., 2020). City rail transport employees should always be willing to help and understand demands when needed by the customers timely. City rail transport should show responsiveness by providing information (about fares, schedules, and maps) that the clients can easily access (Mulley et al., 2017).

2.3 Demographic Factors and Usage

Demographic variables are age, gender, income, household, race, and religion. The demographic variables are kept constant because there is variance in different

theories of planned behavior. For example, people have strong relationships with cars in old age, negatively affecting usage of the city rail transport. Old age people and men have less environmental concern for demographic variables than women and young people. Literature reviews on the relationship between gender and environmental concern towards the attitude conclude that women have more severe ecological problems than men. Women have different mobility patterns and travel a shorter distance than men (Sovacool et al., 2018). Most of the studies suggest a gender difference in travel patterns. People living in cities use public transportation because of its accessibility to the necessity of goods and jobs/earnings. Income increases can harm public transport usage, and people who have savings could be diverted towards automobile usage (Vanderschuren & Baufeldt, 2018).

Demographic variables some studies have mediating relation between intention and usage to show the weakness and strength of the relationship in different categories. Likewise, Ashmore et al. (2019) have argued that gender has different effects in different counties. In Asia, primarily women avoid using public transport services, which negatively affects their attitude, intention, and usage. Chen et al. (2020) further elaborated that household size is positively associated with personal vehicles than public transport. Age, gender, and income affect public transport usage differently within different circumstances (Yazdanpanah & Hadji Hosseinlou, 2017).

In Europe, women are environmentally concerned and use public transport, but in Asian states, men and young people use public transport more than women and children due to insecurity, safety, and cultural norms (Hidayati et al., 2020). This

change might be because of the public's income and awareness of public transport usage. In Malaysia, mixed effects of income and public transport users are found.

Some studies stated that people with the high-income purchase and use personal vehicles. Studies elaborated that public transportation is costly and time-consuming, so low-income people are not using public transit (Suman et al., 2017). Different motives are determined from the literature to choosing the transport mode, i.e., cost, time, frequency, household, income, gender, and perceptions have even more effective than the reality (Nikitas, 2018). It is also found that those who perceive those cars are less safe, more expensive, and less comfortable will use public transport more than personal vehicles. According to Haywood et al. (2017), public transport users can also experience wasted time traveling through public transport. Furthermore, they explained that personal cars on the congested road always waste time and money compared to public transport.

Böcker et al. (2017) examined the individual variables, i.e., age, gender, education, and income, with varied and mixed results. Furthermore, the authors also highlighted different socio-demographic and social-political effects on socio-environment concerns for using transport modes. Their income and family job impacts their decision to use the transport (Wentzel, 2020). Thus, public transportation should provide facilities and extra care to minorities, disabled persons, women, children, and less income. According to Pojani et al. (2018), these are the firm public groups using public transport for their necessities. For sustainability, income, gender, and age should be considered, positively influencing

public transport concerns. Therefore, due to varied and mixed results, no direct relationship is found in the literature, although indirect effects are possible.

2.4 Underpinning Theories

This research makes use of the methodological framework of the TPB (Ajzen, 1991), which has been applied to various mode choice contexts (Chen & Chao, 2011; Chen, 2016; Geng et al., 2017; Pan & Truong, 2018; Gkargkavouzi et al., 2019), but not yet to combine with SERVQUAL in city rail transport of LRT, MRT and KTM Komuter in Greater Kuala Lumpur. The TPB has been frequently combined with additional elements to improve the TPB's explanatory power in describing public transportation use (Eriksson & Forward, 2011; Nordfjaern et al., 2014a; Zailani et al., 2016).

Nowadays, the notion of behavioral intention has gained popularity in the behavioral sciences literature. Predicting human behavior is the most difficult, as many different factors might impact the intention to behave accordingly (Ajzen, 1991). Previous studies used other theories to predict people's behavioral intentions toward a specific activity. As a result, TPB (Ajzen and Fishbein 1977, 1980, and 2018), Theory of Reasoned Action TRA (Fishbein and Ajzen 1977), Pro-Environment Reasoned Action PERA (Nadlifatin et al., 2016), and Social Cognitive Theory (SCT) are the most used approaches to predict human behavior (Bandura, 1999). All these theories used several factors to determine human behaviors.

According to Ajzen (2020), the Theory of Planned Behavior explains and predicts planned human behavior. The TPB aims to determine intention as the immediate antecedent of behaviour, and it is itself a function of attitude toward the behaviour, subjective norm, and perceived behavioural control (Nayum & Nordfjærn, 2021). For this study, the TPB should be the reliable theory of concern.

Customer satisfaction and public transport usage behaviour are best measured using SERVQUAL's (Parasuraman et al., 1985) five dimensions (Yazid et al., 2020). Gronroos (1984) underlined the importance of understanding consumer perceptions of quality for the company's success.

The difference between Parasuraman et al. (1985) and Gronroos (1984) is in the criteria for evaluating service quality. Whereas Parasuraman et al. (1988) highlight ten dimensions that lead to service quality, including tangibility, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding/knowing the customer and access to these dimensions later merged into the five dimensions, i.e., tangibility, reliability, empathy, assurance and responsiveness (Parasuraman et al., 1988) are the factors which influence commuters' perceptions of public transportation service quality (Idlan et al., 2021). The five-dimensional SERVQUAL model (Parasuraman et al., 1985) is still one of the most widely used and unified approaches for assessing the quality of vehicle transit services for customer satisfaction (Ojo et al., 2017).

Therefore, for this study, the five characteristics proposed by Parasuraman et al. (1988), tangibility, service reliability, responsiveness, assurance, and empathy,

stimulate satisfaction in rail transits are used as the predictor of customer satisfaction placed as the moderating factor in the TPB for providing the comprehensive behavioral framework.

2.4.1   The Theory of Planned Behavior

In planned behavior theory by Ajzen (1991), behavioral intention is a significant determinant of an individual's future conduct. In academia, customer loyalty is mainly used to measure behavioral goals (Shahid Iqbal et al., 2018). As a result, a behavioral sense encompasses the intention to do actual behavior and its usage, repurchase/reuse, and recommendation (Fornell, 1992; Zeithaml et al., 1990).

Literature review supported that TPB (Beck & Ajzen, 1991) and (Ajzen, 1991) are the most appropriate to predict behavioral intention (Lindlom & Lindblom, 2018). TPB is broadened model extracted from the TRA model (Fishbein & Ajzen, 1977). Hassan et al. (2016) stated a difference between TPB and TRA theories in TPB. Perceived behavioral control (PCB), defined as the perceived ease or difficulty of doing a behavior, is added as an additional variable. Another factor is social norms (social pressures to perform conduct). In brief, TPB explained that individuals' attitudes towards behavior, individual perception, or pressure from others to perform specific behavior intention (Ajzen, 1991; 2001). According to Chen (2016), critical factors of TPB are attitude, PCB, subjective norms, and intention.

The purpose is the most critical aspect of TPB when performing the activity (Ajzen, 1991). Behavioral intention describes how driven people are to act and how hard they are willing to work to do so (Ajzen, 1991). He claims that intentions reveal how much effort people are willing to put in and how much of a shot they are

planning to expand and perform. A strong desire might lead to a specific action (Ajzen, 1991). Furthermore, the relationship between intention and conduct is not perfect, and behavioral intention is a reliable predictor of actual behavior (Ajzen, 1991).
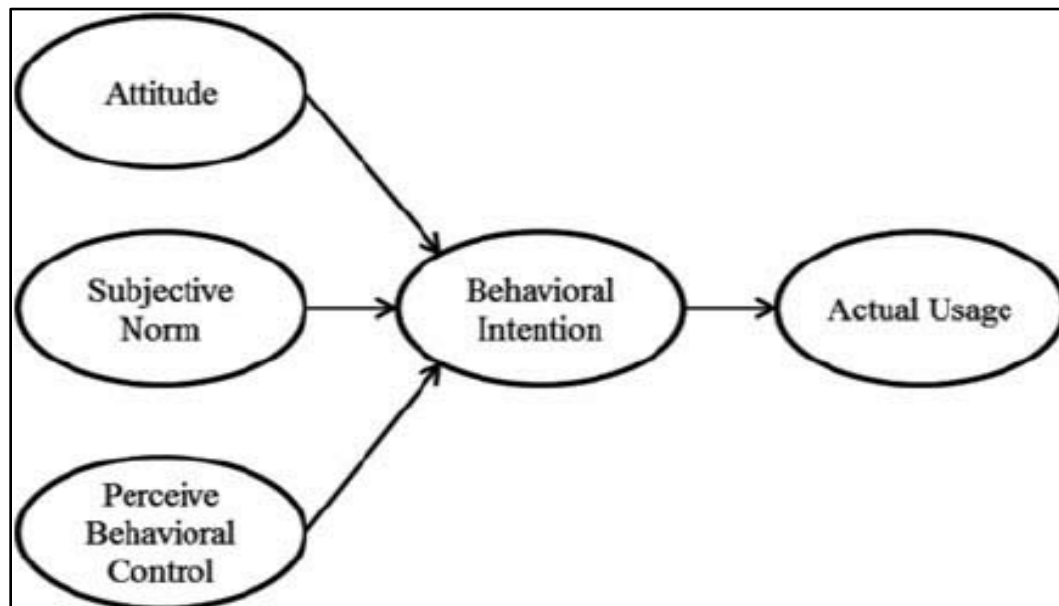
Figure 2.1 Theory of planned behavior TPB
Source: Ajzen (1985)

2.4.2   SERVQUAL

Fu et al. (2017) have integrated the TPB with the customer satisfaction theory to create the public transport travel behavior, as shown in figure 2.2. They found that customer satisfaction significantly impacted public transport travel intention and had a noticeable mediating impact on service quality and intention. An increase in satisfaction transforms into new clients and increases the transportation image. Increased customer satisfaction transforms into new customers and a more positive public image for transportation. Public transport companies needed an effective

pattern to know the factors that determine customer-perceived demand to satisfy them. The researcher needs to determine the dimensions of the quality attributes that affect customer satisfaction for positive usage behavior.
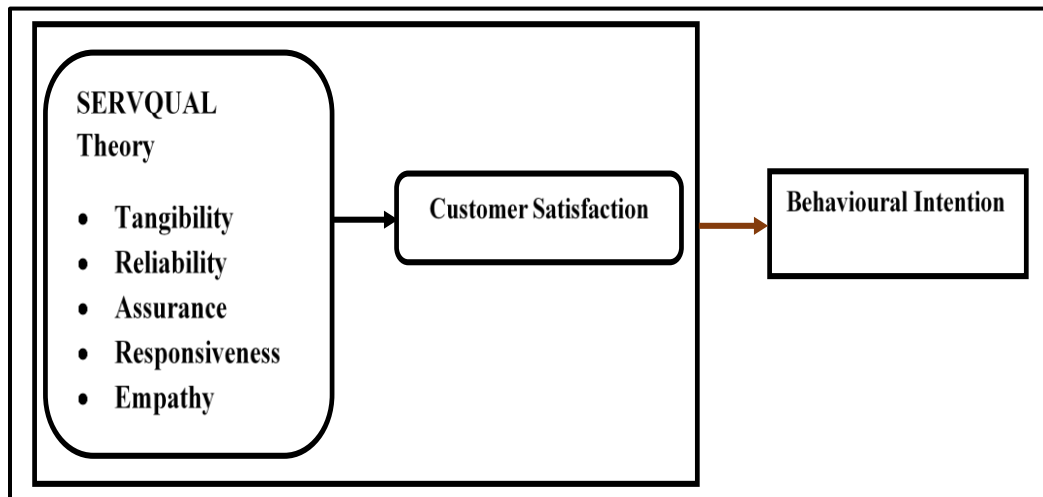
Figure 2.2 Customer Satisfaction-SERVQUAL Theory
Source : (Fu & Juan, 2017) and (Parasuraman et al., 1985)

This research addresses that customer satisfaction, service quality, and passenger behavioral intention are related to the bulk of previous studies. This study thus employs the concept of behavioral intention considering using and recommending public transport. Customer satisfaction mediates the relation between intention and the actual behavior of the public to use public transport (De Oña et al., 2021). Many researchers have used perceived service quality- satisfaction- consumer loyalty structure in various organizations (Bakti et al., 2020) and public transportation to measure consumers' behavioral intention (Van Lierop and El-Geneidy, 2018).

Zeithaml et al. (1990) defined *perceived service quality* as the consumers' opinion about its excellence and superiority. Consumer evaluation for services components or dimensions is related to the perceived service quality (Haywood-Farmer, 1988). Perceived quality services can also be stated as consumers' evaluation of an intrinsic aspect of the service's excellence is the perceived service quality for their satisfaction (Bakti et al., 2020). *Customer satisfaction* is defined as the consumers' emotional state, and the comparative analysis results from the expected and actual services provided to the customers (Sumaedi et al., 2016). Customer satisfaction and service quality are two different aspects. Still, they have a relationship since satisfaction is the accumulative evaluation of the intrinsic and extrinsic quality services variables like the company's image, price, temperature, seating arrangement, and many others. In public transportation, satisfaction is defined as the consumers' emotional state found from the difference in the expectations with the performance of the services. Perceived service quality can positively influence satisfaction (Gao et al., 2018).

Furthermore, it is also revealed a positive impact on satisfaction and public transport use in word-of-mouth marketing (Bakti et al., 2020), specifically for public transport services. Researchers have examined the effect of perceived service quality on satisfaction (Su et al., 2021). They found that perceived service quality influences satisfaction positively also on consumer behavior.

2.5 The Research Framework of Study

The literature review's empirical findings (De Ona et al., 2020, 2021; Mugion et al., 2019; Bakti et al., 2020) revealed that various factors impact the attitude that

motivates people to pick sustainable public transportation options. Public transportation use behavior can be predicted using the Theory of Planned Behavior (Ajzen, 1991) as the rational choice model/framework employing attitude components. Fu and Juan (2017) have integrated both theories, i.e., planned behavior and customer satisfaction, to understand public transport behavior. Figure 2.3 shows the proposed research model of this study. It identifies those independent variables are attitude to use public transport, subjective norms, and perceived behavioral control are significantly associated with the behavioral intention to use public transport. Behavioral intention to use public transportation is a substantial mediating impact on public transport usage. Customer satisfaction moderates the relationship between behavioral intention and actual public transport use behavior in the framework, whereas demographic variables are kept as the controlled variables in the model between the intention and actual behavior.
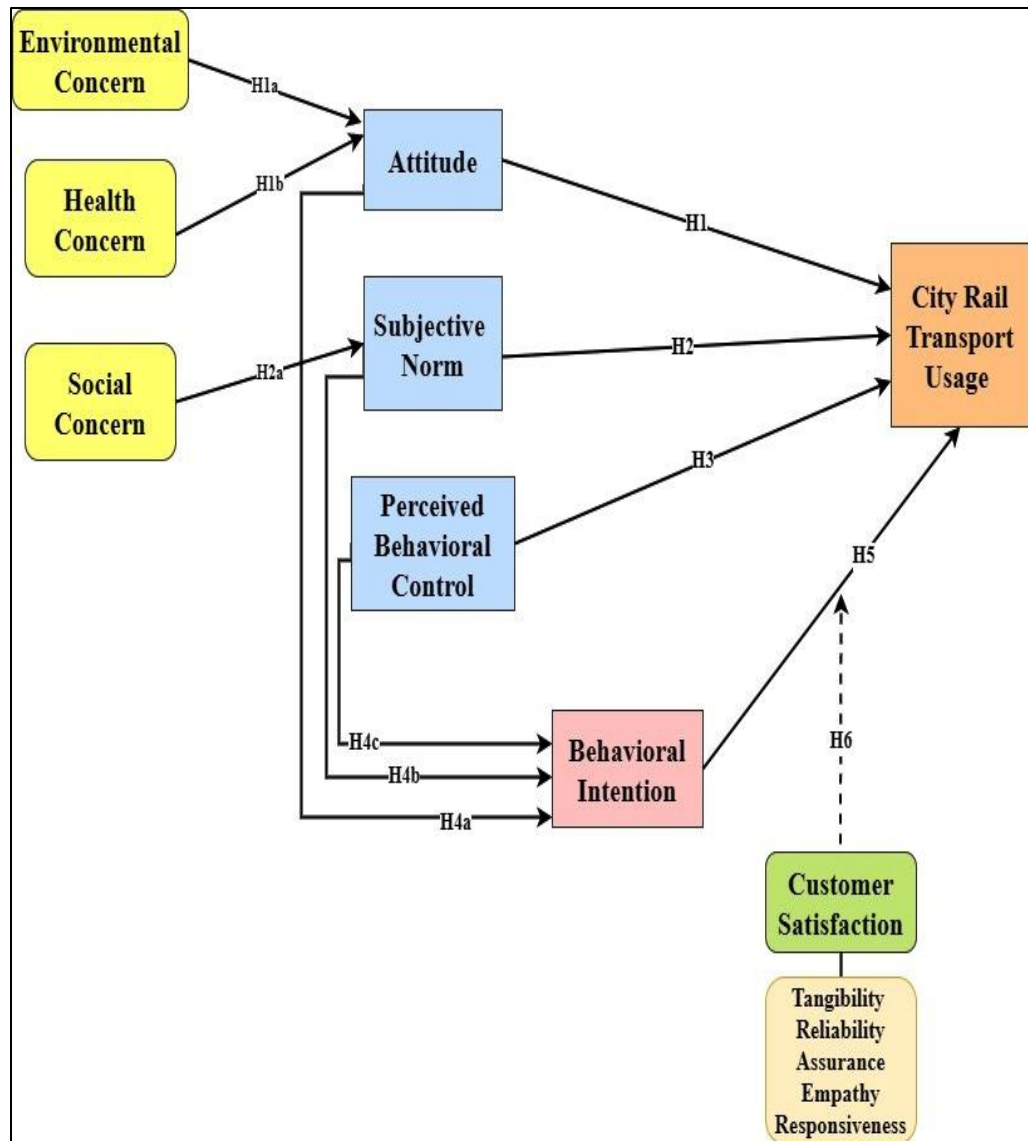
Figure 2.3 The Research Framework

Note. Researcher's study

2.6 Hypotheses Development

The hypotheses of the study are developed from the support of related literature discussed

as follows.

2.6.1 Attitude and Usage

Several studies conducted to determine travel behavior considered the attitude for a long time. In the 1970s, scholars observed that attitudes and behaviors could be mutually exclusive. For illustration, Dobson et al. (1978) and Reibstein et al. (1980) conducted a survey and used 800 samples from Los Angeles citizens and found that bus usage frequency and attitude are positively associated. At the end of the 1990s, a renewed interest in the link between travel attitudes and behavior emerged. The interest was more enhanced by the well-known theory of planned behavior (1991). This theory determines a particular period's behavior for a particular mode choice.

Consequently, most travel behavioral researchers include attitudinal statements to capture their attitude in the survey, and results found significant between attitude and travel behavior (Bagley & Mokhtarian, 2002; Bamberg et al., 2003; Kitamura et al., 1997). Studies from the middle of the 2000s revealed that travel attitudes are linked to travel behavior, but travel attitudes also differ according to the residential area of the people. People living in suburban neighborhoods often have positive driving attitudes, while those living in more urban-type neighborhoods tend to have positive attitudes towards public transport use and active travel. These outcomes suggest that people select a neighborhood that enables them to travel in a desirable way (i.e., a preferred travel mode). Consequently, travel attitudes influence the residential location choice. The effect of the built environment on travel behavior could be an accurate predictor of travel behavior (Cao et al., 2009; Handy et al., 2005). Kroesen et al. (2017) surveyed the Netherlands with around 8000 responses collected and analyzed using a two-wave mobility panel and found that passengers'

attitudes and behaviors are mutually related to each other and vice versa. Instead, attitude is the persistent observation of a person's behavioral feelings, which can be easily recognized by their likes, certain things, and surroundings. The evaluative response to a given thing is referred to as attitude. People use public transport for their journey attitudes and perceptions. According to the planned behavior paradigm, the attitude toward the conduct reflects full behavioral performance. Individuals' beliefs, outcomes, and worries can influence their attitudes. The results determined if the person has a positive or negative attitude toward those who use rail transits. This relationship can be assessed through increased, decreased, or no use of rail transportation.

As a result, it is proposed that:

> **H1** *There is significant and positive relationship of Attitude and City Rail Transport Usage.*

2.6.1.1 Environment Concern and Health Concern

Concern about the environment has risen to the top of the global agenda. Concern for the environment is a real environmental attitude (Schulz et al., 2004). It evaluates one is actions in terms of their impact on the environment (Kim et al., 2019). Buh and Peer (2022) conducted a survey questionnaire in Vienna to determine the attitude and behavior of the environment concerned public towards using the night train in Austria. Through convenience sampling more than 481 questionnaires were processed in SPSS. Their results show that attitudes, subjective norms, perceived behavioral control, environmental concern, and familiarity with night train services are significant with behavioral intention. Furthermore, an

educated person is an environmental concern and uses the train regularly. The high fare, sharing cabins, and long-distance travel are the constraint factors towards the usage.

Previous research focused on environmental difficulties at the individual level (Hao & Song, 2020; Hong & Park, 2019; Sulphey & Faisal, 2021; Bohr and Dunlap, 2018; Huneck et al., 2010). The studies have observed different factors co relationship to analyze attitudes contributing to environmentally friendly behavior (Cruz & Manata, 2020). People who care deeply about the environment act sensibly and frequently make sacrifices (Santarius, 2015). Environmental issues have been highlighted because of eco-friendly conduct.

Various environmental challenges, such as biodiversity loss, air pollution, water scarcity, and noise pollution, harm the environment's long-term viability. Increased use of private cars and decreased use of city rail transportation will have negative consequences (Marin & Mazzanti, 2019). This assumption relates to environmental psychology, which aims to enhance sustainability practices through behavioral changes. This study will aid in comprehending environmentally friendly behavioral variations in the use of goods and services. Environmental behavior influences structural changes in the ecosystem by causing changes in matter/energy from the environment. As a result, eco-friendly behavior does not affect the environment, or, to put it another way, an environmentally friendly attitude.

Environmental worries, health issues, and social concerns, the most prominent predecessors of environmentally friendly actions that have not been researched

before, need to be investigated through studies. Transportation's contribution to overall energy-related CO_2 emissions has increased faster than that of other energy end-use sectors worldwide. Road cars are responsible for 80% of all transportation emissions, mainly in developing countries (Kwan & Hashim,2020). Climate mitigation's health advantages can give another rationale for governments to integrate climate action into national policies. As a result, light rail transportation is one of Malaysia's urban transportation strategies for reducing emissions. Thus, the researcher has developed the following hypotheses:

>**H1a.** *There is significant and positive relationship of Environmental Concern and Attitude.*
>
>**H1b.** *There is significant and positive relationship of Health concern and Attitude.*

2.6.2 Subjective Norm and Usage

Several studies have found that public perceptions and social norms can considerably impact individual behavior (Wang et al., 2020; Wang et al., 2018; Ru et al., 2018). Individuals mainly use rail transport as their beloveds, and close friends do as well (Luoma-Halkola et al., 2020; Luoma-Halkola & Häikiö, 2022). Every individual's subjective belief can differ, yet it can directly and positively impact city rail transport usage. Most industrialized countries strive to provide equitable services to all socioeconomic groups because everyone can choose public transportation to owning a car. When the elderly or elders refuse to take public transportation, the young are forced to accompany them in their vehicles (Levin,

2019). Levin went on to say that public transportation should provide a variety of service dimensions to encourage people of all ages to use it. Personal/individual and normative beliefs are two types of beliefs that obey subjective norms. The social norm is the perception of social responsibility and the belief system performing or not performing what most people anticipate (Liu et al., 2017). The fear of social permission to behave or not act is a normative belief (Kristjansdottir,2017).   Individuals' beliefs about referents' expectations for behavior performance or nonperformance are normative. Therefore, it is controlled by a person's desire for cooperation and concern for social consequences (Li & Wu, 2020). Most industrialized countries seek to give equal services to all socioeconomic groups. The reason for this is that everyone prefers public transportation to private automobiles. Both beliefs are based on a subjective standard. The first is a personal belief, whereas the second is genuine. The social model is therefore founded on social responsibility and if one's belief system is compatible with the expectations of those in need (Ajibade & Boateng, 2021). One common misconception is the fear of societal judgment on what to do or not do because a person's desire to conform and fear of societal constraints determine this aim (Li et al., 2016). Individuals are more inclined to act when their beliefs imply societal pressures or expectations regarding the use of rail transportation from their loved ones.

Nayum and Nordfjærn (2021) surveyed university students in Norway to predict the public transit usage behavior during the winter using a quantitative approach. Around 441 students from two universities in Norway responded and showed their

intention. Their attitude toward using rail transport and perceived behavioral control was the most significant predictor of public transportation use in the winter like, as it is aligned with the notion of the theory of planned behavior and prior research findings (Ajzen, 1991; Eriksson & Forward, 2011; Nordfjaern et al., 2014a; Zailani et al., 2016). Therefore Nayum & Nordfjærn (2021) finalized that subjective norm was not explicitly hypothesized to predict intention in this study. Its considerable influence on perceived behavioral control and attitude suggested that subjective norms significantly indirectly impacted the intention to utilize public transportation.

Thus, it is hypothesized that:

H2. *There is significant and positive relationship of Subjective Norm and City Rail Transport Usage.*

H2a. *There is significant and positive relationship of Social Concern and subjective norm.*

2.6.3   *Perceived Behavioral Control and Usage*

Perceived behavioral control has solid and significant results with behavioral intention. Perceived behavioral control (PCB) reflects how the individual perceives the constraints or capabilities to achieve the target behavior (Ajzen & Fishbein, 1980). Besides, while supposed behavioral control parallels the actual behavioral control, it also expresses pressure on behavior (Ajzen 1991). There are situational controllability, ease, and impediments for the individual to use city rail transportation. A person has perceived controllable behavioral variables can

include elements that encourage or discourage them from taking city rails. Gender differences can also influence the public towards the usage of public transport. Women express more concern about using public transport than men, but due to harassment, they showed anxiety about traveling in trains (Gardener et al., 2019). Thus, factors like age, gender, and income also distract the individuals' attitude towards public transport (Batur and Koç, 2017). Long-distance travel was affected by income; educated persons have a more favorable attitude about using city rail transportation. Age has also impacted the usage of public transport. Thus, these variables are used as behavioral control variables. City rail transport usage and the variables that encourage or discourage its use are significantly related (Mazrová et al., 2021). During the study, Wang et al., 2022 collected 441 questionnaires to evaluate visitor travel intentions better. For the classic TPB, they discovered that perceived behavioral control is the main contributor to travel intention. At the same time, attitude somewhat mediates the association between subjective norm and travel intention for the mediation test. Furthermore, moderation tests demonstrate that both age and perceived danger significantly moderate the subjective norm-travel intention link. Similarly, they justified that PBC is directly related to the tourist's behavior, positively impacting the intention. Thus, the hypothesis is constructed as follows:

H3. There is significant and positive relationship of Perceived behavioral control and city rail transport usage.

2.6.4   *Mediating Effect of Behavioral Intention*

To predict the behavioral intention as a mediator attitude, subjective norm and perceived behavioral control considered as the strongest components of the TPB. Behavioral intention is the most strongly associated mediating factor in determining the usage of the city rail transit (Zailani et al., 2016). The behavioral intention acts as a mediator to predict the services quality provision, attitude and behavior (Sumaedi et al., 2014) and Fu and Juan, 2016).

Public transport passengers' intentions, directly and indirectly, affect the attitude, subjective norms, and perceived behavioral control towards the usage. Whereas (Li et al., 2017) also argued that behavioral intentions are related to the different constructs that are difficult to measure directly because perceived ease and use of individuals' subjective perceptions are different for everyone. Passengers' perceptions and intentions about public transport are different in general and specific. According to Mukhopadhyay (2017), behavioral intention indicates the usage behavior to use the sustainable public transit of LRT, MRT, and BRT in Malaysia. According to the theory of planned behavior (Ajzen & Fishbein, 1991), behavioral intention has a robust mediating effect between attitude, subjective norm, and perceived behavioral control and usage.

Zhao and Cao (2022) surveyed China. During factor analysis and structural equation modelling, they noted that there could be changes in the effects and interpretations of model variables in the post-pandemic context and everyday life. Surprisingly, despite the detrimental impacts of increasing psychological risk, perceived knowledge of COVID-19 has a considerable positive influence on

intention and conduct. A strong pre-pandemic personal attitude toward taking public transportation has enormous and favorable consequences on post-pandemic intention and perceived behavioral control and influencing behavior through intention.

TPB assumes that attitude, subjective norm, and perceived behavioral control directly influence intention and that intention mediating the effect on PBC has direct consequences on behavior (Ajzen, 1991; Liu et al., 2022). Many case studies of transit use behavior (Lanzini & Khan, 2017; Nordfjaern et al., 2014a; Zailani et al., 2016), switching intention from private vehicles to public transit (Chen & Chao, 2011; Salameh & Jawad, 2019), and the related topic of low-carbon transportation behaviour (Eriksson & Forward, 2011; Liu et al., 2022) have demonstrated TPB's capability in modelling individual mobility.

Previously, subjective norm (SN) was defined as the societal pressure that encourages people to use or avoid public transportation (Ajzen, 1991). This measure is completely connected with the behavioral desire to use public transportation, positively and significantly correlated with the perceptions of the other crucial persons' expectations (Wang et al. 2016). The subjective norm is the social standard to which distinct social concerns and concepts are attached. They are encouraged to use public transit by their leaders, famous people, family, friends, and loved ones since it is better for the environment and their health (Tao et al., 2019). If there is social pressure on the public to use public transportation as much as feasible, the environment and health concerns will stay safe (Sadowsky & Nelson, 2017). High-quality public transportation services are offered to everyone

without prejudice, allowing society to reach its goals without squandering the expense and time of megacities (Cao and Hickman, 2020). Studies show that more individuals want to do more than the arbitrary standard and commute via public transit (Wan et al., 2018). People are influenced by their loved ones when using public transport, but behavioral intention can also indirectly affect social norms and city rail transit usage. Succinctly, PCB refers to the ease and complexity of completing an activity. For example, if a person has had a positive experience with a particular form of transportation, he will be more focused on that means of transportation. Age, gender, income, employment, family size, perceived social pressure, education, and occupation are just a few socio-demographic characteristics that might influence mode choice. The use of public transportation by the public can improve the public's perception of behavioral control to maintain excellent health and the environment. The term "perceived behavioral control" can also relate to self-evaluation regarding environmental, health, and other factors that contribute to pollution and congestion (Hargelius and Alm, 2018). Masud et al. (2017) discovered that many socio-demographic parameters such as race, age, education level, and income substantially impact public transit awareness. These controlled variables considerably impact public transportation utilization behavior via behavioral intention (Si et al., 2020). Finally, it was concluded that public opinion, subjective norms, perceived behavioral control, and usage relationships indirectly impact public transportation use. As a result, the following hypotheses are formulated:

H4a. *There is significant and positive mediating relationship of Behavioral Intention among Attitude and City Rail Transport Usage.*

H4b. *There is significant and positive mediating relationship of Behavioral Intention among Subjective Norm and City Rail Transport Usage.*

H4c. *There is significant and positive mediating relationship of Behavioral Intention among Perceived Behavioral Control and City Rail Transport Usage.*

2.6.5   Behavioral Intention and Usage

If the sample data is collected from public transportation users, passengers' behavioral intentions significantly correlate with public transport usage (De Ona et al., 2020). Ajzen et al. (2018) shave argued that behavioral intentions are sometimes difficult to measure directly because every individual has different perceptions of the individual is different for everyone. Intention sometimes has negative and sometimes shows positive intention not to use the services. People's attitudes have an impact on how they use public transportation. The evaluative response (liking and disliking) to a specific activity is known as attitude (De Vos et al., 2020). According to the planned behavior theory, attitude represents an individual's total performance appraisal (Ajzen & Fishben, 1991). People's perceptions influence their decision to use public transportation (Liébana-Cabanillas et al., 2020). The association between attitude and travel behavior is largely mediated by behavioral intention (Liu et al., 2020). As per TPB (Ajzen, 1985), people's behavioral intentions can foretell their immediate behavior. The three fundamental elements of behavioral intention are the public's perception of utilizing public transportation, social standards, and perceived behavioral control. Behavioral intention measures

one's capacity to do an action (Ajzen, 1991). Like contemplation, attitude is how a person reacts to certain issues to carry out a specific action. When people feel more positive, their intentions to engage in each action are stronger (Beck & Ajzen, 1991). According to a study conducted by Sun & Ning (2022), the Chinese city of Suzhou launched a driverless bus service. To explore the aspects that influence users' adoption of driverless buses, the researchers built an integrated model framework based on TAM and TPB features. The measure was used to evaluate 529 passengers who had previously ridden in Suzhou. During the investigation, it was discovered that attitude, subjective norms, and PBC did not affect behavioral intention. According to a multi-group study, behavioral intention determines the direct path defining adoption behaviors.

According to various research (Bask & Rajahonka, 2017), the environment is safe for using alternative modes of transportation. People concerned about the environment intend to use public transportation (Mugion et al., 2018). People worried about physical fitness and mental and physical health, on the other hand, have a favorable attitude toward using public transportation (Guimares et al., 2019; Lucchesi et al., 2020). As a result, the following theory is proposed:

H5. There is significant and positive relationship of Behavioral Intention and City Rail Transport Usage.

2.6.6 *Moderating Effect of Customer Satisfaction*

The factors that influence private automobile users' behavior to utilize rail and the moderating impact factor of customer satisfaction among passengers in the Greater Kuala Lumpur. The interplay between behavioral intention and city rail transport

usage in the context of Malaysia is enriched by the moderating role of customer satisfaction. Extending beyond the traditional focus on individual intention, recent research has begun to investigate the influence of post-usage satisfaction on the initial intention to use city rail systems. Theoretical frameworks such as the Theory of Planned Behavior (Ajzen, 1991) provide a foundation for understanding the interrelation between attitudes, subjective norms, perceived behavioral control, and behavioral intentions. However, empirical studies suggest that the actual utilization of city rail systems subject to alteration due to the experience of customer satisfaction after usage.

Customer satisfaction can improve public motivation to stay away from private vehicles, which can be possible if high-quality services are given. Due to its subjective nature, service quality has been interpreted in various ways involving tangible and intangible aspects such as comfort, safety, accessibility, reliability, and convenience (Beiro et al., 2007; Sumaedi et al., 2014). Customer satisfaction directly and positively impacts and boosts its usage behavior; thus, it is necessary to include customer satisfaction to see the moderator effect (Grujicic, 2013). Sumaedi et al. (2014) and Fu & Juan (2016), on the other hand, revealed that customer satisfaction as the indirect effect on the usage behavior.

Customer satisfaction from public transportation is the most crucial subject for researchers. Zhang (2019) stated that three things satisfy public transportation customers more, i.e., ticket fare, level of the price, and layout of the station/platform. Zhang has also divided the customers into two categories: those who frequently use public transport and others who rarely are not satisfied well. He

concluded from his study that public transportation has a low utility rate of customer needs; reliability, time, and comfort are deemed essential factors positively impacting customer satisfaction. Some researchers considered a high level of service quality the predecessor of customer satisfaction (De Ona et al., 2021). Service quality and customers are pertinent for knowing the intention of the individuals. Although customer satisfaction has a prominent relationship with public transport usage behavior, the relationship between intention to use and actual use of the public transport can be moderated by the satisfied customers. Customer satisfaction mediated public transport and behavioral intention; if the quality of the perceived service provided to the customers, satisfaction level increases, behavioral intention and user behavior are also enhanced (Parasuraman et al., 1985 Ponrahono et al., 2016). The theory of planned behavior (Ajzen. 1991) as the rational choice model/ framework with use intention can determine public transport use behavior. Fu & Juan (2017) have integrated both theories, i.e., planned behavior and customer satisfaction, to understand public transport behavior. They found that perceived service quality and customer satisfaction influence subjective norms and designed behavioral control. Therefore, the following hypothesis is developed:

H6. There is significant and positive moderation effect of Customer Satisfaction on relationship of Behavioral Intention and City Rail Transport Usage

2.7 Summary

It is summarized that the bulk of the literature review is available on public transportation. Countries have tried to provide efficient policies for the sustainable transportation system. Still, the public is not motivated to switch toward rail

transport usage. Public transportation is the most crucial factor that reduces the country's economic, environmental, health, and social issues.

Following the literature review and SDGs, it is observed that the developed and developing world is demanding investment policies for using public transport. The satisfied public always uses public transportation more, and it has a positive impact on the economy, environment, and social development of their countries. The rapid increase in motor vehicle usage and its supply on roads and highways negatively affects the transportation system's performance and pollutes the environment. Social and environmental concerns also influence the behaviors of the public to use public transport. Preceding research papers presented a positive relationship between quality services, customer satisfaction, and behavioral intention.

Additionally, it is found that reliable and punctual, level, and frequent services, comfortable, safe, and secure transit, cleanliness, and other determinants of quality services are needed to increase public transportation usage. Health concern (physical fitness, healthcare facilities, and mental health) is positively related to behavioral intention to use public transportation. This study can help improve the government and transportation industry's strategic plans to generate an effective model so that sustainable urban public transportation could gain ground in Malaysia.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the choices of methodology and research design of the study. The research approach and problems are discussed. It also illustrates the questionnaire's method, population, sampling, size, pilot testing, data collection, and analysis. A need always finds the most appropriate solutions/ answers to the research problem systematically, and the researcher must document the questions, file, and test with a proper and reliable approach. This research investigates urban residential behavior and their intentions to use public transport for socio-economic development in Malaysia. This study is based on factors, i.e., attitudes, subjective norms, perceived behavioral control, customer satisfaction, behavioral intention to use public transport, and public transportation usage in Malaysia. Details of the methods are given below.

3.2 Research Design of this Study

Research design is the strategy to answer research questions before moving toward the research's practical work (Bryman, 2012). It provides the fundamental long-term plan to assist and give direction to the researcher. The major problem of this study is finding out the factors affecting the people's behaviors to use public transport to increase environmental sustainability. This research follows the quantitative approach, which constructs the hypotheses and model to find the relationship among the variables. The closed-ended questionnaire is constructed and adapted from previous studies and pretested to find the validity and reliability

of the questionnaire. The closed-ended questionnaire gathers primary data from people of Greater Kuala Lumpur (especially the federal territory of Kuala Lumpur, Negeri Sembilan, and Selangor state) Malaysia, who use public transit. For data analysis researcher used Smart-PLS and SPSS new version software.

The approach adopted for this research is a deductive one. Researchers start with generalized assumptions/theories and deduce those observations drawn from the conclusion into a specific idea according to the deductive method. Selecting the deductive approach is to develop a framework from the available literature through the research gap. However, this is also most suitable for large samples to produce quantitative data. Though the deductive approach is already much explored and generalized in previous theories based on many observations, this research is reliable but incremental. Deductive reasoning presents the cause-and-effect relationships between the variables and allows the measurement of data quantitatively.

This research paradigm includes model/ worldviews, ideologies, and beliefs of someone for something. A paradigm is a general framework or method for knowing reality. This research is quantitative; it follows a positivist approach. The deduction approach starts when methods are expected and tested against the observations, while induction seeks new patterns followed by specific observations. Deductive reasoning presents the cause-and-effect relationships between the variables and ideas; it allows quantitative data measurement. Deductive reasoning also follows the path of logic and begins with theory and drives new hypotheses.

The epistemological stance of the research is followed with objectivity, not subjectivity, because this study adopted closed-ended questionnaires among the urban regions of Malaysia. Objectivism depicts the existence of entities, and social assumptions exist without social actors' effect; it only focuses on objects and structure. Thus, the present study follows the positivism approach, which is possible through survey questionnaires to achieve the research objectives. This research closed-ended questionnaire is developed and distributed among the residents who have experience using public transport in Malaysia. The picture of the research design is shown in figure 3.1 below:
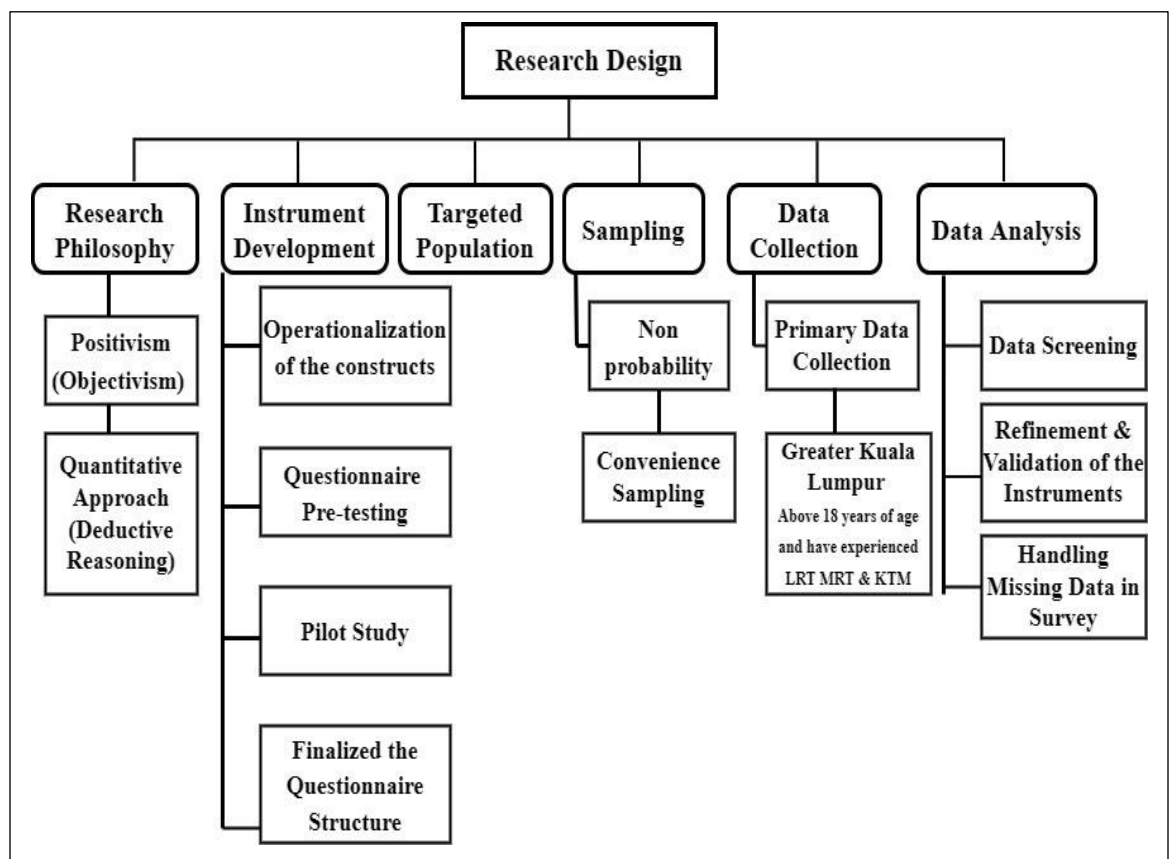
Figure 3.1 Research design of this study
Source: Developed by researcher

3.3 Sampling Design

This study has adopted non-probability sampling, and non-probability/ randomization is the sampling type in which equal chances are not provided for each sample element. The researcher distributed questionnaires among the outreach citizens conveniently reachable and approached through different sources/ networks like friends, colleagues, and relatives/ officials living in regions. When the COVID-19 outbreaks situation becomes routine, the distribution of questionnaires will be conducted in public transport platforms, stops, junctions, hubs, stations, and stops of other public transport, social places, education institutes, offices, and distribution sources can be both manually and through the internet, i.e., by email and social networks. The detail of the sampling of this research is discussed below.

3.3.1 Targeted Population

The researcher targets those people who use the LRT, MRT, and KTM Komuter in specific states. The places like junctions, stops, platforms, and even with the help of a friend, can know the target respondents. The overall population of Malaysia is 32.69 million, and approximately 75% of people live in urban regions of Malaysia. About 9 million people reside in Greater Kuala Lumpur, Malaysia. The researcher selected the targeted population of the residents who are experienced or using public transport (LRT, MRT, and KTM Komuter) because of its availability in the overall metropolitan region of Greater Kuala Lumpur (Federal Territory Kuala Lumpur, Selangor State, and Negeri Sembilan) Malaysia.

3.3.2 Sampling Location and Sampling Frame

According to the target respondents, the sampling frame for this study is according to the target respondents, i.e., the public transport passengers. Thus, Malaysia's sampling location, mainly the conglomerate of the mega-urban states, i.e., Greater Kuala Lumpur, Malaysia, and focused the public transport are, specifically MRT, KTM Komuter, and LRT are functional in the region.

3.3.3 Sample Size

It is revealed that the sample size should be 384 if the population is above 500,000. It is confirmed that because of the enormous passengers (respondents), the sample size of their study would be 384 at the 95% of confidence interval, as shown in table 3.2. The Greater Kuala Lumpur new geographical name of Klang valley with an approximate population of 8.3 million. The population statistics of federal territories and other states are given below in table 3.1below:

Table 3.1 Population Statistics of Federal Territories and States in Malaysia

No.	Name	Population (in thousands)	Federal territory/ State
01	Kuala Lumpur	1769.3	Federal territory
02	Selangor	6554.8	State
03	N. Sembilan	1130.2	State
	Klang Valley	**94524.3**	**Urban Conglomeration**
03	Labuan	99.7	Federal territory
04	Putrajaya	113.3	Federal territory
05	Johor	3,791.5	State

06	Kedah	2,191.0	State
07	Kelantan	1,918.2	State
08	Melaka	935.0	State
10	Pahang	1682.3	State
11	Perak	2511.1	State
12	Perlis	255.3	State
13	P. Penang	1776.2	State
14	Sabah	3910.8	State
15	Sarawak	2821.9	State
16	Terengganu	1266.7	State

Source: Demographic Statistics, Fourth Quarter,2020, Malaysia, Department of Statistics, Malaysia

The larger the sample size reflects, the more accurate results for the whole population. The following table also indicates the confidence interval sample size according to the population derived with the help of Kreije and Morgan's (1970) formula. Several studies also used Kreije and Morgan (1970) to analyze customer satisfaction and city rail transportation usage as the population size is infinite and reduces the standard error (Bakti et al., 2021).

Table 3.2 Determine Sample Size in a Large Population

	Confidence Interval=95%			Confidence Level=99%		
	Margin of Error			Margin of Error		
Population size	5%	2.5%	1%	5%	2.5%	1%
100	80	94	99	87	96	99
500	217	377	475	285	421	485
1000	278	606	906	399	727	943

10000	370	1,332	4,899	622	2,098	6,239
100000	383	1,513	8,762	659	2,585	14,227
500000	384	1,532	9,423	663	2,640	16,055
1000000	384	1,534	9,512	663	2,647	16,317

Source: (Kreije and Morgan, 1970)

3.3.4 Sampling Technique

This study has adopted a convenient sampling technique. The method to be used depends on the study's type, nature, and purpose. The reason to use this sampling type is that in some circumstances, the population is not well defined, or in some studies, it is not necessary to draw inferences from the sample to the people. Furthermore, the population size is enormous. The researcher needs a good sample size, which is only possible by getting accessibility of the ultimate respondents with the help of friends in a particular region. Another reason to use it is that non-probability sampling techniques are cheaper and easier to use than other methods. This study has adopted a convenient sampling technique (Bakti et al., 2021). The method to be used depends on the study's type, nature, and purpose.

Furthermore, the population size is enormous. The researcher needs a good sample size, which is only possible by getting accessibility of the ultimate respondents with the help of friends in a particular region. Another reason to use it is that non-probability sampling techniques are cheaper and easier to use than other methods.

A. Convenient Sampling

Convenient sampling, also termed haphazard/ accidental sampling, is a non-probability technique in which the researcher has easy access to the participants.

When it is an infinite population or lack of information on people, it would be necessary for the researcher to choose convenient sampling for easy access and purposive sampling (if the researcher has the thing in their mind) and suit participants to the research purpose. The convenient sample is also used to collect ecological data along roadsides, rail sides, parking areas, near camps, social places, or areas where targeted people are densely populated. The main disadvantage of convenient sampling is likely to be biased results. Another disadvantage is that outliers can be more destructive, but neither biases nor probabilities are quantified in sampling.

3.4 Research Instrument Development

A customized questionnaire is developed based on six variables scales (5-point Likert Scale) of attitude, subjective norm, perceived behavior control, customer satisfaction, behavioral intention, and usage behavior for the data collection. The researcher developed the instrument to achieve the objectives of this research. Section A is about the consent form from the users of public transportation. In section B, demographic/ background information is about: resident's gender, age group, marital status, education level, occupation, monthly earnings, public transport use, frequency of using public transportation, average time, and average distance covered by the respondents as shown in table 3.3. Each question in the demographic section is also coded accordingly.

Table 3.3 Demographic Questions of the Respondents

No.	Question	Label

1	States	Kuala Lumpur
		Selangor
		N. Sembilan
2	Gender	Male
		Female
3	Age group	18 to 20 years old
		21 to 30 years old
		31 to 40 years old
		41 to 50 years old
		51 years old and above
4	Ethnicity	Malay
		Chinese
		Indian
		Others
5	Nationality	Foreigner/ Non-Malaysian
		Malaysian
5	Marital status	Single
		Married
		Divorced
		Widowed
6	Education level	Primary
		Secondary/SPM/O-Level
		STPM/Certificate/Diploma
		Bachelor
		Postgraduate
7	Occupation	Govt/ Public employee
		Private sector employee
		Self-employed
		Student
8	Your Income per month in (RM)	Below RM2,000
		RM2,001 to RM3,000
		RM3,001 to RM4,000
		RM4,001 to RM5,000
		RM5,001 to RM6,000
		RM6,001 to RM 7,000
		RM7,001 and above
9	What type of public transport you use?	KTM Komuter
		Mass Rail Transit (MRT)
		Light Rail Transit
10	Your main purpose of using public transport:	For work
		For education
		For social activities
11	Weekly usage	1-5 times
		6-10 times
		11 and more

12	Travel time	Less than 15 minutes
		16-30 minutes
		31-45 minutes
		46 – 60 minutes
		More than 60 minutes
13	Distance Travelled	Less than 3 km
		3 – 9 Km
		10-16 Km
		17 – 23 Km
		More than 23 Km

Note. Socio-Demographic data of the respondents developed by the researcher.

Section C consists of (independents, dependents, mediating, and moderating) variables in the questionnaire. The 5-point Likert scale with the responses given 1= strongly disagree, 2=disagree, 3=neither agree nor disagree/neutral, 4= agree, 5= strongly agree is assigned. The detail of the variables and their items are discussed below:

3.4.1 Attitude Items

The first independent variable is an attitude towards public transport usage. A total of 21 Items were adapted from the studies of (Borith LONG et al., 2011; Sumaedi and Yarmen, 2015; Nayum and Nordfjaern, 2021). Those concerned about their health and environment show a positive attitude toward public transport (Sumaedi et al., 2015); (Nayum and Nordfjaern, 2021). items labels and codes are shown in table 3.4.

Table 3.4 Attitude Items for Instrument Development

Dimension	Code	Item	
	AT1	I enjoy using city rail transport regularly.	(Borith LONG et al.,

Attitude	**AT2**	It is more convenient for me to use city rail transport.	2011; Sumaedi et al., 2015
	AT3	Using city rail transport saves my time.	
	AT4	I have a positive attitude regarding city rail transport usage.	
	AT5	For me, using city rail transport will be a fantastic experience.	
	AT6	It is exciting for me to use city rail transport.	
	AT7	I would want to use city rail transport.	
	AT8	The city rail transport appeals to everyone because it is efficient.	
Environmental Concern	**ATE1**	I like to take public transportation since it is more environmentally friendly.	(Sumaedi and Yarmen, 2015; Nayum and Nordfjaern, 2021)
	ATE2	I love to take city rail transport since it helps to reduce pollution.	
	ATE3	I try to take city rail transport because it reduces traffic congestion.	
	ATE4	I prefer city rail transport to drive my car because it is a more environmentally responsible alternative.	
	ATE5	I want to travel by city rail transport without polluting the environment.	

	ATE6	I like to use city rail transport since it produces less CO_2 than a private car.
	ATE7	I like to rely on city rail transport since it is more environmentally friendly.
	ATH1	I choose to use city rail transport because it reduces traffic crash injuries, disabilities, and deaths.
	ATH2	I prefer to use city rail transport because traffic-related air pollution is dangerous to our health.
Health Concern	ATH3	I prefer to travel by city rail transport because it promotes physical activity, which keeps us fit and healthy.
	ATH4	I prefer to take city rail transport because it helps me to relax.
	ATH5	When purchasing necessary products and services, I prefer to take city rail transport.
	ATH6	I prefer to use city rail transport since it allows me to get to healthcare institutions quickly.

3.4.2 Items for Subjective Norms

The subjective norm is the second independent variable. Those socially concerned people show their behavioral intention for public transport. A total (of 11 items)

were adopted from the study (Nayum and Nordfjaern, 2021). The detail of the items

and their codes are shown in table 3.5 below:

Table 3.5 Subjective Norms Items for Instrument Development

Dimension	Code	Item	
Subjective Norm	**SN1**	People who are important to me always motivate me to use city rail transport since it is safer and more convenient.	
	SN2	Essential people always encourage me to take city rail transport because it is less expensive.	
	SN3	People who are significant to me always take city rail transport to go on work daily.	
	SN4	My family members and friends should always use city rail transport to save money on travel.	
	SN5	My family members and friends will encourage me to take city rail transport daily.	
	SN6	The presence of influential members in the surroundings of the passengers/peers signifies that they will use city rail transport in the future.	
Social Concern	**SN7**	The prefer to use city rail transport over private vehicles in society.	(Nayum and Nordfjaern, 2021)
	SN8	Using city rail transport presents my community life principle.	
	SN9	By using city rail transport, I have become more socially connected.	
	SN10	There are social influences to use city rail transport.	
	SN11	The city rail transport is primarily affordable for all.	

3.4.3 Perceived Behavioral Control Items

Perceived Behavioral control is the third independent variable. Certain factors permit and provide ease, and others increase obstacles for the public to use public transport. There are eight items for perceived behavioral control adopted from the study (Borith LONG et al., 2011); detail of the items and codes are shown in table 3.6.

Table 3.6 Perceived Behavioral Control Items for Instrument Development

Dimension	Code	Item	
Perceived Behavioral Control	PBC1	I face problems while using city rail transportation.	(Borith LONG et al., 2011)
	PBC2	I can use city rail transportation frequently.	
	PBC3	When I travel with somebody unknown on city rail transport, I feel uneasy.	
Controllability	PBC4	The decision to use city rail transport is under my Control.	
	PBC5	It is entirely up to me whether I take city rail transport regularly.	
Perceived Ease & Obstacles for behavior	PBC6	When I travel with my children, I find it difficult to use city rail transportation.	
	PBC7	When I travel with bags or luggage, taking city rail transportation is difficult.	
	PBC8	My money allows me to use city rail transportation.	

3.4.4 Behavioral Intention Items

According to the theory of (Ajzen 1985), behavioral intention is the mediating variable. There are seven behavioral intention items adopted from the studies, i.e.

(Nayum and Nordfjaern, 2021; Bamberg et al., 2007; Nordfjærn et al., 2014a, and

Sumaedi and Yarmen, 2015), detail of the items and codes are given below in table

3.7.

Table 3.7 Behavioral Intention Items for Instrument Development

Dimension	Code	Item	
Behavioral Intention	**BI1**	I say positive things regarding the city rail transport service to others.	(Nayum and Nordfjaern, 2021; Bamberg and Schmidt, 2003; Bamberg et al., 2007; Nordfjærn et al., 2014a, and Sumaedi and Yarmen, 2015)
	BI2	I recommend using the city rail transport service to someone who seek my advice.	
	BI3	I encourage friends and relative to do business with the city rail transport.	
	BI4	I consider the city rail transport service as my first choice to travel.	
	BI5	I will do more business with the city rail transport service in the next few years.	
	BI6	I intend to use the city rail transport in future.	
	BI7	The city rail transport is pleasure and reliable to use.	

3.4.5   *City Rail Transport Usage Items*

City Rail transport usage behavior is the dependent variable showing the actual

and consistent use of public transport by the public of urban regions. Six items are

adapted for public transport usage behavior (Ngah et al., 2020). Those items and

codes are presented in table 3. 8.

Table 3.8 Public Transport Usage Items for Instrument Development

Dimension	Code	Item

Public transport Usage	USE1	I travel on city rail transport for recreational activities.	(Ngah et al., 2020)
	USE2	I use city rail transport services to stay safe and secure.	
	USE3	City rail transport is economical for me to use.	
	USE4	I daily prefer to use rail transport due to traffic congestion.	
	USE5	Increase in rail transport usage can increase public health.	
	USE6	Usage of rail transport in cities is environment friendly strategy	

3.4.6   Customer Satisfaction Items

In this study, customer satisfaction moderates' behavioral intention and usage behavior. Seven items of customer satisfaction scales are adopted from the study (Sumaedi et al., 2015 Sumaedi and Yarmen, 2015). The detail of the items and their codes are listed in table 3.9.

Table 3.9 Customer Satisfaction Items for Instrument Development

Dimension	Code	Item	
Customer Satisfaction	CS1	I am satisfied with services and quality of city rail transport.	(Sumaedi et al., 2014).
	CS2	The perceived service was equivalent to ideal service.	
	CS3	The perceived service performance is higher than the expectation.	
	CS4	I am satisfied with the level of services provided by the employee(s) of city rail transport.	
	CS5	I am satisfied with the cleanliness of the city rail transport.	

| **CS6** | I am satisfied with the information system of the city rail transport. |
| **CS7** | I am satisfied with the ease of entry and exit for the city rail transport. |

3.5 Questionnaire Pretesting

Pre-testing is conducted by sending the questionnaire to the related academic specialist and a few industry practitioners prior to disseminating the survey questionnaire among the targeted respondents. The process of pre-testing is essential for many reasons. Like comments from the experts can help predict the applicability of the questions, repetition can be avoided (Bradburn at al., 2004). The expert and examiners clarify any ambiguities with the questions asked. Moreover, to clarify any ambiguities with the questions so that clear and understandable instruction can be provided to respondents or interviewers (Bryman, 2012).

The pre-test can also estimate how long it will take respondents to finish the questionnaire (Bryman, 2012). After the operationalization of the questionnaire, several amendments were suggested by the respected mentors for the project. Later after the incorporation of the suggestions, a pre-test was conducted with the prototype questionnaire in this study to check whether the questionnaire could effectively achieve the study's objectives or needed modifications and more accuracy. The researcher sent the questionnaire to industry professionals and academic experts to review for feedback. Some changes were made to understand better, clarify, recommend, rewrite, and add new items to the questionnaire and suggested removing the repetition of the few statements and the words. Because the surveys are self-administered, the feedback helped alter them to improve the

communication element and make the final version easier to understand so that respondents will give accurate answers.

3.6 Pilot Study

Pilot testing is a process for the instruments to find whether it is reliable and valid and can be used for the data collection or not. A pilot study helps the researcher avoid the wastage of resources in the wrong direction. The resources can be efforts, time, and money. It also helps to detect the questionnaires' flaws and errors or any other complexity. In this present COVID-19 pandemic situation, the researcher performed a pilot study. According to (Connelly, 2008) ideally, the pilot study sample size should be 10% of the sample size for the preliminary study. If the sample size for the main study is 384 or more, then it should be approximately 39 or more than it, and so forth. An online questionnaire was distributed among the public transport users of the Klang Valley (federal territory of Kuala Lumpur) Malaysia.

3.6.1 Reliability

Reliability and validity are essential tests used to determine the quality of the research. Reliability is about the consistency of the measurement, whereas validity is about the accuracy of the measurement. For the reliability test of this research, Cronbach's Alpha reliability test is conducted; 46 cases are processed in SPSS-Version-22-0, shown in table 3.10 below:

Table 3.10 Case Processing Summary

		N	%	N of Items
	Valid	46	100.0	
Cases	Excluded[a]	0	.0	
	Total	46	100.0	83

Note. List wise deletion based on all variables in the procedure.

Overall, Alpha reliability found was 0.946, as shown in table 3.11. The closed-ended questionnaires consisted of 93 items (Number of items) of all six variables: attitude, subjective norm, perceived behavioral control, behavioral intention, public transport usage behavior, and customer satisfaction.

Table 3.11 Pilot Test Reliability Results

Variables	Items	Cronbach's Alpha
Attitude (AT)	21	0.949
Subjective Norm (SN)	11	0.797
Perceived Behavioral Control (PCB)	08	0.841
Behavioral Intention (BI)	07	0.686
Customer Satisfaction (CS)	30	0.861
Usage Behavior (USE)	06	0.816

Total	83	0.946

Note. SPSS pilot testing results of present study

As indicated in table 3.8, there is twenty-one attitude (AT) items with a standardized item Cronbach's Alpha reliability of 0.949. Subjective Norm (SN) has a Cronbach's Alpha Reliability of 0.797. Whereas for eight items of Perceived Behavioral Control (PCB), Alpha reliability is 0.841. The mediating variable, Behavioral Intention (BI), has a Cronbach's Alpha reliability rating of 0.686. The dependent variable, public transit usage behavior (USE) has an Alpha reliability score of 0.816. The moderator is customer satisfaction. In table 3.8, the reliability of Cronbach's Alpha value for customer satisfaction is 0.861.

3.6.2 Validity

Validity refers to the degree to whereby the survey measure corresponds to the true meaning of the study's concept (Cooper et al., 2000). It refers to a study to see how far discrepancies in measurement tools differ from actual disparities amongst respondents. An instrument is not deemed valid unless it is examined to see what it has supposed to measure. In the present study, validity refers to how well a test captures the intended information using three commonly used methods: content validity, convergent validity, and discriminant validity.

Content validity is described by Rungtusanatham (1998) as " the extent to which a measurement instrument catches the different sides of a construct." Content validity is a researcher's critical assessment of a measurement instrument's content relevance (Hinkin, 1998; Polit and Beck, 2006).

Convergent validity is defined as "the extent which either repeated effort to measure same concept coincide" (Julian et al., 2022). Anderson and Gerbing (1988) proposed factor loading within each dimension to establish convergent validity. Convergent validity was assessed using confirmatory factor analysis on factor loadings on the latent variable.

The *discriminant validity* is the degree to which measures of distinct latent variables are unique. A measure should reflect just the variance attributable to its intended latent variable, not additional latent variables (O'Leary-Kelly & Vokurka, 1998). Hair et al. (2010) used correlation analysis to examine the discriminant validity of each component.

3.7 Data Collection

This study follows the primary data collection method. The data is collected with the help of a closed-ended questionnaire. The questionnaire is developed and used to collect the public (residents) who have used public transport in Greater Kuala Lumpur (Malaysia). Secondary data has been collected from existing literature which has already been conducted and is accessible through various search engines, like IEEE, Science Direct, Emerald, Google Scholar, and ResearchGate.

3.7.1   Primary Data Collection

The primary data is the firsthand data collected for the data analysis. The questionnaires are disseminated using a convenient sample frame amongst public transit participants. The manually closed-ended questionnaire is being turned into

Google form and disseminated among inhabitants of the states of Kuala Lumpur, Negeri Sembilan, and Selangor. They have used the city rail transportation. Questionnaires were disbursed with the help of friends and colleagues through online/ offline internet sources and social networks (LinkedIn, Twitter, Facebook, and emails). At the endemic researcher tried to physically visit the stations and travel on LRT, MRT, and KTM regions and filled some questionnaires during the face-to-face meet-up with the respondents. Around 741 total questionnaires were returned, and only 729 valid and filled questionnaires were finalized for the data analysis.

3.7.2 Ethical consideration

For the data collection, the researcher has also created a conducive environment for the participants. According to the Universiti Tunku Abdul Rahman, Kampar, Malaysia's ethical permission letter No: Re: U/SERC/191/2020 dated 18th November 2020 (see Appendix A), the researcher must respect the ethical concerns when collecting, analyzing, and displaying data. The researcher also follows plagiarism policy for her write up. This research is free of any harm to the individual and community.

3.8 Data Screening

The data screening must be required to detect outliers after the data collection (Teh, 2010). During outliers' detection, univariate, bivariate, and multivariate approaches were used (Hair et al., 1998). Kline (2005) explained that a univariate outlier is used where the researcher needs to score a single factor. Likewise, a multivariate

outlier analyzes more than one variable. Furthermore, Hair et al. (1998) elaborates that outlier with dependent or independent variables less than three for each case were eliminated from the preliminary univariate and multivariate analyses.

3.8.1 Missing Data

Hair et al. (2010) have proposed that the missing data effect can be minimized within acceptable limits by removing cases of missing data on any variables from the study. After excluding occurrences of missing data from less than 10% of the city rail transport, the sample size used for analysis in this study is 729.

3.9 Data Analysis Plan

The process of finding the result to achieve the specific objectives of the research is called data analysis. For the pilot and final study, demographic and descriptive analysis, the SPSS was used. At the same time, and Smart PLS software is used to test the constructs of the conceptual model of this study. Of course, this software would help find the required statistical results for testing hypotheses. PLS-SEM results will measure the difference between reflective and formative constructs of the model. If the researcher finds measurements that meet all criteria in the model, there is a need to assess the structural model (Hair et al., 2017).

The researcher tested internal consistency through composite reliability values, and the value should be more than 0.70 (CR>0.70) (Hamid et al., 2017). The Cronbach's Alpha reliability value should be >0.60 (Hair et al., 2017). The reliability score is referred to the degree of consistency with the respondents who selected the option in different circumstances on different scales/ raters (Sam et al.,

2018). Convergent validity tested will also be required in which the cross-loadings should be greater than $0.50/ > 0.50$ (Hamid et al., 2017). For analysis, a discriminant validity test will be required for which values should be greater than the co-relation of the constructs (Hair et al., 2017). Path coefficient tests will also be required where the T statistics value should be > 1.96 (Rodriguez-Entrena et al., 2018), for Pearson's coefficient (R2) should be greater than 1.0. The researcher will try to use predictive sample re-use techniques (Q2) that can be effectively used as relevant (Hair et al., 2017). Where based on the blindfolding procedure (Q2) evaluates the predictive validity of a complex model using PLS (Q2)>0. As a result, the SEM will be used in the initial analysis stage to validate characteristics such as attitude, subjective norm, perceived behavioral control, and customer satisfaction that substantially impact public transport use behavior. The factor analysis reduces the many variables into a few factors. Hence, the proposed study will primarily use the SEM to test the model and associated hypotheses. Based on the results of the SEM analysis, significant/supported variables. Thus, Smart PLS software will perform mediation, moderation, and control variable results to measure the model fitness. Detail analysis is provided later in the discussion chapter.

3.10   Summary

This research is to summarize that it is quantitative and constructed a closed-ended questionnaire for the data collection. The convenient sampling method is adopted to collect data from the residents of urban regions in Malaysia. In the COVID-19 circumstance, the data collection mode during the pilot study is through the internet based on emails and social networks: LinkedIn, Facebook, WhatsApp, and many

more. The survey was altered into a Google form and delivered to Malaysians who had used public transportation. After reaching the criteria, the raw data was processed into the SPSS for reliability testing. All six variables, i.e., AT, SN, PCB, CS, BI, and USE, were reliable during pilot testing. As discussed above, Cronbach's Alpha reliability is more than the threshold of 0.60. The researcher used SPSS and Smart PLS software to analyze the constructs' model and hypotheses for the results.

CHAPTER FOUR

DATA ANALYSIS & RESULTS

4.1 Introduction

The methodologies and procedures of the current study were mentioned in the previous chapter, while data analysis and presentation of the results are covered in this chapter. With the use of SPSS version-22.0 and Smart PLS tools, this chapter analyses demographic conventions, the PLS algorithm, and bootstrapping results to determine the effects of exogenous and endogenous variables. The chapter adheres to the widely used PLS analysis reporting format that has been employed in earlier investigations (Chin, 2010). PLS-SEM (Partial Least Square, Structural Equation Modeling) also aids path analysis and model fitness for researchers. Finally, a summary of the investigation's findings is offered.

4.2 Demographic Analysis

The data was collected from Kuala Lumpur, Selangor, and Negeri Sembilan from the LRT, MRT, and KTM Komuter city rail transit users. In demographic findings, results show that 97% of the respondents are city rail users; however, others have declined the participation in data provision. After data screening total of 729 responses are finalized to proceed with the analysis.

Table 4.1 a Data Finalized for Analysis

Region	Population (in thousand)	Questionnaire distributed	Questionnaire finalized	Response rate

Kuala Lumpur	1769.3	250	244	97.6
Selangor	6554.8	400	359	89.75
N. Sembilan	1130.2	150	126	84
The Greater Kuala Lumpur	9454.3	800	729	91.1%

The highest number of respondents are from Selangor, with 359 responses, and 244 are from federal territory Kuala Lumpur although 126 belong to Negeri Sembilan. 59.8% and 41.2% are the male and female gender responses. Whereas the most responses were given by the 31 to 40 years old age group with 37.2%, 32.2% of responses are recorded from the age group of 21-30 years old, and the lowest of 4% are the respondents 51 years old and above. In a literature review, it was also discussed that travel pattern differences had been influenced by gender. According to Sola (2016), "Variations among male and female behavior noticed in different aspects of mobility, and these changes of gender can vary in unique ways." The women have more optimistic beliefs to choose environment-friendly options (Coruh et al., 2022).

De Pascale et al. (2022) agreed that the world always favors male identity over female identity. In a survey, Böcker et al. (2020) discovered that gender impacts care preferences. In most nations, women prefer driving public transportation because they feel safer and more liberated. On the other hand, women are more ecologically conscious; if they are informed and given high-quality services, they

will undoubtedly use public transportation (Kacharo et al., 2022). In Malaysia, males are more likely than females to employ private modes of transport. In the instance of Malaysia, out of 729 respondents, 429 (58.8%) are male, and the rest are female.

According to the Department of Statistics Malaysia (2021), more than 50% of residents are Malay ethnic, due to which the majority of the respondent's ethnicity is Malay, with 58.8%. Chinese with 20.2%, 15.4% are Indian, and 5.6% are others, i.e., Indonesian, Pakistanis, Nepalis, and European. About 659 respondents have Malaysian citizens, and the remaining respondents are foreign residents.

The respondent's highest marital status is married with 50.1%, and the lowest is widowed with the % 2.5, whereas respondents having the single group are with 33.9% and divorced are 13.6%.

Most of the respondents have bachelor's degrees, 44.7%. The lowest have the primary education with 2.7%, whereas respondents having a postgraduate degree are 15.1%, secondary/SPM/O-level are 15.2%, and respondents with STPM/Certificate/Diploma are 22.2%. Most of the respondents are self-employed with 42.2%, 16.7% are students, 31.1% are private-sector employees, and 9.9% are government employees.

20.7% of the respondents have below RM2,000 income, whereas 23.2% belong to RM2,001 to RM3,000 income groups, and 20.2% have an income of RM3,001 to RM4,000. The lowest response rate is from the people with the highest income

group is RM7,001 and above. New Strait Times Malaysia (2022) reported that most low-income residents use rail transits, even though most consumers complain about the high fare and lack of accessibility. However, they are aware that the government would need to improve public transportation services and maintenance in the future. The administration has admitted that railway systems are underutilized, and that connection is a problem (Deputy Transport Minister Datuk Kamaruddin Jaffar, Malaysia Economic, and Strategic Outlook Forum, 2020).

High-income people can easily buy the latest branded world-class automobiles without taxes to enjoy their travel. The respondents who use MRT are 38.5%, KTM Komuter with 34%, and LRT with 27.4%. Most people use city rail transits for social/ recreational activities and education with 38.1% and 34.2%. Taking rail transit in the urban region during college and university timings saves parents time and money. It can also give students time to get a head start on home assignments, read, study, or even decompress after a long day at college and university (Education Malaysia Global Services, 2022). The response for this study is from the people who use city rail transits for social/ recreational activities and education with 38.1% and 34.2%.

Among the several forms of passenger transportation used in tourism, rail transit is significant in Malaysia due to its low cost, high safety, and comfortable journey for passengers. A contemporary rail transportation network that is both practical and accessible in a tourist area is likely to attract more interstate visitors. Because the transportation service has restricted routes to travel around the target, users

such as tourists or visitors were unable to reach their chosen location, particularly independent passengers whose mobility is dependent on it (Bajada & Titheridge, 2017; Hashim et al., 2019). People use 1-5 times per week with the highest percentage of 80.4 passengers, travel the most prolonged time 35-45 minutes with 37.7%, and most responders travel more than 23 km with 41.3 %, as shown in table 4.1b.

Table 4.1 b Demographic profile

No.	Question	Label	Frequency	Percentage
1	States	Kuala Lumpur	244	33.47
		Selangor	359	49.25
		N. Sembilan	126	17.28
2	Gender	Male	429	58.8
		Female	300	41.2
3	Age group	18 to 20 years old	77	10.6
		21 to 30 years old	237	32.5
		31 to 40 years old	271	37.2
		41 to 50 years old	115	15.8
		51 years old and above	29	4.0
4	Ethnicity	Malay	429	58.8
		Chinese	147	20.2
		Indian	112	15.4
		Others	41	5.6
5	Nationality	Foreigner/ Non-Malaysian	70	9.6
		Malaysian	659	90.4
5	Marital status	Single	247	33.9
		Married	365	50.1
		Divorced	99	13.6
		Widowed	18	2.5
6	Education level	Primary	20	2.7
		Secondary/SPM/O-Level	111	15.2
		STPM/Certificate/Diploma	162	22.2
		Bachelor	326	44.7
		Postgraduate	110	15.1
7	Occupation	Govt/ Public employee	72	9.9
		Private sector employee	227	31.1
		Self-employed	308	42.2
		Student	122	16.7

8	Your Income per month in (RM)	Below RM2,000	151	20.7
		RM2,001 to RM3,000	169	23.2
		RM3,001 to RM4,000	147	20.2
		RM4,001 to RM5,000	118	16.2
		RM5,001 to RM6,000	91	12.5
		RM6,001 to RM 7,000	31	4.3
		RM7,001 and above	22	3.02
9	What type of public transport you use?	KTM Komuter	248	34.0
		Mass Rail Transit (MRT)	281	38.5
		Light Rail Transit	200	27.4
10	Your main purpose of using public transport:	For work	202	27.7
		For education	249	34.2
		For social activities	278	38.1
11	Weekly usage	1-5 times	586	80.4
		6-10 times	45	6.2
		11 and more	98	13.4
12	Travel time	Less than 15 minutes	43	5.9
		16-30 minutes	134	18.4
		31-45 minutes	275	37.7
		46 – 60 minutes	194	26.6
		More than 60 minutes	83	11.4
13	Distance Travelled	Less than 3 km	41	5.6
		3 – 9 Km	107	14.7
		10-16 Km	301	10.8
		17 – 23 Km	201	27.6
		More than 23 Km	79	41.3

4.3 Measurement Model Analysis

This study used partial least square structural equation modeling (PLS-SEM) analysis procedures to present better and up-to-date approaches and measure relationships among the variables (Sarsted, 2015; Henseler et al., 2015; Chin, 1998; Salisbury et al., 2002). Thus, data analysis performed through Smart PLS includes Cronbach's Alpha reliability ($\alpha=>0.70$) and composite reliability (CR= > 0.70), Average variance extracted (AVE= >0.40) (Black and Babin, 2010 and Awang,

2015) along with the structural significance of the model which ascertains the hypothesized assumptions.

Hair et al. (2010) also reported that the usage of the Smart PLS is to examine measurement models and structural models in two different phases of confirmatory factor analysis and path analysis to know the quality and relationships among the factors. Thus, measurement of the model helps to assess the quality criteria of the constructs, which starts with the examination of the factor loadings followed by construct validity and reliability.

4.4 Reliability Analysis

A measurement model is said to have satisfactory internal consistency when the threshold value for each construct is equal to or exceeds the value of 0.7. Furthermore, Bagozzi and Yi (1988) said that composite reliability should be 0.7 or greater if the research is explanatory. Based on the recommended values of construct reliability, researchers removed some reflective indicators/items to increase the reliability of the constructs. The results of Cronbach alpha and composite reliability of current research are presented in table 4.2. From PLS Algorithm tests, results reflect that all the constructs meet the threshold value of 0.70 for Cronbach alpha and composite reliability. The variables, i.e., attitude, behavioral intention, customer satisfaction, environmental concern, health concern, perceived behavioral control, social concern, subjective norm, usage behavior have values with 0.956, 0.957, 0.939, 0.911, 0.896, 0.955, 0.934, 0.876, 0.964 respectively. Likewise composite reliability values (CR) are also positive i.e., 0.963, 0.964, 0.938, 0.920, 0.963, 0.950, 0.910 and 0.971 respectively. Thus, these

results indicate that it is concluded that the data collection instrument used for the current study is reliable., as shown in table mentioned below.

Table 4.2 Internal Consistency and Reliability

Constructs	Cronbach's Alpha	Composite Reliability
Attitude	0.956	0.963
Behavioral Intention	0.957	0.964
Customer Satisfaction	0.939	0.953
Environmental Concern	0.911	0.938
Health Concern	0.896	0.920
Perceived Behavioral Control	0.955	0.963
Social Concern	0.934	0.950
Subjective Norm	0.876	0.910
Usage Behavior	0.964	0.971

4.5 Construct Validity

Construct validity is determined when substantial convergent and discriminant validity are obtained while utilizing PLS-SEM.

4.5.1 Average Variance Extracted (AVE) (Convergent Validity)

The ability of successive attempts to measure the exact concept to approve is known as convergent validity. If two or more measures of the same object are legitimate measures of the idea, they should agree (Bagozzi et al., 1991). The average variance extracted (AVE) was also determined in this study to verify the constructs' convergent validity. The "average variance extracted (AVE)" value must be at least 0.50. According to Fornell and Larcker (1981), and AVE value of more than 0.5 is desirable and acceptable. Table 4.3 also presents AVE for all latent variables, i.e., attitude, behavioral intention, customer satisfaction, environmental concern, health concern, perceived behavioral control, social concern, subjective norm, usage

behavior show the strong AVE values of 0.767, 0.768, 0.803, 0.790, 0.658, 0.791, 0.669, and 0.848. Based on the results of AVE, it can conclude that items are converged in their constructs as every construct has a value equal to or more than 0.50. Hence convergent validity is not an issue.

Table 4.3 Construct Convergent Validity (AVE)

Constructs	Average Variance Extracted (AVE)
Attitude	0.767
Behavioral Intention	0.768
Customer Satisfaction	0.803
Environmental Concern	0.790
Health Concern	0.658
Perceived Behavioral Control	0.763
Social Concern	0.791
Subjective Norm	0.669
Usage Behavior	0.848

4.5.2 Discriminant Validity

The degree to which measures of differing views are distinct is referred to as discriminant validity. If two or more ideas are distinct, appropriate assessments of each should not be overly correlated (Bagozzi et al., 1991; Henseler et al., 2015). When two theoretically relevant notions are incompatible, divergent validity occurs (Hair et al. 2010). Furthermore, according to Hair et al. (2014), "discriminate validity is having incentive to check that a reflective construct has a worthy link with his own items in PLS route model." The Fornell and Larcker criterion can be used to examine discriminant validity. The Heterotrait-Monotrait ratio can be used to see if each construct is distinct and measures different phenomena than the other constructs in the study. Table 4.4 looked at divergent validity, which is currently necessary for determining the relationship between variables. All latent variables

with divergent values have positive diagonal values: attitude, environmental worry, health concern, social concern, subjective norm, perceived behavioral control, behavioral intention, customer satisfaction, and usage behavior.

i. Fornell and Larcker Criterion

When the square root of AVE for a construct is more significant than its correlation with all other constructs, the discriminant validity can be measured according to Fornell and Larcker's (1981) ratio. As a result, for each construct, the square root of the AVE should be more significant than the correlation between the constructions (Alarcon and Sanchez, 2015). In this study, the square root of AVE (bold and italic) for a construct was more significant than its association with other constructs (Table 4.4), implying that discriminant validity can be established.

Table 4.4 Discriminant validity- Fornell and Larcker criterion

Constructs	AT	BI	CS	EC	HC	PBC	SC	SN	USE
AT	*0.876*								
BI	0.336	*0.877*							
CS	0.426	0.274	*0.896*						
EC	0.502	0.303	0.432	*0.889*					
HC	0.525	0.375	0.489	0.586	*0.811*				
PBC	0.362	0.706	0.221	0.378	0.395	*0.874*			
SC	0.232	0.253	0.298	0.343	0.396	0.235	*0.889*		
SN	0.195	0.147	0.405	0.294	0.386	0.157	0.554	*0.818*	
USE	0.370	0.395	0.400	0.562	0.464	0.366	0.198	0.187	*0.921*

Note. Bold and Italic represent the square root of AVE and (AT= Attitude, BI=Behavioral Intention, CS= Customer Satisfaction, EC= Environment Concern, HC= Health Concern, PBC= perceived behavioral control, SN= Subjective Norm, SC=social concern and USE=Usage behavior).

HTMT values are the estimate of the correlation between the constructs. The analysis also established that discriminant validity was based on the HTMT ratio. The correlation between the two notions should differ if the HTMT value is less than one. The disagreement over HTMT criteria threshold values can be seen in the literature; Kline (2011) indicated a value of 0.85 or less, while Teo et al. (2008) advocate a more liberal value of 0.90 or less as acceptable. Table 4.5 demonstrates that the HTMT values are within the specified range.

Table 4.5 Discriminant validity- HTMT Criterion

Constructs	AT	BI	CS	EC	HC	PBC	SC	SN	USE
AT	--								
BI	0.347								
CS	0.449	0.288							
EC	0.526	0.321	0.467						
HC	0.559	0.403	0.533	0.649					
PBC	0.375	0.737	0.232	0.404	0.426				
SC	0.242	0.267	0.316	0.371	0.435	0.248			
SN	0.214	0.163	0.450	0.332	0.440	0.174	0.608		
USE	0.381	0.410	0.419	0.598	0.496	0.380	0.207	0.207	--

Note. AT= Attitude, BI=Behavioral Intention, CS= Customer Satisfaction, EC= Environment Concern, HC= Health Concern, PBC= perceived behavioral control, SN= Subjective Norm, SC=social concern and USE=Usage behavior.

4.5.3   Cross Loading/ Outer Loading

Cross-loading is a set of indicators that explains how latent variables are closely associated and loaded in their own/parent construct rather than other constructs in the investigation (Kothari, 2004). The underlying construct to which all items belong has a more robust factor loading than the other construct in the study (Wasko and Faraj, 2005). As a result, discriminant validity is achieved based on the

evaluation of cross-loadings. When each item's loading estimates are higher than 0.5-0.7, a measurement model is said to have good indication reliability (Hair et al., 2010). At 0.5, everything is essential, with a lower bound of 0.7 and an upper bound of 0.927. The analysis recommended that removing items with standard loading statistics of less than 0.7 (Chin, 1998) be released during the measurement model.

The cross-loading for all indicators is presented in table 4.6. A total of eight items were deleted in which five items from the "Environment concern" construct, i.e., ATE2 ATE3, ATE4, ATE8, and two items from customer satisfaction construct, i.e., CS1 and CS7, were deleted. Whereas other items from Attitude, i.e., AT1, AT2, AT3, AT4, AT5, AT6, AT7, AT8, have strongly loaded with 0.931, 0.720, 0.918, 0.912, 0.888, 0.899, 0.902, 0.816 in their construct than other values. Four items of environmental concern, ATE1, ATE5, ATE6, ATE7, retained strong values of 0.882, 0.914, 0.873, and 0.885 in their construct.

Six items of health concern, i.e., ATH1, ATH2, ATH3, ATH4, ATH5, ATH6, have strongly loaded in their construct with values of 0.766, 0.821,0.820, 0.830, 0.825, and 0.804. All the seven behavioral intention items, i.e., BI1, BI2, BI3, BI4, BI5, BI6, BI7, have strongly loaded in their construct with 0.868, 0.898, 0.905, 0.904, 0.878, 0.796, 0.881 and 0.877. Six items of customer satisfaction CS2, CS3, CS4, CS5, CS6 strongly loaded in its own construct than others with values 0.892, 0.906, 0.896, 0.880,0.906. All the indicators of perceived behavioral control i.e., PBC1, PBC2, PBC3, PBC4, PBC5, PBC6, PBC7 and PBC8 with strong cross-loading values i.e., 0.808, 0.876, 0.891, 0.904, 0.897, 0.883, 0.893 and 0.833 which shows that items are strongly converged in their own construct.

Likewise, six items of subjective norm construct i.e., SN1, SN2, SN3, SN4, SN5, SN6, are strongly converged in its own construct with the values of 0.783, 0.874, 0.763 0.842, and 0.822. The items of social concern i.e., SN_SC1, SN_SC2, SN_SC3, SN_SC4, SN_SC5 have the cross-loading values: 0.892, 0.907, 0.898, 0.909, 0.839 simultaneously usage behavior indicators i.e., USE1, USE2, USE3, USE4, USE5, USE6 are also strongly loaded in their own construct with the values of 0.912, 0.917, 0.925, 0.927, 0.926 and 0.920 respectively as shown in table below.

Table 4.6 Discriminant Validity-Cross loading

Indicators	AT	EC	HC	BI	CS	PBC	SN	SC	USE
AT1	0.931	0.420	0.474	0.284	0.396	0.320	0.170	0.212	0.327
AT2	0.720	0.476	0.506	0.373	0.324	0.318	0.135	0.267	0.351
AT3	0.918	0.395	0.455	0.295	0.384	0.317	0.217	0.222	0.304
AT4	0.912	0.366	0.425	0.264	0.359	0.285	0.163	0.176	0.279
AT5	0.888	0.392	0.438	0.320	0.379	0.335	0.170	0.143	0.303
AT6	0.899	0.356	0.429	0.248	0.343	0.293	0.153	0.153	0.279
AT7	0.902	0.463	0.486	0.278	0.431	0.322	0.186	0.226	0.356
AT8	0.816	0.580	0.421	0.259	0.349	0.317	0.163	0.194	0.357
ATE1	0.409	0.882	0.499	0.255	0.393	0.330	0.289	0.308	0.489
ATE5	0.418	0.914	0.528	0.245	0.366	0.324	0.292	0.346	0.481
ATE6	0.477	0.873	0.522	0.297	0.381	0.363	0.238	0.295	0.521
ATE7	0.469	0.885	0.529	0.274	0.395	0.324	0.233	0.274	0.500
ATH1	0.377	0.523	0.766	0.260	0.370	0.315	0.259	0.301	0.307
ATH2	0.425	0.380	0.821	0.336	0.421	0.319	0.256	0.262	0.396
ATH3	0.468	0.438	0.820	0.334	0.428	0.313	0.270	0.286	0.457
ATH4	0.415	0.456	0.830	0.312	0.430	0.312	0.284	0.264	0.443
ATH5	0.458	0.557	0.825	0.284	0.326	0.357	0.294	0.313	0.333
ATH6	0.398	0.506	0.804	0.295	0.410	0.307	0.529	0.518	0.308
BI1	0.299	0.309	0.368	0.868	0.280	0.669	0.141	0.216	0.373
BI2	0.304	0.271	0.325	0.898	0.197	0.640	0.111	0.191	0.358
BI3	0.314	0.278	0.340	0.905	0.245	0.643	0.119	0.242	0.363
BI4	0.299	0.277	0.325	0.904	0.224	0.626	0.136	0.249	0.380
BI5	0.295	0.222	0.319	0.878	0.219	0.591	0.130	0.220	0.336
BI6	0.223	0.197	0.259	0.796	0.197	0.557	0.109	0.199	0.288
BI7	0.324	0.296	0.362	0.881	0.296	0.600	0.145	0.235	0.345
BI8	0.288	0.257	0.323	0.877	0.258	0.614	0.139	0.216	0.319

CS2	0.383	0.382	0.431	0.186	0.892	0.120	0.355	0.264	0.351
CS3	0.407	0.394	0.426	0.201	0.906	0.149	0.354	0.270	0.345
CS4	0.362	0.379	0.438	0.294	0.896	0.237	0.344	0.258	0.343
CS5	0.403	0.399	0.428	0.272	0.880	0.255	0.392	0.258	0.352
CS6	0.358	0.382	0.465	0.272	0.906	0.227	0.368	0.283	0.397
PBC1	0.273	0.306	0.351	0.569	0.133	0.808	0.172	0.219	0.370
PBC2	0.320	0.330	0.309	0.597	0.156	0.876	0.127	0.195	0.284
PBC3	0.316	0.349	0.369	0.615	0.199	0.891	0.159	0.213	0.309
PBC4	0.304	0.305	0.344	0.625	0.206	0.904	0.138	0.194	0.304
PBC5	0.305	0.317	0.319	0.640	0.201	0.897	0.114	0.173	0.325
PBC6	0.267	0.314	0.341	0.616	0.187	0.883	0.124	0.164	0.284
PBC7	0.315	0.307	0.319	0.631	0.153	0.893	0.104	0.184	0.303
PBC8	0.418	0.410	0.407	0.632	0.302	0.833	0.161	0.299	0.371
SN1	0.136	0.260	0.398	0.064	0.216	0.083	0.783	0.488	0.157
SN2	0.104	0.239	0.264	0.083	0.296	0.104	0.874	0.513	0.080
SN3	0.178	0.253	0.339	0.144	0.420	0.140	0.763	0.354	0.253
SN4	0.184	0.239	0.291	0.176	0.300	0.193	0.842	0.427	0.131
SN6	0.199	0.215	0.288	0.144	0.436	0.130	0.822	0.466	0.156
SN_SC1	0.226	0.346	0.387	0.215	0.295	0.233	0.498	0.892	0.195
SN_SC2	0.183	0.325	0.370	0.243	0.289	0.238	0.503	0.907	0.184
SN_SC3	0.213	0.319	0.360	0.235	0.300	0.178	0.483	0.898	0.173
SN_SC4	0.219	0.306	0.376	0.238	0.286	0.222	0.521	0.909	0.192
SN_SC5	0.191	0.223	0.260	0.189	0.146	0.171	0.453	0.839	0.131
USE1	0.317	0.508	0.408	0.335	0.372	0.337	0.174	0.187	0.912
USE2	0.348	0.517	0.421	0.356	0.365	0.358	0.194	0.184	0.917
USE3	0.343	0.512	0.427	0.366	0.390	0.312	0.191	0.185	0.925
USE4	0.343	0.510	0.424	0.387	0.356	0.346	0.149	0.179	0.927
USE5	0.320	0.522	0.433	0.359	0.364	0.322	0.159	0.179	0.926
USE6	0.374	0.536	0.448	0.381	0.364	0.346	0.164	0.178	0.920

Note. AT= Attitude, BI=Behavioral Intention, CS= Customer Satisfaction, EC= Environment Concern, HC= Health Concern, PBC= perceived behavioral control, SN= Subjective Norm, SC=social concern and USE=Usage behavior.

4.5.4 Indicator Multicollinearity

The Variance Inflation Factor (VIF) statistics emphasize the indicators' multicollinearity (Fornell and Vookstein, 1982). According to Hair et al. (2016), Multicollinearity is not a severe problem if the VIF values are less than 5. Table 4.7

shows the VIF values for the study's indicators and are all below the suggested

threshold.

Table 4.7 Multicollinearity Statistics (VIF) For Indicators

Construct's Indicators	VIF
AT1	2.308
AT2	1.704
AT3	2.676
AT4	2.180
AT5	4.313
AT6	4.859
AT7	4.242
AT8	2.383
ATE1	4.274
ATE5	2.047
ATE6	2.549
ATE7	2.716
ATH1	2.343
ATH2	2.700
ATH3	2.270
ATH4	2.778
ATH5	2.596
ATH6	2.159
BI1	3.277
BI2	4.500
BI3	4.867
BI4	4.709
BI5	3.680
BI6	2.314
BI7	4.414
BI8	4.506
CS2	2.552
CS3	2.081
CS4	3.771
CS5	3.036
CS6	3.952
PBC1	2.305
PBC2	3.637
PBC3	3.911
PBC4	4.543
PBC5	4.151
PBC6	3.702

PBC7	3.948
PBC8	2.543
SN1	1.750
SN2	2.727
SN3	1.724
SN4	2.383
SN6	2.032
SN_SC1	3.278
SN_SC2	3.681
SN_SC3	3.392
SN_SC4	3.613
SN_SC5	2.377
USE1	4.462
USE2	4.616
USE3	4.949
USE4	2.192
USE5	2.083
USE6	4.899

Note. AT= Attitude, BI=Behavioral Intention, CS= Customer Satisfaction, EC= Environment Concern, HC= Health Concern, PBC= perceived behavioral control, SN= Subjective Norm, SC=social concern and USE=Usage behavior.

4.5.5   *Factor Loading*

The measurement of each item in the correlation matrix that correlates with the specified principal component is factor loading. Factor loadings range from -10 to +10, with higher values indicating a stronger relationship between the item and the underlying factor (Pett et al., 2003). None of the indicators in the study had a factor loading that was less than 0.50, which is the suggested value (Hair et al., 2016). In addition, no additional elements were eliminated, and factor loading is shown in table 4.8.

Table 4.8 Factor loading

	AT	EC	HC	BI	CS	PBC	SN	SC	USE
AT1	0.931								
AT2	0.720								

AT3	0.918					
AT4	0.912					
AT5	0.888					
AT6	0.899					
AT7	0.902					
AT8	0.816					
ATE1		0.882				
ATE5		0.914				
ATE6		0.873				
ATE7		0.885				
ATH1			0.766			
ATH2			0.821			
ATH3			0.820			
ATH4			0.830			
ATH5			0.825			
ATH6			0.804			
BI1				0.868		
BI2				0.898		
BI3				0.905		
BI4				0.904		
BI5				0.878		
BI6				0.796		
BI7				0.881		
BI8				0.877		
CS2					0.892	
CS3					0.906	
CS4					0.896	
CS5					0.880	
CS6					0.906	
PBC1						0.808
PBC2						0.876
PBC3						0.891
PBC4						0.904
PBC5						0.897
PBC6						0.883
PBC7						0.893
PBC8						0.833
SN1						0.783
SN2						0.874
SN3						0.763
SN4						0.842
SN6						0.822
SN_SC1						0.892

Note: In the original, the SN and SN_SC1 rows appear in a column to the right of the PBC column. The PBC values occupy one column, and SN1–SN6 and SN_SC1 occupy the next columns to the right.

SN_SC2	0.907	
SN_SC3	0.898	
SN_SC4	0.909	
SN_SC5	0.839	
USE1		0.912
USE2		0.917
USE3		0.925
USE4		0.927
USE5		0.926
USE6		0.920

Note. AT= Attitude, BI=Behavioral Intention, CS= Customer satisfaction, EC= Environment concern, HC= Health concern, PBC= perceived behavioral control, SN= Subjective Norm, SC=social concern and USE=Usage behavior.

4.5.6 Goodness of Fit (Model's Predictive Capabilities)

In this study, the researcher looked at the coefficient of determination (R^2), the effect of size (F^2), and the predictive relevance measure (Q^2) to assess the goodness of the fit model.

The analysis reveals an R^2 value of 0.280 for USE which shows that 28% of the variance in USE can be attributed to SC, EC, HC, SN, BI, CS, and AT. Whereas (R^2) values for other endogenous variables, i.e., AT, SN, and BI, are 0.333, 0.306, and 0.506. Based on the threshold value of 0.10 (Falk and Miller, 1992), this research model obtained acceptable R^2 statistics for all the endogenous variables, as shown in table 4.9. The R square determines how much variability is described by independent variables (Hair et al., 2016).

Table 4.9 R Square values

Constructs	R Square	R Square Adjusted
AT	0.333	0.331
BI	0.506	0.504
SN	0.306	0.306
USE	0.280	0.274

In the present study, the influence on public transport usage behavior is assessed through several predictor variables. According to Hair et al. (2013), it is recommended that the F^2 effect shall also be presented. F^2 size statistic specifies if removing an independent variable from the model can substantially impact the dependent variable (Hair et al., 2013). The analysis results of (F^2) statistic show that in the present study, the removal of EC, HC, SC, PBC, and SN significantly influences Usage behavior. The F^2 effect size and significance are highlighted and presented in table 4.10.

Table 4.10 F Square values

Constructs	AT	BI	CS	EC	HC	PBC	SC	SN	USE
AT		0.014							*0.026*
BI									*0.026*
CS									*0.055*
EC	*0.086*								
HC	*0.121*								
PBC		*0.782*							0.011
SC							*0.442*		
SN		0.001							0.000
USE									--

Note. AT= Attitude, BI=Behavioral Intention, CS= Customer satisfaction, EC= Environment concern, HC= Health concern, PBC= perceived behavioral control, SN= Subjective Norm, SC=social concern and USE=Usage behavior.

Effect size (Q^2) for predictive relevance of Usage behavior was 0.235, as shown in table 4.11. The statistic indicates that the independent variables have a medium effect in producing Q2, showing medium predictive relevance (Hair et al., 2016).

Table 4.11 Construct Cross Validated Redundancy

Constructs	Q^2
AT	0.244
BI	0.385
CS	--
EC	--
HC	--
PBC	--
SC	--
SN	0.201
USE	0.235

Note. AT= Attitude, BI=Behavioral Intention, CS= Customer satisfaction, EC= Environment concern, HC= Health concern, PBC= perceived behavioral control, SN= Subjective Norm, SC=social concern and USE=Usage behavior.

Standardized Root Mean Square Residual SRMR can be used to measure fit in addition to R^2, F^2, and Q^2 metrics. The SRMR index's acceptable range is 0 to 0.08, or less than 0.10 in some cases (Hu and Bentler, 1999). This standard is considered a good fit. While NFI should be larger than or equal to 0.80, the upper bounds for d_ULS and d_G should not exceed 95% and 99%, respectively. In this investigation, the SRMR is 0.054, and the NFI is 0.84, as shown in table 4.12.

Table 4.12 The Model fit.

	Saturated Model	Estimated Model
SRMR	0.054	0.100
d_ULS	4.459	15.532
d_G	1.305	1.461
NFI	0.840	0.828
rms Theta	0.093	

Note. AT= Attitude, BI=Behavioral Intention, CS= Customer satisfaction, EC= Environment concern, HC= Health concern, PBC= perceived behavioral control, SN= Subjective Norm, SC=social concern and USE=Usage behavior.
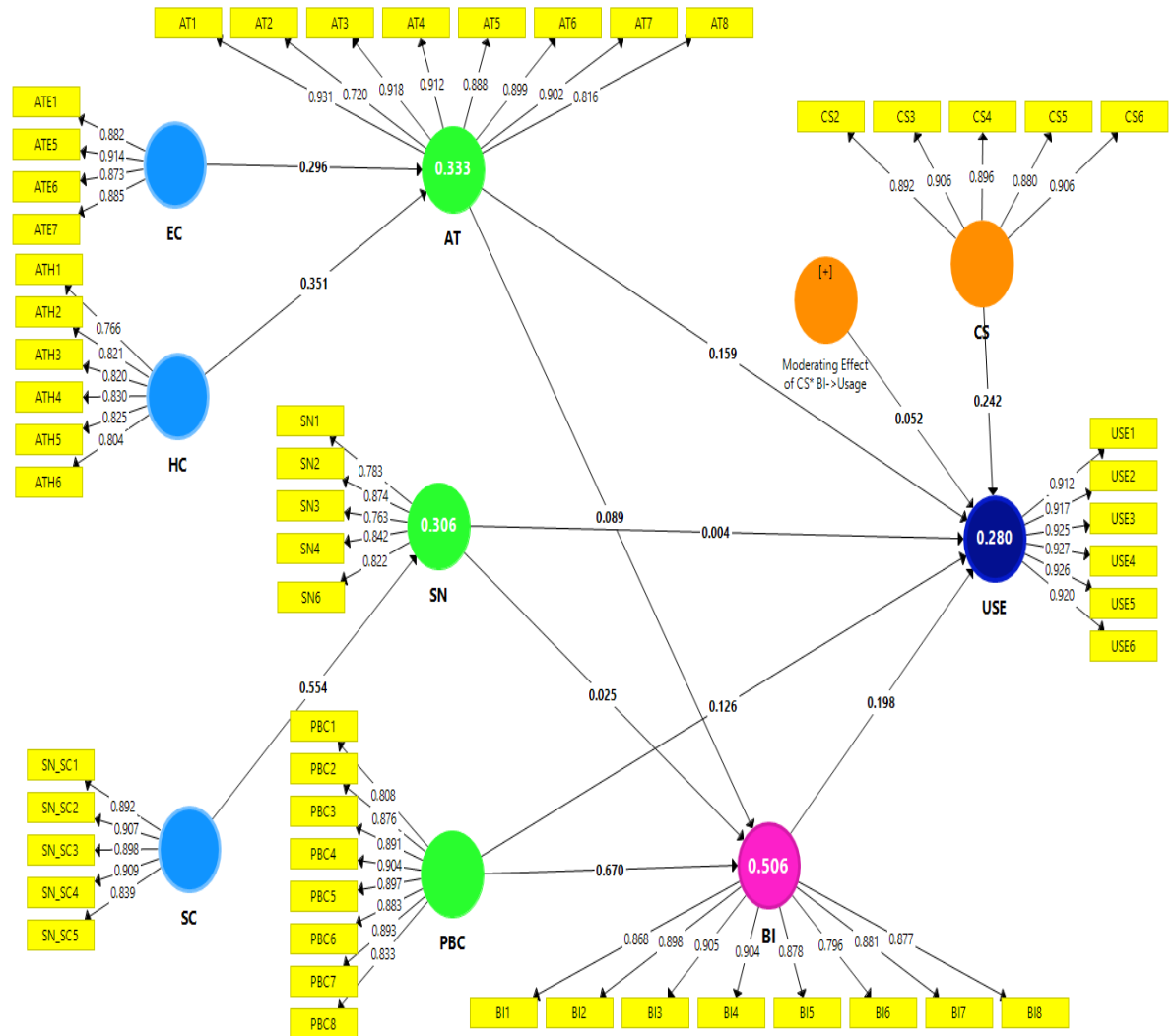
Figure 4.1 Structural Equation Modeling (PLS Algorithm)

Note. EC= Environment Concern, HC, Health Concern, AT=Attitude, SN= Subjective, SC=Social Concern, Norm, PBC=Perceived Behavioral Control, BI= Behavioral Intention, CS= Customer Satisfaction, USE= Usage.

4.6 Structural Model Assessment

The next step in structural equation modelling is assessing the hypothesized relationship to substantiate the proposed hypotheses.

4.6.1 Hypotheses Testing

According to Hair et al. (2010), t-statistics is used to measure the hypotheses. The hypotheses are accepted if the t-statistics value meets the standard value of 1.96 (marketing research) and 1.65 (exploratory research). The original sample estimate is the path coefficient, a standardized beta coefficient, and the standard deviation in bootstrapping is the standard error. The hypotheses' results are shown in Table 4.12, presenting the t-statistics and beta measures for all the hypotheses.

H1 There is significant and positive relationship of Attitude and City Rail Transport Usage.

Hypothesis one assesses whether attitude significantly impacts public transport usage behavior. The result revealed that attitude has significant impact on USE (β =0.066; ρ = 0.000, T-Statistics=3.508). Hence hypothesis one is **supported.**

H1a. There is significant and positive relationship of Environmental Concern and Attitude.

This sub hypothesis represented the environmental concern as an antecedent relationship with an attitude and assumed whether attitude significantly impacts the usage behavior. The result (β =0.296; ρ = 0.000, T-Statistics=7.107) revealed that environmental concern has significant impact on an attitude of public. Hence (H1a) is also **supported.**

H1b. There is significant and positive relationship of Health concern and Attitude.

The second sub-hypotheses for hypothesis one is to examine whether antecedent, i.e., health concern has a significant impact on the public's attitude. The results showed that attitude has a substantial and significant impact (β =0.351; ρ = 0.000, T-Statistics=8.859). Thus (H1b) is also **supported.**

H2. There is significant and positive relationship of Subjective Norm and City Rail Transport Usage.

Hypothesis two evaluates whether subjective norms (SN) have a substantial and significant impact on usage behavior (USE). The result revealed that subjective norm has a weak and insignificant impact on public transport usage with the values, i.e., (β =0.004; ρ = 0.901, T-Statistics=0.124). Therefore, hypothesis two is **not supported**.

H2a. There is significant and positive relationship of Social Concern and subjective norm.

Hypothesis two has sub hypotheses (H2a) which estimate that social concern (SC) is the antecedent of the subjective norm (SN) and shows a significant impact on it. The result uncovered that SC has strong and significant impact on SN (β =0.198; ρ = 0.000, T-Statistics=3.712). Hence (H2a) **is supported.**

H3. There is significant and positive relationship of Perceived behavioral control and city rail transport usage.

Hypothesis three assesses that perceived behavioral control (PBC) is directly and significantly related to the usage behavior (USE). The result displayed that PBC has strong, positive, and significant impact on USE (β =0.126; ρ = 0.016, T-Statistics=2.399). Hence hypothesis three is **supported.**

H4a. There is significant and positive mediating relationship of Behavioral Intention among Attitude and City Rail Transport Usage.

Hypothesis Four (a) appraises whether behavioral intention mediates the impact of attitude and usage behavior. The result revealed that attitude has significant impact on USE (β =0.066; ρ = 0.016, T-Statistics=2.418). Hence hypothesis (4a) is **supported.**

H4b. There is significant and positive mediating relationship of Behavioral Intention among Subjective Norm and City Rail Transport Usage.

Hypothesis four (b) estimates that behavioral intention mediates the effect of subjective norms on user behavior. The insignificant results unveiled that behavioral intention does not mediate the relationship between subjective norms and public transport usage (β =0.126; ρ=0.437, T-Statistics=0.778). Hence hypothesis (H4b) is **not supported.**

H4c. There is significant and positive mediating relationship of Behavioral Intention among Perceived Behavioral Control and City Rail Transport Usage.

Hypothesis Four (c) evaluates whether behavioral intention mediates the impact of perceived behavioral control on public transport usage. The result showed the mediation effect on behavioral intention and public transport usage (β =0.132; ρ = 0.016, T-Statistics=3.542). Hence hypothesis four (c) is **supported.**

H5. There is significant and positive relationship of Behavioral Intention and City Rail Transport Usage.

Hypothesis five assesses that behavioral intention has a significant and direct impact on user behavior. The result also supported that behavioral intention significantly impacts usage behavior with the values, i.e., (β =0.198; ρ = 0.000, T-Statistics=3.712). Therefore, hypothesis five is **supported.**

H6. There is significant and positive moderation effect of Customer Satisfaction on relationship of Behavioral Intention and City Rail Transport Usage.

Hypothesis six examined whether customer satisfaction moderates the positive relationship between behavioral intention and usage behavior. The analysis uncovered that there is No Moderation effect of customer satisfaction as the values also reported the insignificant values i.e., (β = -0.022; ρ = 0.568, T-Statistics=0.570). Hence hypothesis six is not supported.

Table 4.12, table 4.13, and figure 4.1 present the results of structural equation modeling about the usage behavior for city rail transit, where the hypotheses H1, H1a, H1b, H2a, H3, H4a, H4c, H5 are supported, whereas H4b, H2, and H6 are not supported.
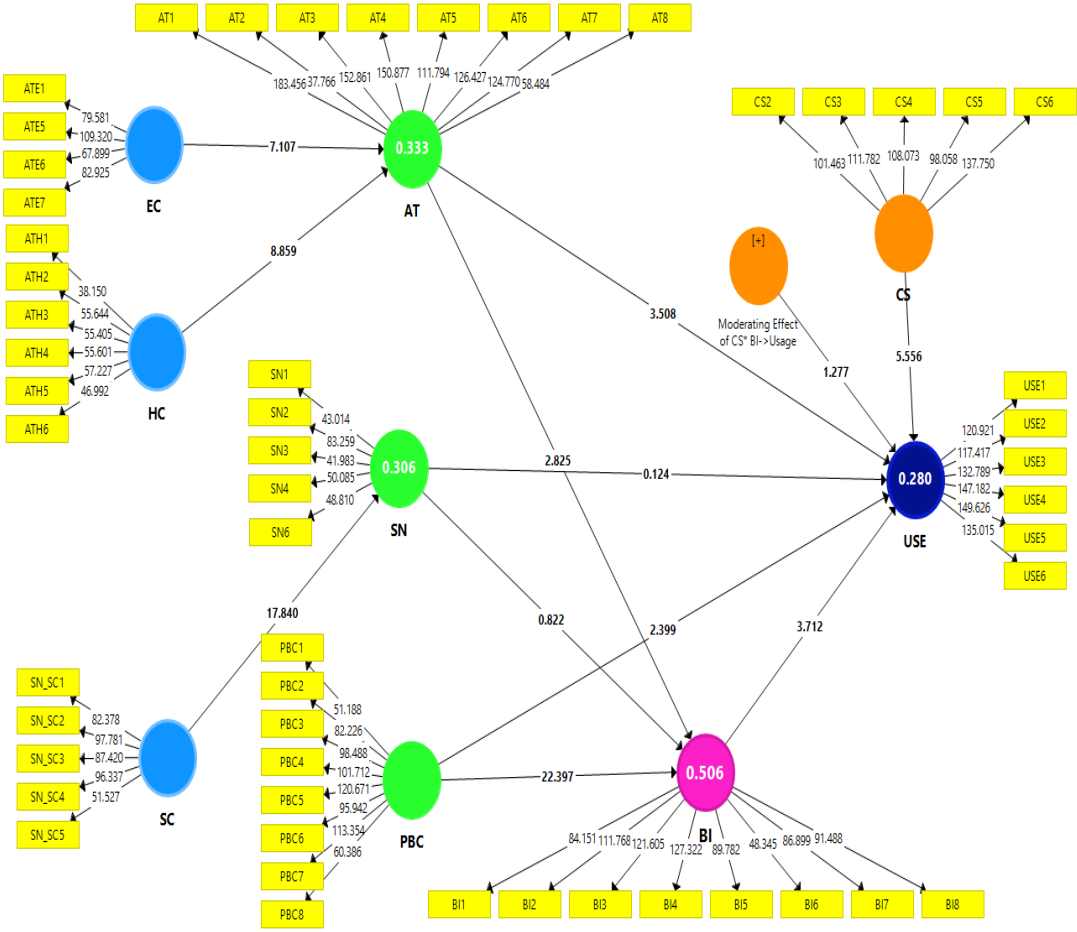
Figure 4.2 Structural Equation Modeling (Bootstrapping)
Note. EC= Environment Concern, HC, Health Concern, AT=Attitude, SN= Subjective, SC=Social Concern, Norm, PBC=Perceived Behavioral Control, BI= Behavioral Intention, CS= Customer Satisfaction, USE= Usage.

Table 4.12 Path Coefficient (Direct Relations)

Hypotheses	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision

H1. AT -> USE	0.159	0.045	3.508	0.000	**Supported**
H1a. EC ->AT	0.296	0.042	7.107	0.000	**Supported**
H1b. HC ->AT	0.351	0.040	8.859	0.000	**Supported**
H2. SN -> USE	0.004	0.035	0.124	0.901	**Not Supported**
H2a. SC -> SN	0.554	0.031	17.840	0.000	**Supported**
H3. PBC -> USE	0.126	0.053	2.399	0.016	**Supported**
H5. BI-> USE	0.198	0.053	3.712	0.000	**Supported**

Note. EC= Environment Concern, HC, Health Concern, AT=Attitude, SN= Subjective, SC=Social Concern, Norm, PBC=Perceived Behavioral Control, BI= Behavioral Intention, CS= Customer Satisfaction, USE= Usage.

4.6.2 Indirect Effect

The indirect effects of mediation and moderation can aid in the understanding mechanism of noticeable circumstances. An indirect effect is an impact of an independent variable on a dependent variable mediated through a mediator variable; a direct effect is an effect of an independent variable on a dependent variable that is not mediated through a mediator variable (Baron and Kenny, 1986). According to moderation effects, the impact of predictors on outcomes depends on the moderators (James and Brett, 1984; Baron and Kenny, 1986). The integrated model of mediation and moderation describes the intricacies of real-world situations by combining mediation and moderation aspects in a single study (Liao et al., 2010; Teper et al., 2013). The moderator effect in this study is investigated by using a product indicator (PI) technique. According to Kenny & Judd (1984) PI is the one of the test to find the interaction among the latent indicators for

moderation. The association between attitude and usage behavior for city rail transit is mediated by behavioral intention, as shown in Table 4.12. On the other hand, behavioral purpose does not affect the link between subjective norms and usage behavior. Nonetheless, the relationship between perceived behavioral control and usage behavior is mediated by behavioral purpose. The results also reveal that the mediating variables (behavioral intention) and the dependent variable (customer satisfaction) have no moderation effect on (usage).

Table 4.13 Path coefficient (Indirect relations)

Hypotheses	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
H4a. AT -> BI -> USE	0.018	0.007	2.418	0.016	**Supported**
H4b. SN -> BI -> USE	0.005	0.006	0.778	0.437	**Not Supported**
H4c. PBC -> BI -> USE	0.132	0.037	3.542	0.000	**Supported**
H6. Moderating Effect 1 CS*BI -> USE	-0.022	0.039	0.570	0.568	**Not Supported**

Note. EC= Environment Concern, HC, Health Concern, AT=Attitude, SN= Subjective, SC=Social Concern, Norm, PBC=Perceived Behavioral Control, BI= Behavioral Intention, CS= Customer Satisfaction, USE= Usage.

The graph shows no moderation effect of CS on BI and USE. The relation of behavioral intention and usage behavior does not affect whether the customer satisfaction level increases or reduces. The reason might be that the behavioral intention of the public has wide variation as people are using public transport due to several factors as also highlighted in the previous and present study.
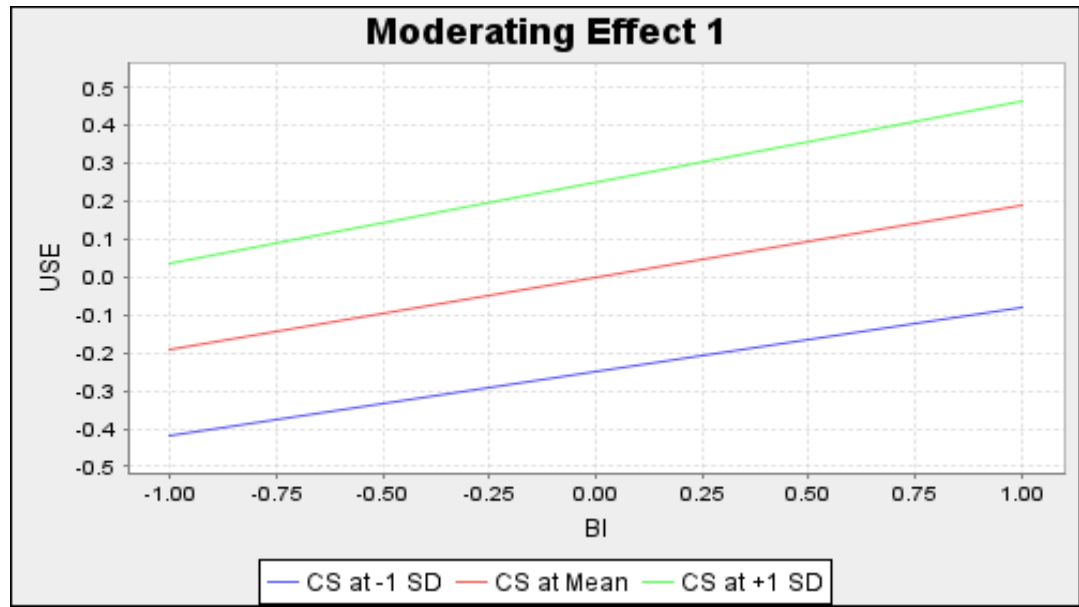
Figure 4.2 Moderation effect of Customer Satisfaction (CS)

The graph illustrates a low degree of customer happiness with the blue line, a higher level of customer satisfaction with the green line, and no customer satisfaction with the red line. According to the statistical findings, customer satisfaction moderately affects the association between behavioral intention and usage behavior. However, it has no relevant moderation effect on the relationship between behavioral intention and usage behavior.

4.7 Summary

From the result and discussion, it is concluded that the antecedents, i.e., environmental concern and health concern, are positively associated with a particular attitude. The social norm has a significant and positive association with the subjective norm. On the other hand, subjective norms have a dubious direct relationship with user behavior. The perception of behavioral control and attitude is related to city rail transport usage. The effect of attitude perceived behavioral

control and usage behavior is mediated by behavioral intention, although subjective

norms are unaffected. Customer satisfaction has little effect on behavioral intention

or usage behavior, but it does have a clear correlation with user behavior.

CHAPTER FIVE

CONCLUSION

5.1 Introduction

The previous chapter described the analysis and results. The findings, consequences, conclusions, and recommendations are discussed in the present chapter. The most important insights are illustrated with recent literature to support those assumptions. The complete research and its findings are summarized in this chapter.

5.2 Discussion of Major Findings

Several antecedents and factors are highlighted and examined in the present study. Their direct as well as indirect relationship tested and presented as major findings are discussed with the support of the recent literature review.

The summary of the results is mentioned in the table 5.1 below:

Table 5.1 Summary of the Results

Constructs	Alpha	CR	AVE	R^2	F^2	Q^2	Discriminant validity	Model Fitness				Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Decision
								SRMR	d_ULS	d_G	NFI				
AT	0.956	0.963	0.767	0.330	0.026	0.244	0.876	0.054	4.459	1.305	0.840				
BI	0.957	0.964	0.768	0.506	0.026	0.385	0.877								
CS	0.939	0.953	0.803	----	0.055	----	0.896								
EC	0.911	0.938	0.790	----	0.086	----	0.889								
HC	0.896	0.920	0.658	----	0.121	----	0.811								
PBC	0.955	0.963	0.763	----	0.782	----	0.874								
SC	0.934	0.950	0.791	----	0.442	----	0.889								
SN	0.876	0.910	0.669	0.306	0.011	0.201	0.818								
USE	0.957	0.964	0.848	0.280	----	0.235	0.921								

Direct Relations

		Original Sample (O)	T Statistics	P Values	Decision
H1.	AT -> USE	0.159	3.508	0.000	Supported
H1a.	EC ->AT	0.296	7.107	0.000	Supported
H1b.	HC ->AT	0.351	8.859	0.000	Supported
H2.	SN -> USE	0.004	0.124	0.901	Not supported
H2a.	SC -> SN	0.554	17.840	0.000	Supported
H3.	PBC -> USE	0.126	2.399	0.016	Supported
H5.	BI-> USE	0.198	3.712	0.000	Supported

Indirect Relations					
H4a.	AT -> BI -> USE	0.018	2.418	0.016	Supported
H4b.	SN -> BI -> USE	0.005	0.778	0.437	Not Supported
H4c.	PBC -> BI -> USE	0.132	3.542	0.000	Supported
H6.	Moderating Effect 1 CS*BI -> USE	-0.022	0.570	0.568	Not Supported

H1 There is significant and positive relationship of Attitude and City Rail Transport Usage:

In this study first hypothesis was to assess the attitude's positive impact on the city rail transport usage. Empirically and theoretically, it was also proved that a positive attitude is the most dominant indicator of positive behavior. The result of this study (β *=0.066; ρ = 0.000, T-Statistics=3.508*) presented in the previous chapter also supports the positive relationship between attitude and city rail transport usage.

Lippa (1990) considered attitude a kind of evaluative response (like or dislike). Furthermore, he emphasized it as an intervening variable in social psychology research and a hypothetical construct that can be inferred but cannot be directly observed. As is the case with travel behavior, it is not influenced by the service level of the transport system but is influenced by psychological factors such as perceptions, concerns, attitudes, and habits (Fujii & Kitamura, 2003; Ajzen, 1991). Olson & Zanna (1993) supported that attitude stimulates relatively persistent and consistent behavioral inclination based on the likes and dislikes of people towards recognition, event, objects, and the environment. The theory of Ajzen and Fishbein (1980) elaborated that attitude reflect the overall evaluation of performing the behavior by the individual. Elshaer et al. (2022) revealed that attitudes are based on the different antecedents, concerns, and beliefs about the likelihood that behavior will result in outcomes. Thus, it can be said that a positive attitude results in positive behavior. This study suggests that environmental and health concerns will be

related to the attitudes towards public transport and the proposed model, i.e., behavioral intention directly related to the usage behavior.

In addition, Kamaruddi (2012) proves that Attitude significantly affects city rail transport usage and mediated by behavioral intention. The goals are to encourage and improve the more environmentally friendly modes to use the existing public transport efficiently.

H1a. There is significant and positive relationship of Environmental Concern and Attitude:

This sub hypothesis for hypothesis one represents that the positive attitude of respondents is due to an antecedent "environmental concern" relationship, which strengthens the attitude and usage behavior relationship. The result (β =0.296; ρ = 0.000, T-Statistics=7.107) also supported the environmental concern and attitude effect.

Environmental concern (EC) represents the affection associated with beliefs about environmental problems (Fu et al., 2020; Lee, 2008; Schultz et al., 2004; Dunlap & Jones, 1992). Despite extensive studies, controversy remains over whether environmental concern can be considered an element of environmental awareness. According to Bamberg (2003) and Chen et al. (2011), and environmental concern can be viewed as a combination of subjective values and objective environmental problems. Hence, it seems to be a positive association between environmental concerns and the attitude of individuals. Most of these studies (Lin & Syrgabayeva, 2016; Mobley et al., 2010; Suki, 2013; Sekhokoane et al., 2017) have also verified

that environmental concern increases the adoption intended of the pro-environmental behavior.

Moreover, Jamaliah et al. (2021) and Liu et al. (2020) found evidence that city rail transport usage is the pro-environmental behavior directly and positively affected by the environmentally concerned persons. Other studies have shown that environmental concern does not translate into behavioral change directly, especially in developing countries (Tam & Chan, 2017). However, Bamberg (2003) claimed that these controversial results stem from the lack of corresponding measurement structures between EC and behavior. Recent studies (Fu et al., 2020; Wong-Parodi & Rubin, 2022; Liu et al., 2020; Lee & Lim, 2020) have revealed that environmental concern has a more substantial predictive power for pro-environmental behavioral intention and behavior is also termed environmental attitude.

In short, it can be considered a positive or negative attitude toward environmental problems and behaviors, which is essentially synonymous with environmental value (Bleys et al., 2018). The environmental paradigm scale measures attitudes toward the broader environmental problem (Bamberg, 2003). The environmental psychology literature on the attitude-behavior relationship indicated that environmental concern is a strong predictor of pro-environmental behavioral intention and behavior (Shin et al., 2022; Park et al., 2020; Casalo & Escario, 2018).

 Lanzini et al. (2017) argued no significant environmental concerns about using cars and public transport. On the contrary, Murray et al. (2010) discussed that

personal beliefs about the environment influence attitudes towards public transport. This study successfully analyzed and supported the positive relationship between the role of environmental values and concerns on a positive attitude toward city rail transport usage.

H1b. There is significant and positive relationship of Health concern and Attitude:

Another sub-hypothesis for hypothesis one is that health concern positively and significantly impacts attitude. The outcome of the results (β =0.351; ρ = 0.000, T-Statistics=8.859) have supported the assumption.

Current research focuses on the importance of health benefits derived from city rail transport to measure environmental health issues. Including this health concern as a precursor is growing evidence for the public health benefits of using urban rail transport (Kwan et al., 2017). The study by Tajalli & Hajbabaie (2017) argued that public health indicators for the use of public transport are of little importance. They further highlighted that policy analysts often overlooked in the economic analysis process, such as vehicle emissions rates, accidents, essential mobility benefits, and mental health. Due to this ignorance, the importance of traveling through city rail transport to the destination to promote health has not been effectively considered (Nieuwenhuijsen et al., 2017). There is a close relationship between city rail transport and physical activity in human life. A physically inactive lifestyle is a significant public health challenge (Littman, 2018).

A recent study (Massar et al.,2021) found that the lack of public transport in Barcelona impacted air pollution and that NOx levels rose between 4.4% and 7.1%

during public transport strikes. The same trend was observed in the case of black carbon in the air. In other words, access to public transport impacts air quality and health through physical activity (Basagana et al., 2018). The present research shows that people who go to public transport stations get more physical activity than others. Low-income groups of people at risk of obesity have the potential to reap the health benefits of transportation by walking (Glazener & Khreis, 2019).

Furthermore, World Health Organization (2019) also highlighted that most people could achieve a minimum level of daily physical activity by increasing public transport. Active lifestyles can be directly impacted by providing access to public transport for people, especially low-income and minority groups (Saif et al., 2019). Thus, the people concerned about their health are positively involved in city rail transport usage.

H2. There is significant and positive relationship of Subjective Norm and City Rail Transport Usage:

Hypothesis two evaluates whether subjective norm (SN) positively and significantly impacts usage behavior (USE). The result (β =0.004; ρ = 0.901, T-Statistics=0.124) revealed that subjective norm has a weak and insignificant impact on public transport usage with the values.

Ajzen (1991) considered attitude to be the reliable indicator for predicting behavior, whereas subjective norms are the weak indicator. Ajzen also argued on his assumption that societal pressures sometimes could not force people to a particular behavior (Ibrahim & Arshad, 2018). Si et al. (2019) argued that the subjective norm does not affect user behavior; they further elaborate that it is not necessary for

public transport usage due to the influential people. People mostly prefer their children and loved ones to use their car rather than public transport because of the safety and security (Kwan et al., 2018). Parents mostly feel their children are safe in private automobiles rather than public transport (Berg & Ihlström, 2019). This study does not support the assumption, and it can be said that there is no relationship between subjective norms and public transport usage behavior.

H2a. There is significant and positive relationship of Social Concern and subjective norm:

Hypothesis two has sub hypotheses (H2a) which estimate that social concern (SC) is the antecedent of the subjective norm (SN) and shows a significant impact on it. The result (β =0.198; ρ = 0.000, T-Statistics=3.712) uncovered that SC has strong and significant impact on SN. According to the theory of planned behavior (Ajzen, 1991), the subjective norm is the desire for personal behavior that does not have a completely independent rational decision-making power. Unless there are any societal restrictive restrictions or pressures on behavioral intention (Mifsud et al., 2019), generally, it is observed in few studies that individual behaviors generally deviate towards the expectations of their important organizations or persons in life. Therefore, important people strongly perceive subjective norms as more likely to engage in behavior and show social concerns towards the behavior (Ru et al., 2018). The above research reported a positive correlation between social concern and subjective norms towards the intention (Barbera & Ajzen, 2020).

Furthermore, they stated that more significant social concern connected to the subjective norm leads to a stronger intention to participate in public transit usage (Hine & Mitchell, 2017). On the other hand, many passengers do not want to use city rail transport to travel. Passenger awareness about public transport and accessibility benefits is limited (Smith et al., 2018). Passengers can take hints or suggestions from their loved ones and families regarding traveling through municipal public transport. Therefore, a perceived social concern is an essential factor in this context. For the government, it is possible to start formulating policies or regulations and boost consumer enthusiasm with positive advocacy to increase the intention to use city rail transport. Hence, it can be said that the individual concerned about their loved ones and the important person in their lives shows a positive and significant association between subjective norms.

H3. There is significant and positive relationship of Perceived behavioral control and city rail transport usage:

Hypothesis three assesses that perceived behavioral control (PBC) is directly and positively related to the city rail transport usage (USE). The result (β =*0.126; ρ = 0.016, T-Statistics=2.399*) displayed that PBC has strong, positive, and significant impact on the behavior.

It is preferred to the level of ability and control a person perceives by exhibiting a positive or negative specific behavior (Ajzen et al., 1991). It is based on an individual's belief in the power of contextual and intrinsic factors to promote behavior (Ru et al., 2018). People expect restrictions and much more influence on

their conduct if they believe they have more opportunities and resources. Internal factors, including talents, abilities, learning, and insight that are fundamental in the human, or external elements, such as time, opportunity, or cooperation from other individuals, can be split into internal and external components (Karimi et al., 2017). Perceived behavioral control has the same potential as actual behavioral control in influencing behavioral intention and conduct (Hansen et al., 2018). According to relevant studies, perceived behavioral controls are essential drivers of the desire to acquire or use any product/service (Yu et al., 2018; Bouscasse et al., 2018; Buckley et al., 2018). In city rail transits, there are several limitations, i.e., awareness and knowledge, accessibility, safety, fare, and convenience/availability are the most critical factors influencing passenger behavior (Rahimi et al., 2020).

On the one hand, people have expressed some concern about the fare and accessibility for current city rail transits. On either side, increased physical activity helps improve health and safety for public transport. Some people doubt whether individuals can easily access and travel through smart rail transits. When people feel they have more resources and opportunities and fewer common barriers, their perceived behavioral control becomes stronger (Ajzen, 2020). As proposed in Chen et al. (2019), perceived behavior control has explained the intention to use directions with public transport. An empirical study of city rail transportation systems has shown that residents' desire to use the system is positively associated with their perceived behavioral control (Fu & Juan, 2017). The more control a person has when using a city rail transit system, the more likely they will do so.

5.2.1 Mediating Effect

In addition, a previous survey conducted by Hassan et al. (2020), Zhang et al. (2019), and Li et al. (2018) as the mediator of the TPB revealed that intention is the most important predictive variable in estimating actual behavior. Behavioral intention also directly relates to behavior with a robust mediating effect. The purpose is to summarize the motivational factors influencing a given behavior by following the theories i.e., TRA and TPB (Ajzen, 1991). It is expected that people will be more likely to adopt environmentally friendly behavior as they have similar intentions. Hines et al. (1987) developed the environmental behavior model, which considered its intention to be a key determinant of environmentally friendly behavior. Taylor & Baker (1994) evidenced that purchasing intention strongly assesses purchasing behavior. Based on Ajzen's (1991) TPB model, Attitude, emotional regulation, and perceived behavioral control positively correlate with behavioral intention, which influences behavior. Applying this idea to our research, the researcher argued whether the three attitudes, subjective norm, and perceived behavioral control, affect the intention, ultimately affecting the behavior through objective construction.

H4a. There is significant and positive mediating relationship of Behavioral Intention among Attitude and City Rail Transport Usage:

Hypothesis Four (a) appraises whether behavioral intention mediates the impact of attitude and usage behavior. The result (β =0.066; ρ = 0.016, T-Statistics=2.418) revealed that behavioral intention positively mediates the relationship of attitude and significantly impacts user behavior. Attitude is not only directly associated

with behavior, but sometimes intention also predicts the behavior through its mediating effect between attitude and behavior. Behavioral intention refers to the willingness to attempt an association with behavior. *Behavioral attitudes* respond positively or negatively to a particular action (Fishbean & Ajzen, 2000; Yu & Yu, 2017). Behavioral intention usually refers to the desire to take a specific action, which is considered the basis for direct action (Ajzen & Kruglanski, 2019). In the present study, intentions mainly refer to consumer perceptions and trends regarding the permanent use of city rail transit usage.

In contrast, Sustainable usage intention refers to the consumer's desire or plan to use city rail transport permanently. Consumers prefer sustainable public transportation when they have a protective or social attitude towards public transportation. A recent meta-analytical study (Chatterjee, 2021) examined several general principles in environmental psychology and concluded that intention is a robust behavior assessment.

H4b. There is significant and positive mediating relationship of Behavioral Intention among Subjective Norm and City Rail Transport Usage:

Hypothesis four (b) estimates that behavioral intention mediates the effect of subjective norms on user behavior. The insignificant results (β =0.126; ρ=0.437, T-Statistics=0.778) unveiled that behavioral intention does not mediate the relationship between subjective norms and city rail transport usage. Many studies (Barbera & Ajzen, 2020; Kim et al., 2013; Liu et al., 2019) have found no mediation effect of behavioral intention on the subjective norm and public transport usage

behavior in the original TPB framework. Some other studies (Wan et al., 2017; Suki & Salleh, 2018; Septiani et al., 2018) confirm that subjective norm is an essential and robust assessment of behavioral intention. In the case of Malaysia, due to the lack of quality services provision by public transport in different dimensions of tangibility, reliability, assurance, empathy, and responsiveness. Parents are concerned about their family, safety, security, saving time and money. The study stated that social concern does not affect an individual's intention to act. Friends, family members' opinions are important decision-makers regarding personal choice motives. Subjective norm is the individual's perception of social pressures regarding specific behaviors from parents, friends, culture, and government agencies. Numerous studies have shown that subjective criteria positively affect a person's intentions. In addition, Borhan et al. (2018) suggested that subjective norms positively affect consumer behavior because others/ loved ones feel that people should travel by city rail. According to several studies (Fan & Zheng, 2020; Xin et al., 2019; Xu et al., 2020), subjective norms can affect people's decision to travel longer distances for rail transportation but support the decision to travel shorter distances car and bike-sharing. In the case of a public transportation system, if using a city rail transit system is considered a socially desirable behavior, the individual is more likely to use it.

This study further develops TPB in public transportation systems by exploring the critical role of subjective criteria on service intention. When the population does not receive extensive, effective public transportation systems during the infant development phase, subjective criteria for system utilization could not be a critical

assessment. This study will contribute to identifying that parent, loved ones, leaders and other well-known persons asked their beloved to not use the rail transport in urban regions of Malaysia where LRT, MRT and KTM are operational and the stages of its use in adoption, thereby paving the way for future research (Yu et al., 2018).

H4c. There is significant and positive mediating relationship of Behavioral Intention among Perceived Behavioral Control and City Rail Transport Usage:

Hypothesis Four (c) evaluates whether behavioral intention positively mediates the impact of perceived behavioral control on public transport usage. The result (β =0.132; ρ = 0.016, T-Statistics=3.542) showed the mediation effect on behavioral intention and public transport usage. The results reveal a positive and significant relationship between PBC and behavioral intention. There is a full mediating effect of behavioral intention between PBC and usage behavior (Lee and Jan 2018). This research suggests that behavioral intention fully processes planned behavioral assessment (Mafabi et al., 2017). PBC refers to a person's level of control over the performance of a particular behavior and an individual's perception of the ease or difficulty in managing the behavior (Ajzen, 1991). To date, many researchers have highlighted the important role of PBC in intention and behavior, for example, improving public behavior (Fu et al., 2019), e-waste recycling (Wang et al., 2019), and energy Savings intent (Ru et al., 2018). Thus, behavioral intention positively mediates the relationship of PBC and City rail transport usage because PBC is also strong indicator after attitude determine consistent consumer behavior.

H5. There is significant and positive relationship of Behavioral Intention and City Rail Transport Usage:

Hypothesis five assesses that behavioral intention has a positive and direct impact on city rail transport user behavior. The result (β =0.198; ρ = 0.000, T-Statistics=3.712) also supported that behavioral intention significantly impacts user behavior. Although many studies have deliberately examined the role of travel priorities, only a few studies have examined how travel behaviors and attitudes change in line with environmental and health awareness. Limited studies have found that people who migrate to urban-type neighborhoods or transit-oriented developments (TODs) are more likely than their previous neighbors to drive, cycle and use city rail transport (De Vos et al., 2018). However, Van de Cowering et al. (2016) found that living away from a railway station has a positive effect on car use and a negative impact on attitudes towards public transport usage. Using panel data from Beijing (China), the priority for travel mode changed significantly after the respondents left. The impact of the built environment on travel-related attitudes.

According to the TPB, behavioral intention is the most crucial indicator of behaviors. Attitudes, a cognitive propensity that reflects the excellent and unfavorable judgement of the people, a particular product, or a specified behavior, has a significant impact. A person who feels that acting in a certain way will result in positive outcomes will positively affect the behaviors. According to the TPB analytical framework, personal attitudes are valid predictive variables that affect the behavioral intents of transport mode selection (Wu et al., 2020). According to Liu et al. (2017), passenger attitudes toward low-carbon travel and intention to

choose are significantly correlated. The attitudes for travel-related purposes have the most substantial explanatory power (Stark, 2018; Hössinger et al., 2018). They further utilized to the implementation of city rail transport services to meet the passenger demand intended for mobility and accessibility. In present research, passenger attitudes toward city rail transport tend toward the general assessment of passengers and their behavioral intention. If experimental evidence convinces passengers, it is reasonable to believe that city rail transport will positively affect their aspirations.

5.2.2 Moderating Effect

H6. There is significant and positive moderation effect of Customer Satisfaction on relationship of Behavioral Intention and City Rail Transport Usage:

Hypothesis six examined whether customer satisfaction moderates the positive relationship between behavioral intention and usage behavior. The analysis ($\beta = -0.022; \rho = 0.568, \text{T-Statistics}=0.570$) uncovered that there is No Moderation effect of customer satisfaction as the values also reported the insignificant values. In the present research, passenger satisfaction refers to how a passenger perceives demand for city rail transportation services.

In study, Leecharoen (2020) explore the relationship between customer satisfaction and both intention and behavior in the context of rail usage. Through a comprehensive survey of rail commuters, the researchers investigate whether customer satisfaction acts as a moderator between intention and usage behavior.

Contrary to conventional assumptions, their findings reveal that while customer satisfaction does influence intention and behavior, it does not exhibit a significant moderation effect in this context.

De Ona et al. (2021) revealed that customer loyalty is the behavioral intention that impacts the public's positive behavior if the service quality already satisfies their customers. Customer loyalty is a firm commitment to repurchase or reuse a product demanded by the customer (Oliver, 1999).

However, a few striking differences were discovered, such as that contentment has a lesser impact on loyalty (Khatibi et al., 2002; Reichheld, 1996). While loyal customers must be satisfied, it is assumed that minutely satisfied customers are not necessarily loyal. Because satisfied consumers sometimes defect, satisfaction attributes are neither simple nor linear (Jones & Sasser, 1995). Customers' satisfaction levels rise as they perceive and satisfied with antecedents such as pricing, service quality, social affinity, switching costs, brand image, and reputation. Moreover, the higher the level of satisfaction for specific and general antecedents, the more it aids to reinforce intention and usage. However, our research findings show that customer satisfaction has little effect on customer intention or use of municipal rail transportation. Hypothesis six is not supported based on the findings.

Satisfied Passengers will benefit from the services including premium charges, good condition, high accessibility, and security (Kim & Lee, 2010; Amin et al., 2013). Customer satisfaction is the cognitive and affective response to services, not the indirect factor (Hu & Thanica, 2009).

Several recent studies have been conducted (i.e., Vicente et al., 2020; Chen & Shen, 2020; de Ona et al., 2021; Nguyen-Fuok et al., 2020; Ahmad et al., 2020; Nuenhui) 2020; Ramos et al. And others, 2019; Vicente-Serra et al., 2020; Esmailpour et al., 2020; Sotanpur et al., 2020; Isai et al., 2020; Zhang et al., 2019; Pérez-Morón et al., 2022; Veloso & Sousa, 2022) in different contexts. To explore the relationship of service quality and behavior, it was suggested that if a company committed to provide high-quality products to its customers, its intentions to reuse will be even greater. Satisfied customer improving their social status demonstrate a positive attitude towards usage. However, further empirical research can help determine customer satisfaction as one of the most critical factors in the service industry.

First, this study proposes to use the SERVQUAL model (Parashuraman et al., 1988) as an effective tool to cover all aspects of service quality through modern rail transport. Second, the company needs to know the requirements required to optimize passenger satisfaction before providing services.

However, Sumedi et al. (2014) and Fu & Xuan (2016) found that service quality did not significantly impact customer satisfaction. Murray et al. (2010) examined public attitudes toward public transportation, stating that improving service quality does not affect city rail transport until the quality meet the standards. Therefore, this relationship between customer satisfaction and its impact on usage is primarily influenced by a very complex phenomenon of the behaviors of individuals. Therefore, customer satisfaction is an important indicator regardless of the indirect effect of moderation. The results also reject the moderation effect of customer satisfaction towards the intention and city rail transport usage.

5.3   Implications of the Study

There are two types of implications in this study, one theoretical implication and the other practical implications. Theoretical implications of academic contributions are presented, while others are practical contributions to the society, industry and policymakers. The current study contributes to the theoretical and empirical understanding of the various factors affecting city rail transit usage. This research sheds light on the practical implications of improving awareness among researchers, policymakers, academic institutions/universities, governments, and the public to understand the benefits of using city rail transport in Malaysia.

5.3.2   Theoretical Implications

Although the primary goal of the research conducted is to gain practical insight, the study also has theoretical implications. The present study's academic background has provided an extended model by combining factors of the Theory of TPB and Customer Satisfaction-SERVQUAL model. The study has predicted the influence of the environmental and health concern factors on attitude, social concern on the subjective norm, and perceived behavioral control. The results determined that subjective norms do not affect public transit usage behavior. This model has helped assess the various precedents and consequences for city rail transport usage. It explored the impact of five dimensions of service quality (i.e., tangibility, reliability, assurance, empathy, and responsiveness) as customer satisfaction indicators and helped create research in new areas that previous research could not design. Second, it helps to identify participants in the study to use city rail transport, particularly MRT, LRT, and KTM Komuter in Kuala Lumpur, Selangor, and

Negeri Sembilan, Malaysia. The results determined that customer satisfaction is the most crucial factor but does not moderate the relationship between intention and city rail usage.

Moreover, the proposed extended TPB and SERVEQUAL model structure helps predict the passenger's behavior as a target subject predictor. Environmental, health, as well as social aspects, are all-powerful precedents. Environmental and health concerns assess attitudes, while social concerns assess subjective norm criteria. Perceived behavioral control and attitudes of people positively influence intention, which leads to positive usage behavior. The subsequent use of the TPB model and SERVQUAL-customer satisfaction indicates that customer satisfaction is a critical assessment but does not control the impact between behavioral intention and usage behavior. This finding suggests that subjective criteria are weak indicators and do not help respondents switch from their present behavioral goals to passengers' public transport usage behavior. During face-to-face meetings with respondents, the researchers observed that people do not want to allow their loved ones to have insecure and unsafe travel as faced by the public previously. They consider rail transport as very costly and time-wasting for them compared to automobiles and bikes. As a result, the subjective norms are a weak construct that does not affect user behavior. However, this can be a contributing factor and should be considered in future research.

Analyzing behavior can be particularly problematic, meaning that car users can continue this process repeatedly until awareness of the consistent city rail transit

usage and its benefits. There are also four theoretical implications for using TPB in the current results briefly discussed:

It is applied to revise the intention of car drivers to prevent road traffic and pollution and examine the expectations of the environmentally friendly target. Firstly, in the present study suppositions, the TPB and SERVQUAL assessments help control the present behavior, which has stimulated the car usage and ignorance towards the congestion problem by knowing the true purpose of city rail transport usage.

Secondly, the behavioral intention successfully worked as a mediator in the model for attitude and PBC but not for subjective norms. The attitude and subjective norms also positively and directly affect the usage behavior, although the subjective norm does not influence user behavior.

The potential effect of environmental and health concerns on attitude and social concerns affecting the subjective norm is also significant and positive in results.

Thirdly, the results suggest that environmental, health and social concerns are essential and positive antecedents for attitude and subjective norms have inserted the potential in the TPB model. Fourthly, the present study outcome perceived that customer satisfaction is a separate and essential indicator that can influence user behavior without the moderation effect. Thus, future studies should focus on maintaining the results by considering factors that do not significantly affect the individual's behavior towards the usage behavior.

Recent studies, however, have found that there is a problem in understanding the consequences of using city rail transport instead of private cars. Thus, apart from

presenting the statistical evidence, this study has created a contribution to knowledge through extended TPB (Ajzen, 1991) models to predict the influence of the environmental and health concern factors on attitude, social concern on the subjective norm, and perceived behavioral control. To predict the respondents' behavior towards the usage of city rail transits (LRT, MRT, and KTM) in Malaysia, (Kalhoro et al., 2021) began their analysis by testing models separately and identified salient beliefs, i.e., attitude, subjective norms, perceived behavioral control, the behavioral intention that influence user behavior. Developing the extended TPB constructs together with SERVQUAL, and customer satisfaction (Fu & Juan, 2016) is limited in literature, probably because of the difficulty in obtaining a good model fit when the full TPB model is tested. Therefore, for future studies that plan to test the constructs of the modified TPB, a reasonable antecedent for attitude and subjective norm should be included in the TPB models. For instance, the current study managed to develop an acceptable model fit.

5.3.3 *Practical Implications*

The study on determining factors to use urban rail transport in Greater Kuala Lumpur using a behavioral framework has several practical implications for urban planning, transportation policy, and infrastructure development. The state hopes to motivate people to adopt more environmentally friendly practices and stimulate higher usage of LRT, MRT, and KTM Komuter in the urban region, specifically Greater Kuala Lumpur of Malaysia. The broader strategy is needed to focus on promoting urban rail transport rather than private cars. Here are some key practical implications that could arise from the findings of such a study:

Targeted Marketing and Information Dissemination: Understanding the behavioral factors that influence people's choices to use urban rail transport can help authorities develop targeted marketing campaigns and information dissemination strategies. By addressing specific concerns or motivations identified in the study, transportation agencies can effectively promote the benefits of using urban rail, thereby encouraging more people to adopt this mode of transportation.

This research has provided more detailed knowledge about the effects of different factors like environmental concerns, health concerns, and social concerns on public attitudes toward sustainable usage behavior. Therefore, there is a need to understand the go-green behavior by focusing on the environment. The influence of city rail transit usage can positively influence the physical benefits and the mental health of the people of Malaysia.

Consequently, education is an effective tool to stimulate behavioral change. So far, environmental education has mainly focused on enhancing ecological knowledge among the people. Unlike western countries, the Malaysian public, the government, and industry are unaware or ignored due to their meagre interests in the benefits of city rail transit usage, which reduces their willingness to adopt such behavior and their autonomy towards car purchase and use. Therefore, there is a need to increase passengers' environmental education and provide them with quality services with reasonable cost and time efficiency.

Improvement of Service Quality: If the study identifies factors such as reliability, frequency, comfort, and safety as important determinants of urban rail usage, transportation authorities can focus on improving these aspects. This could involve investing in better maintenance, advanced safety systems, and more frequent and punctual services, leading to an enhanced user experience and increased ridership.

The study highlighted the five dimensions of service quality, i.e., tangibility, reliability, assurance, empathy, and responsiveness. If LRT industries adopt, MRT and KTM Komuter can increase customer loyalty and attract new customers to their services. The study has elaborated that those high-quality services through city rail transit can directly affect the intention and behavioral relationships. The market must acknowledge that quality services embedded with technological advances effectively provide environmentally friendly amenity behavior among the public. An effective fare system should be introduced. It is necessary to have direct rules, tax/tariff rules, and other indirect car supply and demand laws that could help promote public transit use.

Last-Mile Connectivity: If the study highlights factors related to accessibility and convenience, urban planners and transport agencies can focus on enhancing last-mile connectivity. This might involve integrating the urban rail system with other modes of transportation such as buses, cycling lanes, and pedestrian pathways to make it easier for people to access and use the rail network.

Pricing Strategies: If cost is identified as a significant factor affecting rail usage, authorities can consider implementing flexible pricing strategies such as fare

discounts during off-peak hours, monthly passes, or loyalty programs to make urban rail more financially attractive to potential users.

Urban Design and Land Use Planning: Findings related to factors like station accessibility, proximity to residential and commercial areas, and the surrounding built environment can inform urban design and land use planning. Placing stations strategically in areas with high population density and mixed land use can encourage more people to use urban rail for their daily commuting needs.

Behavioral Nudges and Incentives: Behavioral insights gained from the study can be used to design interventions that nudge individuals towards using urban rail. For example, offering incentives such as discounts, rewards, or priority boarding to frequent rail users can positively influence their behavior and encourage others to follow suit. Malaysia's automobile industry provides short-term benefits, but it can strategically harm the country's sustainability. Thus, city rail transportation industries could be provided with effective economic stimulus measures, such as subsidies for public transport, by limiting the number of motor vehicles purchased.

Community Engagement and Collaboration: Involving the community in the planning process based on the study's findings can foster a sense of ownership and involvement. Local input can help shape the development of urban rail systems to align with the preferences and needs of the people who will be using them.

Furthermore, this study adds to the environmental knowledge of society, i.e., the passengers and their families. They should consider developing a practical approach to city rail transport by raising environmental awareness. At the same

time, leadership roles and promotional campaigns can also be required. Academia should set the course at the graduation level to increase awareness at student levels.

A collective effort is needed by considering different factors, i.e., quality services along with high accessibility near to their residence will also improve city rail transport usage. Hence, automobile, and public transport companies must acknowledge their corporate social responsibility by considering the country's economic, social, and environmental benefits, diversifying, and motivating themselves and the public by implementing long-term strategic planning rather than short-term outcomes. Environmental NGOs also must play a role in disseminating, understanding, and developing relevant approaches to improve their level of knowledge. Hence, it is clear from the study that efforts toward improving city rail transit accessibility and user behavior can improve sustainability in Malaysia.

Environmental Sustainability: If environmental concerns emerge as influential factors, transportation agencies can emphasize the environmental benefits of using urban rail, such as reducing traffic congestion and lowering carbon emissions. This could contribute to a shift towards more sustainable transportation options.

At present, more automobile usage has adversely affected the environment. It has increased the congestion issues of greenhouse gases, road blockage, wasted public prime time, increased accidents, and increased health issues. Thus, the government should play a role (through ordinances, laws, and policies such as tax law, the law of demand and supply, pricing policy, services policies, subsidies, and many more)

to hinder the public from reducing the purchase and usage of private cars as compared to the city rail transits.

Monitoring and Evaluation: The study can establish a baseline for monitoring and evaluating the success of interventions and improvements made based on its findings. Regular assessments can help determine the effectiveness of strategies implemented and guide ongoing adjustments.

This study also observed through previous studies that every factor should be considered, such as demographic factors like age group, gender, ethnicity, and income could significantly influence usage behavior for city rail transit. All those factors should be considered while implementing an action to promote and use city rail transport in Malaysia.

Long-Term Planning and Investment: The study's insights can inform long-term transportation planning and infrastructure investment decisions. By identifying key factors that influence urban rail usage, authorities can prioritize funding for initiatives that align with the preferences and behaviors of the target user population. Initially, this research helps the government enforce adequate policies and laws to positively maintain individual behavior toward city rail transit usage. This study has emphasized and highlighted the severe issue of automobile usage and recommended an alternate solution for city rail transit usage.

Incorporating the practical implications derived from this study can lead to a more efficient, user-friendly, and sustainable urban rail transport system in Greater Kuala

Lumpur, meeting the needs and preferences of its residents while promoting a shift towards more sustainable modes of transportation.

5.4 Recommendations

Here are some recommendations on the factors affecting public behavior to use city rail transport in Greater Kuala Lumpur:

The study's recommendation for the future directions is to promote city rail transport usage among the public can be possible by the successful provision of service quality for the city rail transportation, considering each factor. However, it can be related to the psychological factors, beliefs, attitudes, intention and customer satisfaction, and demographic factors, such as age group, gender, ethnicity, and income of the passengers. Malaysia should also implement a policy restricting private cars in cities to reduce traffic congestion and road accidents.

Consider Diversity of Malaysia: For the age group of the targeted households, the Government and industry should focus on the elderly and youngsters/ students by creating a niche market. For the gender of the respondents, males as well as females both should be considered without discrimination for effective execution of the plans for city rail transit usage (Wang et al., 2022). The Malaysian population is based on a diverse population belonging to different ethnicity. Other ethnic groups, such as Chinese Malay and Indian Malay, and other residents, must also be considered to expand city rail transport usage in Malaysia by accepting the ground realities and motivating the public by focusing on several factors underlined in this

study. In Malaysia, significant reforms are needed in the current and future transport system to increase the share of city rail transport for work trips and make it easier for all consumers to travel, especially labour who depend on it. The idea also applies to young people, women, and the elderly.

Reduction in automobile driving: City rail transport naturally benefits the environment, reducing the number of people who drive single-occupancy vehicles. 85% of greenhouse gas emissions from the transportation sector are from the land transportation system. One of the most effective ways people can save energy is to use city rail transportation. According to the American Public Transportation Association, U.S., public transportation saves 37 million metric tons of carbon dioxide annually. The association further elaborated that a person switching from a 20-mile journey in a car to current public transportation can reduce their annual CO_2 emissions by 20 pounds a day or more than 48,000 pounds a year, which equates to a 10% reduction in greenhouse gas produced by typical people two-adult, two-car homes. Eliminating a car and using public transportation instead of driving can save up to 30% on carbon dioxide emissions. By increasing the number of passengers on city rail transport, more fuel is saved, air pollution is reduced, and the area's carbon footprint is reduced.

Government-Industry Collaboration: The researcher appreciates the Government and industry for approving and constructing city rail services through the different projects to promote city rail transits. Ismail Sabri said in a statement in March 2022 that the Government had approved the manufacture of the previously suspended MRT3 by the Pakatan Harapan-led Federal Administration.

Also known as the circle line, MRT3 connects existing MRT1 and MRT2 lines in a wide loop around the Greater Klang Valley. The MRT3 is about 50 km long and has a circular layout along the perimeter of Kuala Lumpur. The Government of Malaysia has taken an excellent step toward go-green sustainability through high accessibility like MRT 3 (50 km long circle line) in the Greater Kuala Lumpur (Times Strait News Malaysia March 2022).

After the approval of MRT3, the CEO, Datuk Mohammad Zarif Hashim, announced that such constructions enhance the well-being of the Malaysian family and prioritize local contractors, Bumiputera players, for creating business and employment opportunities as well. Therefore, such a new plan should be executed effectively to expand metro rail transit services and increase their accessibility for high usage. Urban development strategies should emphasize city rail transport to reduce congestion, energy consumption, and environmental pollution. These collaborative steps will be led to accomplishing a greater emphasis on local rail system technologies, Industrial Building System (IBS), Building Information Modeling (BIM) solutions, technical/ vocational education, and training TVET.

Vibration and corrosion issues: As MRT, KTM, and LRT provide convenient, efficient, and environmentally friendly transportation through Malaysian city roads. Among the specific problems experienced by modern railways is the need to reduce life-cycle costs while minimizing environmental impacts such as vibration and corrosion. The Rapid rail noise is very annoying, and this vibration and corrosion have reduced the value of the houses where the LRT escalators are operating.

Enhanced security measures: Increase the presence of security personnel and install surveillance cameras to improve safety perceptions and prevent incidents of vandalism or harassment.

Emergency protocols: Educate passengers about emergency procedures and install emergency buttons or intercoms in train cars and stations for quick assistance. Recently, on 7th March 2022, the Times-News reported that the escalator in Jalan Ampang caught fire early on Monday morning (The Straits Times, 2022). The corporation was playing the blame game and stated that the management of that escalator was under their supervision. The corporation of Rapid Rail claimed that the photos of an escalator at the Ampang Park Light Rail Transit (LRT) station that caught fire were inaccurate and had caused concern among users. Some of them subsequently contacted the company for further explanation. They further elaborated that the escalator is part of a pedestrian bridge used by the public to cross Jalan Ampang. It was not owned or maintained by Rapid Rail. Public transport corporations and the passengers must ensure that safety measures at the LRT, MRT, and KTM stations should be improved to ensure users' safety and cooperate with local authorities to look for alternative means to access the station safely and efficiently.

Improve last-mile connectivity: Enhance integration with other modes of transportation such as buses, cycling lanes, and pedestrian pathways to make it easier for people to access and exit rail stations.

Expand network coverage: Continuously expand the rail network to cover more areas within Greater Kuala Lumpur, providing convenient options for a larger population.

Fare structure: Evaluate and adjust fare structures to ensure that using the city rail transport remains cost-effective for different income groups, offering discounts for students, senior citizens, and regular commuters.

Integrated ticketing: Implement integrated ticketing systems that allow seamless transfers between different modes of public transportation using a single ticket or payment method. It is also recommended to expand and generate funding in the industry which can also competitively utilize to expand their quality to world-class standards. Ensure that transportation-related agencies are adequately prepared to support Malaysia's position to compete globally with developed countries by promoting infrastructural development. This notion also leads to a high satisfaction- behavioral intention impact.

Modernize facilities: Upgrade stations with comfortable seating, clean restrooms, and waiting areas to create a pleasant travel experience for passengers. In addition to setting up an innovative regulatory mechanism for public transport, the state should also plan to build waiting areas, parks, bicycle, and ride facilities near public transport stations. Diesel engines must be replaced with fully electric engines by autonomous public transport to introduce green public transport in every urban area to erase carbon dioxide and nitric oxide emissions.

Real-time information: Install digital displays that provide real-time train schedules, delays, and platform information to keep passengers informed and reduce uncertainty.

Increase frequency: Optimize train schedules to reduce waiting times, particularly during peak hours, making the service more attractive to those seeking efficient travel options.

Maintenance and reliability: Regularly maintain trains and tracks to minimize breakdowns and disruptions, thereby building trust in the reliability of the rail system.

Green initiatives: Promote the environmental benefits of using public transport, such as reduced air pollution and traffic congestion, to encourage eco-conscious behavior.

Sustainability campaigns: This study's empirical findings help the stakeholders increase efficient actions to promote public transit. Launch public awareness campaigns on the positive impact of reducing individual car usage, highlighting the role of rail transport in achieving a greener city.

Marketing campaigns: Develop engaging marketing campaigns that emphasize the convenience, cost-effectiveness, and advantages of using city rail transport.

User testimonials: Share positive experiences of regular commuters to build social proof and encourage new users to adopt the rail system.

Transit-oriented development: Collaborate with urban planners to encourage mixed-use developments around rail stations, fostering a walkable community and reducing the need for extensive travel.

Zoning policies: Implement zoning regulations that prioritize areas along rail corridors for commercial and residential growth, further promoting rail usage.

Feedback mechanisms: Establish channels for passengers to provide feedback and suggestions, showing them that their opinions are valued and considered in enhancing the system.

Mobile applications: Develop user-friendly mobile apps that provide real-time updates, journey planning, and online ticket purchasing to simplify the travel experience.

Digital payments: Enable contactless payment methods, such as smart cards and mobile wallets, to reduce transactional friction for passengers.

Climate change issues: Malaysia is a country with high water resources due to high rainfall. Recently climate change issues have led to increased global warming, which can also lead to natural disasters such as floods caused by heavy rainfall (Dal et al., 2020). Researchers have shown experimental studies from various universities and research institutes in Kuala Lumpur and Klang Valley that the flooded water cannot be absorbed effectively due to a mysterious land and soil surfaces. Floods damaged property values, automobiles, and market value. Therefore, it is possible to adopt a behavior towards public transport.

Consider pandemic: As Malaysia moved toward the recovery phase from COVID-19 and from 1st April 2022 government has also opened the borders for international countries and allowed tourists to visit Malaysia. The management of the city rail transit should assure the public of their transit sanitization and make the light rail hygiene for the passengers. The public transit must provide the safety kits and equipment for the transits. The fully vaccinated passengers can only travel and should strictly obey the standard operating procedures for their and others' safety. If not, the public transit corps and passengers should be penalized if not following the deadly disease of COVID-19.

Stakeholder involvement: Involve local communities, business associations, and residents in decision-making processes related to rail system expansion and improvements.

Public awareness: This study aims to raise awareness among passengers that using city rail transport is more healthy and environmentally friendly than other modes of transport. This thinking change will encourage people to shift from private vehicles to public transport. Also, provide information about accidents and congestion issues in the country. The communication mechanisms are recommended to raise awareness about using public transport to increase consumption. Academics and organizations should research in-depth transportation issues by considering the ultimate consumers' attitude for appropriate interventions to promote behavior change. Policy to strengthen collaboration with the Ministry of Education (MoE) and various NGOs to raise awareness and teach green behavior at the youth level.

By addressing these factors comprehensively, Greater Kuala Lumpur can encourage more residents to use city rail transport, thereby reducing traffic congestion, air pollution, and promoting a more sustainable and efficient urban transportation system. This study's empirical findings help the stakeholders increase efficient actions to promote public transit.

5.5 Limitations of Study

Throughout this study, several limitations have been observed and should be noted. However, these limitations have not changed the significance of the results and will be considered for future studies. Certainly, here are some potential limitations that should be acknowledged in the study on factors affecting public behavior to use city rail transport in Greater Kuala Lumpur:

The study's findings might be influenced by the demographics of the participants surveyed, potentially not representing the entire population accurately. If certain groups are overrepresented or underrepresented, the results might not be generalizable.

The entire study depended solely on a primary data collection method, such as surveys, might limit the depth and richness of the insights gained from qualitative observations or other forms of data collection. In this current pandemic situation of COVID-19 worldwide, it was tough for the researcher to respond through the online survey questionnaire and face-to-face interviews with residents in Malaysian cities. Primary data is collected through a closed-ended questionnaire, and the study is quantitative, as it is preventing respondents to provide their feedback through a

qualitative approach. The applicable duration for conducting a quantitative survey is limited to just a few months.

Individuals who voluntarily participate in the study might have a different perspective or inclination toward using public transport compared to those who opt not to participate.

A cross-sectional study might not capture changes in behavior over time. Longitudinal data would provide a more accurate understanding of how factors evolve and influence behavior. Respondents might provide socially desirable answers rather than their true opinions, particularly when it comes to sensitive topics like environmental concerns or the reasons for not using public transport.

Language barriers or cultural nuances could affect respondents' understanding of survey questions, potentially leading to misinterpretations or inaccurate responses.

Furthermore, the context of this study examines limited variables on the direct and indirect effects on passenger public transport intentions. In this study, the researcher seeks to analyze the impact of finite independent variables, i.e., environment, health, quality services, social concerns, and behavioral intentions to use city rail transport, positively and significantly related to Malaysia's sustainable development. Customer satisfaction is chosen as an intermediary between dependent and independent variables. Factors beyond the scope of the study, such as changes in government policies, economic shifts, or major infrastructure projects, could impact public behavior but might not be fully accounted for. Other variables such as resource utilization, entrepreneurship, land use, disabilities,

female behavior, equity, corruption, climate change, personality traits, belief system and motivations, and many other factors are needed to understand the purpose and behaviors toward city rail transport use.

Respondents might not accurately recall or report their reasons for using or not using city rail transport, leading to potential inaccuracies in the data collected. Findings from this specific study might not be applicable to other cities or regions with different urban layouts, transportation systems, and cultural contexts. In this study, the two-step approach of the Smart-PLS SEM was used for model testing, and SPSS was used for demographic analysis. Software other than Smart PLS and SPSS can be used.

The cross-effects of various city rail transport in urban and rural, western, and eastern Malaysia and comparative studies abroad have not been explored. This study's scope is limited to the use of city rail transport in Kuala Lumpur, Selangor, and Negeri Sembilan, Malaysia.

As time and resources are important factors limiting the study, future research should be applied over a long period to represent the present position and future forecast better. In addition, there should be more variables in future research better to understand its effects and variations on passenger consumption intentions. The diversity of research can be added, like a technology acceptance model that assesses the acceptance of autonomous public transport to improve the quality of service and benefit in understanding the environmental behavior theory, prominent five personality traits, and travel behavior of Malaysian Passengers.

It's important to acknowledge these limitations to ensure that the study's results are interpreted and applied appropriately, and to guide future research in addressing these potential shortcomings.

5.6 Summary

The world faces many problems that have increased and spread due to human behavior. Climate change and the environmental problem need to be critically addressed to focus on the potential factors that drive public behavior. Malaysians should adapt user behavior and habits for the city rail network to mitigate global warming issues due to traffic flow, like excessive vehicle demand, decreased fatal accidents, and fuel cost. Nowadays, the government is seeking to reduce the number of personal cars by deliberately imposing congestion charges, fees, and buying restrictions, as well as encouraging people to the city rail transit usage. There is a need to highlight the factors that influence the positive public attitude towards public transport in Malaysia through planned behavior and customer satisfaction. Government and industries must integrate and implement a framework/mechanism to improve society and environmental sustainability through an environmental, health concerned attitude towards city rail transit usage.

This study identified the factors that influence consumers to use public transport more than private cars in the Klang Valley, Malaysia. Furthermore, this research reveals that perhaps the quality of public transport is also strongly linked to customer loyalty and intentions to behave. This research contributes to the literature by focusing on behavioral intention to increase public transport use. This research

will add on the government officials and transportation industries to mitigate the congestion issues in Greater Kuala Lumpur, Malaysia. In 2018, World Bank estimated the dire condition that every household has his/her motorcar.

This study assessed the factors behind the problems; people are still increasing their purchase of private cars/automobiles and do not use public transport. Thus, this study supported that public intention is significantly and positively related to city rail transit usage. Furthermore, this study concludes that environmentally friendly behavioral intention needs to be further studied to promote city rail transit usage in Malaysia.

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Table 1. Standard Observations

	RECOMMENDED VALUE	REFERENCE
Cronbach's Alpha reliability	α=>0.70	Black and Babin, (2010) and Awang (2015)
Composite reliability	CR= > 0.70	Black and Babin (2010) and Awang (2015)
AVE	more than 0.5	Fornell and Larcker (1981)
HTMT	0.90 or less	Teo et al. (2008)
R square	0.10 or greater	Falk and Miller (1992)
f-square	(>=0.02 is small; >= 0.15 is medium;>= 0.35 is large)	Cohen (1988)
		REILLY et al (2007)
	0.01 is acceptable	
Q Square	above 0 shows that the model has predictive relevance.	Hu and Bentler, (1999)
SRMR index	0 to 0.08, or less than 0.10	(Hu and Bentler, 1999).
NFI	larger than or equal to 0.80	Hu and Bentler (1999), Forza & Filippini (1998)
d_ULS and d_G	the upper bounds should not exceed 95% and 99%	Forza & Filippini (1998)

Table 2 F^2 (Mean, STDEV, T-Values, P-Values)

	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values

AT -> BI	0.015	0.010	1.353	0.176
AT -> USE	0.028	0.015	1.677	0.094
BI -> USE	0.028	0.014	1.793	0.073
CS -> USE	0.057	0.021	2.611	0.009
EC -> AT	0.089	0.027	3.248	0.001
HC -> AT	0.125	0.030	4.038	0.000
PBC -> BI	0.797	0.124	6.327	0.000
PBC -> USE	0.012	0.009	1.117	0.264
SC -> SN	0.450	0.073	6.071	0.000
SN -> BI	0.003	0.004	0.305	0.760
SN -> USE	0.001	0.002	0.011	0.991

Table 3 R^2 (Mean, STDEV, T-Values, P-Values)

Construct	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
AT	0.336	0.031	10.849	**0.000**
BI	0.510	0.034	14.741	**0.000**
SN	0.309	0.034	8.923	**0.000**
USE	0.287	0.028	9.998	**0.000**

Table 4 Construct Cross validated Redundancy (Total)

Constructs	SSO	SSE	Q^2 (=1-SSE/SSO)
AT	5832.000	4411.363	0.244
BI	5832.000	3583.883	0.385
CS	3645.000	3645.000	
EC	2916.000	2916.000	
HC	4374.000	4374.000	
PBC	5832.000	5832.000	
SC	3645.000	3645.000	
SN	3645.000	2911.561	0.201
USE	4374.000	3344.863	0.235

Table 5 Construct Cross validated Communality (Total)

Constructs	SSO	SSE	Q² (=1-SSE/SSO)
AT	5832.000	1793.973	0.692
BI	5832.000	1762.157	0.698
CS	3645.000	1116.470	0.694
EC	2916.000	1075.357	0.631
HC	4374.000	2110.029	0.518
PBC	5832.000	1809.804	0.690
SC	3645.000	1176.885	0.677
SN	3645.000	1823.821	0.500
USE	4374.000	961.092	0.780

Table 6 Path Coefficients (Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
AT -> BI	0.089	0.088	0.032	2.825	0.005
AT -> USE	0.159	0.159	0.045	3.508	0.000
BI -> USE	0.198	0.199	0.053	3.712	0.000
CS -> USE	0.242	0.242	0.044	5.556	0.000
EC -> AT	0.296	0.297	0.042	7.107	0.000
HC -> AT	0.351	0.352	0.040	8.859	0.000
Moderating Effect of CS* BI->Usage -> USE	0.052	0.053	0.041	1.277	0.202
PBC -> BI	0.670	0.671	0.030	22.397	0.000
PBC -> USE	0.126	0.125	0.053	2.399	0.016
SC -> SN	0.554	0.555	0.031	17.840	0.000
SN -> BI	0.025	0.025	0.030	0.822	0.411
SN -> USE	0.004	0.005	0.035	0.124	0.901

Table 7 Specific Indirect Effects (Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
HC -> AT -> USE	0.056	0.056	0.016	3.411	0.001

EC -> AT -> USE	0.047	0.048	0.017	2.777	0.006
EC -> AT -> BI -> USE	0.005	0.005	0.002	2.288	0.022
AT -> BI -> USE	0.018	0.017	0.007	2.418	0.016
SC -> SN -> BI -> USE	0.003	0.003	0.004	0.767	0.443
PBC -> BI -> USE	0.132	0.134	0.037	3.542	0.000
HC -> AT -> BI	0.031	0.031	0.012	2.702	0.007
SC -> SN -> BI	0.014	0.014	0.017	0.812	0.417
HC -> AT -> BI -> USE	0.006	0.006	0.003	2.324	0.020
SC -> SN -> USE	0.002	0.003	0.019	0.124	0.902
EC -> AT -> BI	0.026	0.026	0.010	2.613	0.009
SN -> BI -> USE	0.005	0.005	0.006	0.778	0.437

Table 8 Total Indirect Effects (Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
AT -> BI					
AT -> USE	0.018	0.017	0.007	2.418	0.016
BI -> USE					
CS -> USE					
EC -> AT					
EC -> BI	0.026	0.026	0.010	2.613	0.009
EC -> USE	0.052	0.053	0.017	3.054	0.002
HC -> AT					
HC -> BI	0.031	0.031	0.012	2.702	0.007

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
HC -> USE	0.062	0.062	0.016	3.847	0.000
Moderating Effect of CS* BI->Usage -> USE					
PBC -> BI					
PBC -> USE	0.132	0.134	0.037	3.542	0.000
SC -> BI	0.014	0.014	0.017	0.812	0.417
SC -> SN					
SC -> USE	0.005	0.006	0.019	0.261	0.794
SN -> BI					
SN -> USE	0.005	0.005	0.006	0.778	0.437

Table 9 Total Effects (Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
AT -> BI	0.089	0.088	0.032	2.825	0.005
AT -> USE	0.176	0.176	0.044	4.002	0.000
BI -> USE	0.198	0.199	0.053	3.712	0.000
CS -> USE	0.242	0.242	0.044	5.556	0.000
EC -> AT	0.296	0.297	0.042	7.107	0.000
EC -> BI	0.026	0.026	0.010	2.613	0.009
EC -> USE	0.052	0.053	0.017	3.054	0.002
HC -> AT	0.351	0.352	0.040	8.859	0.000
HC -> BI	0.031	0.031	0.012	2.702	0.007
HC -> USE	0.062	0.062	0.016	3.847	0.000
Moderating Effect of CS* BI->Usage -> USE	0.052	0.053	0.041	1.277	0.202

PBC -> BI	0.670	0.671	0.030	22.397	0.000
PBC -> USE	0.259	0.259	0.040	6.447	0.000
SC -> BI	0.014	0.014	0.017	0.812	0.417
SC -> SN	0.554	0.555	0.031	17.840	0.000
SC -> USE	0.005	0.006	0.019	0.261	0.794
SN -> BI	0.025	0.025	0.030	0.822	0.411
SN -> USE	0.009	0.010	0.035	0.263	0.793

Table 10 Strategies for transportation

No.	Strategy	Objective
1	Strengthen enforcement to ensure compliance with regulations and laws to improve safety, quality of service, and reliability:	The objective of this strategy is to strengthen the capacity of enforcement agencies through means such as intensive use of technology.
2	To use a secure and safer approach system for road users, infrastructural and vehicles:	The objective for this strategy is to lower the risk of fatalities caused due to road accidents, i.e., 24 out of 100000 of population in overall Asian countries. Road safety guidelines, rules, regulations strengthen the transport policy. These accidents have cause national loss of RM 8.8 million in a year 2017. Emergency safety and security guidelines and law enforcement are required.
3	To ensure the security approaches for Malaysian transportation by considering the international standards.	The objective of this strategy is to provide guarantee from the Malaysian transportations, airlines, and marines ships to comply with the standards, i.e., SARPS standard Airlines recommended Practices by Malaysian civil aviation organizations (ICAO) to address the international security

issues. For marine IAIA (International association for marine navigations coordinated the guidelines to ensure security.

4	Strengthen infrastructure/facilities, increase, and utilize digitization to improve connectivity, accessibility, and acceptance:	The objective is to optimize the use of infrastructure and transportation facilities. Improve public transport connectivity and accessibility to promote the transition of modes from private vehicles to public transport. Provides intelligent and shared mobility for goods and passengers.
5	Enforce compliance with actions/regulations and move to international environmental standards:	The objective is to minimize the environmental impact of the growth and expansion of the transport sector. Reduce greenhouse gases emissions, black smoke, and other pollutants from the transport sector. Increase support for green initiatives in all transport sectors.
6	Prioritize the public transportation as the major and vital formation in mapping sustainable growth of space and transportation in urban areas:	Its objective is to consolidate land use planning and public transport planning. Ensure the consolidation of development with the public transport system to reduce the demand for travel by private vehicles.
7	Accelerate the implementation of low-carbon mobility initiatives:	Its objective is to decrease the poisonous gases emission i.e., Greenhouse gases, CO_2 and NO_2 from the transport. Enhancement of the energy-efficient vehicles (EEV) is needed as the mode of transportation of choice. Increase the use of public transport and non-motorized transport.
8	The Institute's measures to control pollution, noise, and waste from the transport sector:	Its objective is to ensure that waste products of the transport sector are treated and disposed of systematically and adequately. Minimize the impact on

		the environment due to pollution caused by transportation.
9	Develop effective communication, awareness and to educate the community to develop behavioral change in sustainable transport choices:	Importance of behavior change is needed to achieve the mission to improve sustainable practices in managing the transport sector is inevitable. However, the level of environmental awareness and benefits of implementing sustainable transport practices among transport operators, manufacturers, service providers, and consumers remains low, hindering efforts to move to green practices. It is important to note that increased awareness itself is not sufficient and must be followed by behavioral changes to make an impact. The aim is to raise awareness among transport operators and service providers to prioritize the delivery of quality services to increase the productivity of the transport sector. Encourage mode shifts from private vehicles to public transportation. Calculate positive behaviors such as proper road use ethics. Action Items: i. Develop communication mechanisms to increase awareness of the benefits of using public transport to increase consumption. ii. Do research to understand travel behaviors and travel patterns for appropriate interventions to promote behavior change. iii. Implement programs to promote behavior change. iv. Strengthen collaboration with the ministry of education to increase awareness and develop school student' green behaviors. (AKASA Model, Tbilisi Declaration) (UNESCO, 1977)

10	Expanding the global footprint and promoting the internationalization of transportation services awareness:	The objective is to raise awareness among transport operators and service providers to prioritize the delivery of quality services to increase the productivity of the transport sector. Encourage mode shifts from private vehicles to public transportation. Calculate positive behaviors such as proper road use ethics.
11	Develop encouraging and conducive environment for local transport industry for becoming a regional and global player in world:	The aim is to ensure industry players/operators are competitive and able to expand their services overseas. Encourage local operators to increase their benefits and invest overseas.
12	Ensure that transportation agencies and firms to effectively ready to sustain Malaysia's position in global competitiveness index:	its objective is to ensure that transport-related agencies are aware of and adequately equipped to perform their role in updating data and improving processes in a global position.

Note. Strategies are extracted from the transportation policies of Malaysia 2019-2030.

APPENDIX II

i. Ethical Approval letter for Research Project/Protocol

UTAR **UNIVERSITI TUNKU ABDUL RAHMAN**
Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

Re: U/SERC/191/2020

18 November 2020

Dr Au Yong Hui Nee
Department of Economics
Faculty of Business and Finance
Universiti Tunku Abdul Rahman
Jalan Universiti, Bandar Baru Barat
31900 Kampar, Perak

Dear Dr Au Yong,

Ethical Approval For Research Project/Protocol

We refer to your application for ethical approval for your research project (PhD student's project) and are pleased to inform you that your application has been approved under <u>expedited review</u>.

The details of your research project are as follows:

Research Title	The Assessment of Urban Socio-Economic Development Through Sustainable Public Transport System in Malaysia
Investigator(s)	Dr Au Yong Hui Nee Dr Charles Ramendran a/l SPR Subramaniam Dr Abdelhak Senadjki Dr Lam Weng Hoe Dr Lam Weng Siew Maryam Kalhoro (UTAR Postgraduate Student)
Research Area	Social Sciences
Research Location	Malaysia
No of Participants	1,000 participants (Age: 18 - 70)
Research Costs	UTAR Research Fund 2020 Cycle 1
Approval Validity	18 November 2020 - 17 November 2021

The conduct of this research is subject to the following:

(1) The participants' informed consent be obtained prior to the commencement of the research,

(2) Confidentiality of participants' personal data must be maintained; and

(3) Compliance with procedures set out in related policies of UTAR such as the UTAR Research Ethics and Code of Conduct, Code of Practice for Research Involving Humans and other related policies/guidelines.

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Website: www.utar.edu.my

1. **Questionnaire of the study**

The Assessment of Urban Socio-Economic development through Sustainable Public Transport System in Malaysia

Dear respondent,

I am Maryam Kalhoro, a PhD Scholar at UniversitiTunku Abdul Rahman, Kampar, Malaysia. Attached herewith is the questionnaire for my research. It is requested to please spare 10-15 minutes to fill this questionnaire, your participation will be highly appreciated.

The purpose of this questionnaire is '*to analyse the urban public transportation system and its impacts on sustainable development in Malaysia'.* The questionnaire is consisted of two parts. Part-I is based on background information of the respondents and part-II is about the different variables of the study i.e., environment, social, health concerns, quality services, customer satisfaction and intention to use public transportation.

There are no right or wrong answers. This through data, we aim to know how you feel.

We assure that the information provided by you shall be used only for academic and research purpose. The data furnished and the identity of the respondent will be kept confidential. For any questions regarding this study, please do not hesitate to contact at the below given contacts:

Main Supervisor: Asst. Prof. Dr. Au Yong Hui Nee at auyonghn@utar.edu.my,
Co-Supervisor:Asst. Prof. Dr.CharlesRamendran SPR Subramaniam at
charlesr@utar.edu.my,
PhD Student: Ms. Maryam Kalhoro at maryamkalhoro@1utar.my .

We sincerely appreciate your inputs!

Many thanks for considering our request.

Kind Regards,

Ms Maryam Kalhoro
PhD (DBA) Student@ Faculty of Business &Finance
UniversitiTunkuAbdul Rahman, Kampar, Malaysia

Responden yang dihormati,

Saya Maryam Kalhoro, seorang Sarjana PhD di UniversitiTunku Abdul Rahman, Kampar, Malaysia. Terlampir dengan ini adalah borang soal selidik untuk penyelidikan saya. Dimohon untuk meluangkan masa 10-15 minit untuk mengisi soal selidik ini, penyertaan anda akan sangat dihargai.

Tujuan soal selidik ini adalah *'untuk menganalisis sistem pengangkutan awam bandar dan kesannya terhadap pembangunan lestari di Malaysia'.* Soal selidik terdiri daripada dua bahagian. Bahagian-I didasarkan pada informasi latar belakang responden dan bahagian-II adalah mengenai pemboleh ubah yang berbeza dari kajian, iaitu persekitaran, sosial, masalah kesihatan, perkhidmatan berkualiti, kepuasan pelanggan dan niat untuk menggunakan pengangkutan awam.

Tidak ada jawapan yang betul atau salah. Ini melalui data, Kami bertujuan untuk mengetahui bagaimana perasaan anda.

Kami memastikan bahawa maklumat yang anda berikan hanya boleh digunakan untuk tujuan akademik dan penyelidikan. Data yang diberikan dan identiti responden akan dirahsiakan. Untuk sebarang pertanyaan mengenai kajian ini, jangan ragu untuk menghubungi di kontak yang diberikan di bawah ini:

Penyelia Utama: Asst. Prof Dr. Au Yong Hui Nee di auyonghn@utar.edu.my,
Penyelia Bersama: Asst. Prof. Dr. Charles Ramendran SPR Subramaniam di charlesr@utar.edu.my,
Pelajar PhD: Cik Maryam Kalhoro di maryamkalhoro@1utar.my.

Kami sangat menghargai input anda!

Terima kasih kerana mempertimbangkan permintaan kami.

Salam,

Cik Maryam Kalhoro
Pelajar PhD (DBA) @ Fakulti Perniagaan & Kewangan
UniversitiTunkuAbdul Rahman, Kampar,
Malaysia

* Have you ever experienced the public transport in Klang Valley (Kuala Lumpur) Malaysia?

(Adakah anda pernah mengalami pengangkutan awam di Lembah Klang (Kuala Lumpur) Malaysia?)

☐ **Yes** Ya
☐ **No** Tidak

(If yes, please proceed further) (If No, please close the questionnaire here)

(Jika ya, teruskan lebih jauh) (Sekiranya Tidak, sila tutup soal selidik di sini)

 * I give my consent to participate in this survey.

(Saya memberikan persetujuan untuk menyertai tinjauan ini.)

☐ **Yes** Ya
☐ **No** Tidak

(If yes, please proceed further) (If No, please leave the questionnaire here).

(Jika ya, teruskan lebih jauh) (Sekiranya Tidak, sila tutup soal selidik di sini)

PART-I

BAHAGIAN-I

BACKGROUND INFORMATION

MAKLUMAT LATAR BELAKANG

This section contains items regarding your demographic information. Please respond to each item by CHECKING THE BOX that best describes you.

(Bahagian ini mengandungi item mengenai maklumat demografi anda. Tolong balas setiap item dengan MEMERIKSA KOTAK yang paling tepat menggambarkan anda.)

1. **Gender (**Jantina)
   - ☐ Male   Lelaki
   - ☐ Female   Perempuan

2. **Age group**   (Kumpulan umur)
   - ☐ 18 to 20 years old   (Berumur 18 hingga 20 tahun)
   - ☐ 21 to 30 years old   (Berumur 21 hingga 30 tahun)
   - ☐ 31 to 40 years old   (31 hingga 40 tahun)
   - ☐ 41 to 50 years old   (Berumur 41 hingga 50 tahun)
   - ☐ 51 years old and above   (Berumur 51 tahun ke atas)

3. **Ethnicity**   (Etnik)
   - ☐ Malay   (Bahasa Melayu)
   - ☐ Chinese   (Orang Cina)
   - ☐ Indian   (Orang India)
   - ☐ Others_____ (Yang lain)_____

4. **Marital status**   (Status perkahwinan)
   - ☐ Single   (Bujang)
   - ☐ Married   (Berkahwin)
   - ☐ Divorced   (Bercerai)
   - ☐ Widowed   (Janda)

5. **Education level**   (Peringkat Pendidikan)
   - ☐ Primary   (Utama)
   - ☐ Secondary/SPM/O-Level   (Menengah / SPM / O-Level)
   - ☐ STPM/Certificate/Diploma   (STPM / Sijil / Diploma)
   - ☐ Bachelor   (Sarjana Muda)
   - ☐ Post Graduate   (Pascasiswazah)
   - ☐ Other_____   (Yang lain)_____

6. **Occupation**   (Pekerjaan)
   - ☐ Govt/ Public sector Employee   (Pekerja Sektor Awam / Kerajaan)
   - ☐ Private sector employee   (Pekerja sektor swasta)
   - ☐ Self employed   (Bekerja sendiri)
   - ☐ Student   (Pelajar)
   - ☐ Other_____   (Yang lain)_____

7. **Your Income per month in (RM)**   Pendapatan anda dalam sebulan (RM)
   - ☐ Below RM2,000   (Di bawah RM2,000)
   - ☐ RM2,001 to RM3,000   (RM2,001 hingga RM3,000)
   - ☐ RM3,001 to RM4,000   (RM3,001 hingga RM4,000)
   - ☐ RM4,001 to RM5,000   (RM4,001 hingga RM5,000)
   - ☐ RM5,001 to RM6,000   (RM5,001 hingga RM6,000)
   - ☐ RM6,001 to RM 7,000   (RM6,001 hingga RM 7,000)
   - ☐ RM7,001 and Above   (RM7,001 dan Ke Atas)
   - ☐ Other_____(Yang lain)_____

8. **What type of public transport you use?** (Apakah jenis pengangkutan awam yang anda gunakan?
   ☐ Light Rail Transit (or Mono rail)   (Transit Rel Ringan (atau Mono rel)
   ☐ Mass Rail Transit (MRT)
   ☐ KTM Komuter, KTM intercity)

9. **Your main purpose of using public transport.**
   (Tujuan utama anda menggunakan pengangkutan awam)

   ☐ For work   (Untuk pekerjaan)
   ☐ For education   (Untuk pendidikan)
   ☐ For social activities   (Untuk aktiviti sosial)

10. **Your frequency of using public transport in a week.**
    (Kekerapan anda menggunakan pengangkutan awam dalam seminggu)
    ☐ 1-5 times   (1-5 kali)
    ☐ 6-10 times   (6-10 kali)
    ☐ 11 and more (11 dan lebih)
    ☐ Others_____(Yang lain)_____

11. **Your Average travelling time in a day.**
    (Purata masa perjalanan anda dalam sehari)

    ☐ Less than 15 minutes   (Tidak sampai 15 minit)
    ☐ 16-30 minutes   (16-30 minit)
    ☐ 31-45 minutes   (31-45 minit)
    ☐ 46 – 60 minutes   (46 - 60 minit)
    ☐ More than 60 minutes   (Lebih dari 60 minit)
    ☐ Others_____(Yang lain)_____

12. **Your Average travelling distance per day.**
    (Purata jarak perjalanan anda setiap hari)
    ☐ Less than 3 km   (Kurang daripada 3 km)
    ☐ 3 – 9 Km
    ☐ 10 – 15 Km
    ☐ 16 – 22 Km
    ☐ More than 22 km (Lebih daripada 22 km)

PART-II Study Variables

BAHAGIAN-II Pemboleh ubah Kajian

The following questions will help us to determine your behavior towards the usage of public transportation. Please decide and select whether you are agree or disagree with the statements on five –point Likert scale.

(Soalan berikut akan membantu kami menentukan tingkah laku anda terhadap penggunaan pengangkutan awam. Tentukan dan pilih sama ada anda setuju atau tidak setuju dengan pernyataan dalam skala Likert lima titik.)

①	②	③	④		⑤	
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree		Strongly Agree	

ATTITUDE TOWARDS THE PUBLIC TRANSPORT USAGE

SIKAP KE ATAS PENGGUNAAN PENGANGKUTAN AWAM

Sr. No	I believe that: (Saya percaya bahawa)	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
	ATTITUDE					
AT1	I like traveling by public transport. (Saya suka menggunakan pengangkutan awam.)	①	②	③	④	⑤
AT2	Using public transport is convenient for me. (Menggunakan pengangkutan awam adalah mudah bagi saya.)	①	②	③	④	⑤
AT3	Using public transport is time efficient. (Menggunakan pengangkutan awam amat menjimatkan masa.)	①	②	③	④	⑤
AT4	I have good feeling towards using the public transport. (Saya mempunyai perasaan baik untuk menggunakan pengangkutan awam.)	①	②	③	④	⑤
AT5	The public transport use will be extremely pleasant for me. (Penggunaan pengangkutan awam akan sangat menyenangkan bagi saya.)	①	②	③	④	⑤
AT6	For me, to use the public transport is interesting. (Bagi saya, menggunakan pengangkutan awam memang menarik.)	①	②	③	④	⑤
AT7	I would enjoy using the public transport. (Saya seronok menggunakan pengangkutan awam.)	①	②	③	④	⑤
AT8	I like the idea of using public transport. (Saya suka idea menggunakan pengangkutan awam.)	①	②	③	④	⑤

	Environment concern Keprihatinan persekitaran					
ATE 1	I prefer to use public transport services because it protects the environment. (Saya lebih suka menggunakan perkhidmatan pengangkutan awam kerana ia dapat melindungi alam sekitar.)	①	②	③	④	⑤
ATE 2	I prefer to use public transport services because it reduces air pollution. (Saya lebih suka menggunakan perkhidmatan pengangkutan awam kerana ia dapat mengurangkan pencemaran udara.)	①	②	③	④	⑤
ATE 3	I prefer to use public transport services because it reduces traffic congestion. (Saya lebih suka menggunakan perkhidmatan pengangkutan awam kerana ia dapat mengurangkan kesesakan lalu lintas.)	①	②	③	④	⑤
ATE 4	I prefer to use public transport because it is more environmentally friendly option than driving a personal vehicle. (Saya lebih suka menggunakan pengangkutan awam kerana ia adalah pilihan yang lebih mesra kepada alamsekitar berbanding kepada memandu kenderaan peribadi.)	①	②	③	④	⑤
ATE 5	I would like to travel by public transport without damaging the environment. (Saya ingin melakukan perjalanan dengan pengangkutan awam tanpa menjejaskan alam sekitar.)	①	②	③	④	⑤
ATE 6	I prefer to use public transport because it emits less carbon dioxide (CO2) than a personal car. (Saya lebih suka menggunakan pengangkutan awam kerana ia mengeluarkan kurang karbon dioksida (CO2) berbanding kepada kereta peribadi.)	①	②	③	④	⑤
ATE 7	I choose to use public transport because it is cleaner for the environment. (Saya memilih untuk menggunakan pengangkutan awam kerana ia pilihan yang lebih bersih untuk persekitaran.)	①	②	③	④	⑤

ATE 8	I think my environmental attitude will encourage me to use public transport. (Saya berasa bahawa sikap persekitaran saya akan mendorong saya untuk menggunakan pengangkutan awam.)	①	②	③	④	⑤
Health concern Kebimbangan kesihatan						
AT H1	I use public transport because it reduces traffic crash injuries, disabilities and deaths. (Saya menggunakan pengangkutan awam kerana mengurangkan kecederaan, kecacatan dan kematian akibat kemalangan jalan raya.)	①	②	③	④	⑤
AT H2	I prefer to use public transport because traffic-related air pollution is dangerous to our health. (Saya lebih suka menggunakan pengangkutan awam kerana pencemaran udara yang berkaitan dengan lalu lintas berbahaya bagi kesihatan kita.)	①	②	③	④	⑤
AT H3	Public transport increases physical activities which keep us physically fit and healthy. (Penggunaan pengangkutan awam meningkatkan aktiviti fizikal yang menjadikan kita sihat dan sihat secara fizikal)	①	②	③	④	⑤
AT H4	I prefer to use public transport because it helps to reduce emotional stress. (Saya lebih suka menggunakan pengangkutan awam kerana ia membantu mengurangkan tekanan emosi.)	①	②	③	④	⑤
AT H5	Public transportation helps us to reach the essential goods and services outlets. (Pengangkutan awam memudahkan kami muntuk mempunyai akses kepada kedai barang- barangan dan perkhidmatan-perkhidmatan yang penting.)	①	②	③	④	⑤
AT H6	Public transport provides easy access to healthcare facilities. (Pengangkutan awam menyediakan akses mudah kepada kemudahan penjagaan kesihatan.)	①	②	③	④	⑤

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AT H7	Use of public transport reduces traffic crash injuries, disabilities and deaths. (Penggunaan pengangkutan awam mengurangkan kecederaan, kecacatan dan kematian akibat kemalangan jalan raya.)	①	②	③	④	⑤

SUBJECTIVE NORM

Sr. No	I Believe that	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
SN1	People close to me usually advise me to take city rail transport since it is safer and more convenient. (Orang yang penting bagi saya selalu mendorong saya menggunakan pengangkutan awam kerana ia lebih selamat dan senang.)	①	②	③	④	⑤
SN2	Important people often push me to take city rail transport because it is cheap. (Orang yang penting bagi saya selalu mendorong saya menggunakan pengangkutan awam kerana harganya berpatutan.)	①	②	③	④	⑤
SN3	People who are important to me always use public transport for their daily commuting trips. (Orang yang penting bagi saya selalu menggunakan pengangkutan awam untuk perjalanan harian mereka.)	①	②	③	④	⑤
SN4	My family and friends always take city rail transit to reduce travel costs. (Keluarga dan rakan saya harus selalu menggunakan pengangkutan awam untuk menjimatkan perbelanjaan perjalanan.)	①	②	③	④	⑤
SN5	My friends and family always support me to take city rail transport every day. (Keluarga dan rakan saya akan menyokong keputusan saya menggunakan pengangkutan awam setiap hari.)	①	②	③	④	⑤
SN6	The presence of notable individuals around the passengers or peers suggests adopting city rail transport in the future.	①	②	③	④	⑤

		①	②	③	④	⑤
	(Kewujudan orang penting / rapat di sekitar penumpang / rakan sebaya mencadangkan menggunakan perkhidmatan pengangkutan awam pada masa akan datang.					
Social Concern						
SN7	The use city rail transport should be given priority over driving a personal car in society. (Masyarakat perlu mengutamakan penggunaan perkhidmatan pengangkutan awam berbanding kenderaan persendirian.)	①	②	③	④	⑤
SN8	Using the city rail transport shows my life's philosophy to the community. (Menggunakan perkhidmatan pengangkutan awam menunjukkan prinsip hidup saya dalam sebuah komuniti.)	①	②	③	④	⑤
SN9	I engage in greater social activity by using city rail transit. (Saya menjadi lebih aktif secara sosial dengan menggunakan pengangkutan awam.)	①	②	③	④	⑤
SN10	There is social pressure to use city rail transport. (Terdapat kewujudan tekanan sosial untuk menggunakan pengangkutan awam.)					
SN11	Everyone can afford city rail transportation. (Pengangkutan awam berpatutan untuk semua.)					
PERCEIVED BEHAVIORAL CONTROL						
PBC1	Every time I face difficulty when I use city rail transport. (Saya menghadapi kesukaran setiap kali menggunakan pengangkutan awam.)	①	②	③	④	⑤
PBC2	Regular usage of city rail transport is doable for me. (Bagi saya, menggunakan pengangkutan awam secara berkala adalah mungkin.)	①	②	③	④	⑤
PBC3	I don't feel at ease when I travel with strangers in city rail transport. (Saya tidak selesa ketika dalam perjalanan dengan orang yang saya tidak kenal dengan baik.)	①	②	③	④	⑤
Controllability						
PBC4	I have control over whether I choose to take city rail transport.	①	②	③	④	⑤

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	(Keputusan untuk menggunakan pengangkutan awam berada di bawah kawalan saya.)					
PBC 5	Whether I frequently take city rail transport is entirely up to me. (Sama ada saya menggunakan pengangkutan awam secara berkala atau sepenuhnya bergantung kepada saya.)	①	②	③	④	⑤
Perceived Ease &Obstacles for behavior						
PBC 6	It is very difficult to use city rail transport while traveling with my children. (Ianya sukar untuk menggunakan pengangkutan awam ketika saya bepergian dengan anak-anak saya.)	①	②	③	④	⑤
PBC 7	I find it challenging to use city rail transport when I have bags or other belongings. (Ianya sukar untuk menggunakan pengangkutan awam ketika saya melakukan perjalanan dengan beg atau bagasi.)	①	②	③	④	⑤
PBC 8	My pocket money allows me to use city rail transport. (Pendapatan saya membolehkan saya untuk menggunakan pengangkutan awam ini.)	①	②	③	④	⑤

CUSTOMER SATISFACTION

Sr. No	I believe that	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
CS1	I am satisfied with services and quality of public transport. (Saya berpuas hati dengan perkhidmatan dan kualiti pengangkutan awam)	①	②	③	④	⑤
CS2	Overall, I am satisfied with public transport service. (Secara keseluruhan, saya berpuas hati dengan perkhidmatan pengangkutan awam.)	①	②	③	④	⑤
CS3	The perceived service performance is higher than the expectation. (Prestasi perkhidmatan pengangkutan awam adalah lebih tinggi daripada jangkaan.)	①	②	③	④	⑤
CS4	I am satisfied with the level of services provided by the employee(s) of public transport.	①	②	③	④	⑤

	(Saya berpuas hati dengan tahap perkhidmatan pengangkutan awamyang diberikan oleh pekerja pengangkutan awam.)					
CS5	I am satisfied with the cleanliness of the public transport. (Saya berpuas hati dengan kebersihan pengangkutan awam.)	①	②	③	④	⑤
CS6	I am satisfied with the information system of the public transport. (Saya berpuas hati dengan sistem informasi pengangkutan awam.)	①	②	③	④	⑤
CS7	I am satisfied with the ease of entry and exit for the public transport. (Saya berpuas hati dengan kemudahan masuk dan keluar untuk pengangkutan awam.)	①	②	③	④	⑤
BEHAVIORAL INTENTION						
S. No	Please indicate your intention to use public transport on below given statements. (Sila nyatakan niat anda untuk menggunakan pengangkutan awam pada pernyataan yang diberikan di bawah ini.)	**Strongly Disagree**	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
BI1	I tell others good things about the city rail transport service. (Saya sentiasa bercakap secara positif mengenai perkhidmatan pengangkutan awam kepada orang lain.)	①	②	③	④	⑤
BI2	If someone asks my opinion, I suggest using the city rail transport. (Saya mengesyorkan penggunaan perkhidmatan pengangkutan awam kepada sesiapa yang meminta nasihat saya.)	①	②	③	④	⑤
BI3	I recommend my friends to use the city rail transit for business purpose. (Saya mendorong rakan dan saudara untuk berniaga dengan pengangkutan awam.)	①	②	③	④	⑤
BI4	In city, I preferred to use rail transport. (Saya menganggap perkhidmatan pengangkutan awam sebagai pilihan pertama saya untuk tujuan perjalanan.)	①	②	③	④	⑤

BI5	In the next years, I'll use the city rail transit more frequently for my business purpose. (Saya akan melakukan lebih banyak perniagaan dengan perkhidmatan pengangkutan awam dalam beberapa tahun yang akan datang.)	①	②	③	④	⑤
BI6	In the future, I want to commute by city rail transport. (Saya berhasrat untuk menggunakan pengangkutan awam pada masa akan datang.)	①	②	③	④	⑤
BI7	I consider city rail transport reliable and pleasurable. (Pengangkutan awam senang digunakan dan boleh dipercayai.)	①	②	③	④	⑤
PUBLIC TRANSPORT USAGE						
USE1	I travel on city rail transport for recreational activities. (Saya melakukan perjalanan dengan menggunakan pengangkutan awam kerana dapat bersantai.)	①	②	③	④	⑤
USE2	I use city rail transport services to stay safe and secure. (Saya melakukan perjalanan dengan menggunakan pengangkutan awam kerana saya merasa lebih selamat daripada berlakunya kemalangan.)	①	②	③	④	⑤
USE3	City rail transport is economical for me to use. (Saya melakukan perjalanan dengan menggunakan pengangkutan awam kerana ia amat jimat bagi saya.)	①	②	③	④	⑤
USE4	I daily prefer to use rail transport due to traffic congestion. (Saya melakukan perjalanan dengan menggunakan pengangkutan awam untuk mengelakkan kesesakan lalu lintas.)	①	②	③	④	⑤
USE5	Increase in rail transport usage can increase public health. (Saya melakukan perjalanan dengan menggunakan pengangkutan awam kerana ia lebih baik untuk kesihatan saya.)	①	②	③	④	⑤
USE6	Usage of rail transport in cities is environment friendly strategy. (Saya melakukan perjalanan dengan pengangkutan awam tanpa merosakkan alam sekitar.)	①	②	③	④	⑤

Once again, we are extremely grateful for your valuable time, your honest information, and your thoughtful suggestions,

(Sekali lagi, kamiingin mengucapkan terima kasih kerana sanggup memberikan masa berharga anda, maklumat jujur anda, dan cadangan bijak anda,)

Thank you for taking the time to complete this survey!

(Terima kasih kerana meluangkan masa untuk menjawab tinjauan ini!)

The End.