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Unveiling passenger satisfaction in rail transit through a consumption values perspective

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ABSTRACT

This study aims to investigate passenger satisfaction in rail transit systems within emerging economies, utilizing a theory of consumption values. It seeks to understand how various values, such as functional, social, emotional, conditional, and epistemic, influence passenger perceptions and experiences providing insights for enhancing rail transit services. This study employs a self-administered questionnaire distributed to 418 passenger rail transit users in Kuala Lumpur city centre over a three-month period. Smart-PLS software was utilized to examine relationships between consumption values and passenger satisfaction. The study findings reveal strong support for functional and social values in influencing passenger satisfaction within rail transit systems of emerging economies. Similarly, emotional and conditional values also play a significant role. Surprisingly, epistemic value does not exhibit substantial influence, highlighting potential disparities in passenger perceptions and priorities. Rail transit operators and regulators should focus on these facets of consumption values in order to maximize passenger satisfaction in rail transit. Conditional aspects such as safety, punctuality, frequency, and accessibility should also be given priority. What is new to the existing literature is that epistemic value was confirmed as the trivial predictor of passengers' satisfaction in rail transit. Hence, clear signage, informative announcements, or accessible digital resources provided by the transit authority will enhance passengers' knowledge and overall experience. Being among a few studies in measuring rail transit satisfaction using the consumption values approach, particularly in the context of Asia-Pacific emerging economies, the empirical results attained broadened the growing literature pertinent to consumer behaviour, consumption values, and sustainable transportation. The findings offer new insights into enhancing rail transit services, emphasizing the need for clear communication and informative resources to boost passenger satisfaction.

1. Introduction

Public transportation plays a vital role in modern urban infrastructure, providing an efficient and affordable alternative to private vehicles. As cities grow and urbanization intensifies, the demand for reliable, sustainable, and inclusive public transit systems has become more critical than ever. Public transit, including buses, trams, subways, and rail systems, offers numerous benefits, such as

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reducing traffic congestion, lowering greenhouse gas emissions, and promoting equitable access to essential services (Ghadiri and Newell, 2024). By facilitating mass transportation, public transit also contributes to broader social and economic goals, such as enhancing mobility for low-income populations, reducing environmental degradation, and supporting economic growth (El Ouadi et al., 2021).

Among the various modes of public transportation, rail transit stands out as a particularly effective solution for large metropolitan areas. Rail systems, which include urban metro lines, light rail, and commuter trains, are known for their capacity to move large numbers of passengers efficiently across urban regions. Metro systems, in particular, have become a cornerstone of public transit in cities worldwide due to their speed, reliability, and ability to operate free from road traffic (Diab and Shalaby, 2020). These systems are designed to handle high volumes of passengers, especially during peak travel times, making them indispensable for urban commuters. Notable examples of extensive and well-established metro systems include the New York City Subway, London Underground, Tokyo Metro, and Paris Métro. These networks not only facilitate mobility but also help shape the economic and social dynamics of the cities they serve (Lu et al., 2018).

Globally, the ridership of rail transit systems is substantial, with billions of passenger trips taken annually across various cities. This emphasizes the importance of rail transit as a key element of urban transportation infrastructure. For instance, cities like Tokyo, Beijing, and Moscow feature some of the highest annual ridership figures, reflecting the pivotal role of metro systems in supporting urban mobility. The capacity of rail systems to operate efficiently in dense urban environments makes them an essential component of city planning, helping to reduce reliance on private vehicles and mitigate traffic congestion (Li et al., 2024). In addition, rail transit's ability to provide both intra-city and inter-city services enables it to cater to diverse transportation needs, making it a versatile option in regions where road networks are often congested or insufficient (Chen et al., 2024).

In the context of Malaysia, the rail transit system has been instrumental in transforming the country's urban mobility landscape. The Malaysian rail network encompasses several key systems, including the Light Rail Transit (LRT), Mass Rapid Transit (MRT), KTM Komuter, and the Express Rail Link (ERL), all of which play a critical role in facilitating the movement of people within and between cities. These systems are integral to Malaysia's broader efforts to promote sustainable urban development and reduce traffic congestion in major urban centres like Kuala Lumpur (Masirin et al., 2017). The Rapid KL network, comprising both the LRT and MRT, is particularly significant in the Klang Valley, serving millions of passengers and connecting key areas of the city with suburban regions. Similarly, the KTM Komuter system provides essential commuter rail services, linking Kuala Lumpur with surrounding areas and contributing to regional connectivity.

Another critical component of Malaysia's rail infrastructure is the ERL, which operates the KLIA Ekspres and KLIA Transit services, connecting Kuala Lumpur Sentral Station with Kuala Lumpur International Airport (KLIA). These services offer a convenient and efficient transportation option for air travellers, further enhancing Malaysia's overall transportation ecosystem. In addition to these systems, the Monorail in Kuala Lumpur provides an elevated rail transit option, catering to both commuters and tourists by serving key commercial and tourist areas within the city centre, including Bukit Bintang and KL Sentral (Kalhoro, 2023). Collectively, these rail systems form a comprehensive network that underpins Malaysia's urban mobility and supports the country's economic growth.

While Malaysia's rail transit system offers numerous advantages, several challenges persist that impact its efficiency and overall effectiveness. One of the most pressing issues is overcrowding, particularly during peak travel hours. Rapid urbanization and population growth in cities like Kuala Lumpur have placed significant pressure on the rail network, leading to overcrowded trains and congested stations. This not only affects passenger comfort but also raises safety concerns, as overcrowded conditions increase the risk of accidents and incidents (Hizam et al., 2021). Addressing this issue requires a combination of infrastructure expansion, service frequency improvements, and better crowd management strategies to ensure that the rail system can accommodate growing demand without compromising safety and comfort.

Another major challenge facing Malaysia's rail transit system is the lack of seamless integration between different modes of transportation. While efforts have been made to improve connectivity, such as the integration of fare systems across different operators, passengers often face difficulties when transferring between different rail lines or between rail and other modes of transport, such as buses or taxis. These challenges highlight the need for more cohesive and coordinated transportation planning to enhance the overall efficiency of the transit network (Yusoff et al., 2021). Additionally, reliability and punctuality remain areas of concern, with service disruptions, delays, and breakdowns frequently affecting the system's performance. These issues can lead to passenger dissatisfaction and inconvenience, undermining the public's confidence in the rail network (Hamzah et al., 2023).

Safety and security are also critical issues that need to be addressed within Malaysia's rail transit system. Incidents of crime, vandalism, and other security threats can create an unsafe environment for passengers and deter them from using public transit. Enhancing security measures, such as increasing surveillance, improving lighting, and deploying more security personnel, is essential to creating a safer and more welcoming transit environment (Hamzah et al., 2023). Accessibility is another challenge, particularly for passengers with disabilities or special needs. While progress has been made in improving accessibility within stations and trains, there are still gaps in infrastructure and services that need to be addressed to ensure that the rail system is truly inclusive and accessible to all (Azmi et al., 2023).

Ultimately, fare affordability is a significant concern for many passengers, particularly those from low-income households. While Malaysia's rail fares are generally considered reasonable compared to other modes of transportation, they can still represent a financial burden for economically disadvantaged groups who rely on public transit for their daily commutes (Hamzah et al., 2023). Ensuring that rail transit remains affordable and accessible to all segments of the population is crucial to promoting equity and social inclusion within the transportation system.

While Malaysia's rail transit system has made significant improvements in enhancing urban mobility and supporting economic development, there are still several challenges that need to be addressed to improve passenger satisfaction. By focusing on issues

such as overcrowding, integration, reliability, safety, accessibility, and affordability, Malaysia can continue to build a more efficient, inclusive, and sustainable rail transit network that meets the needs of its growing population. Through surveys targeting passengers' experiences, it is hoped that this study will provide a clear understanding of addressing these issues. This focused approach ensures that the study is well-structured and capable of addressing the identified issues comprehensively. Hence, this study uniquely applies the theory of consumption values to investigate passenger satisfaction in rail transit systems within the context of emerging economies, specifically focusing on Malaysia's rail transit system. While previous studies have extensively explored ecological consumer behaviour and the impact of consumption values on purchasing intentions (Chakraborty and Paul, 2023; Talwar et al., 2020), their application to public transit systems remains under-researched.

This study addresses this gap by examining how various consumption values (i.e., functional value, social value, emotional value, conditional value, and epistemic value) affect passenger satisfaction in rail transit. The novelty of this study lies in its dual focus; first, it extends the theory of consumption values to a new domain: public transit systems, which, contribute to ecological sustainability by reducing private vehicle usage and promoting environmental conservation. Second, it provides empirical insights into the specific challenges and satisfaction determinants in the rail transit context of an emerging economy, offering valuable implications for improving transit services and policies.

Hence, drawing on the theory of consumption values (Sheth et al., 1991), this study attempts to investigate passenger satisfaction in a rail transit system. The theory of consumption values was applied within the context of ecological consumer behaviour to predict the consumers' purchase intention or consumption behaviour towards different types of products (Zailani et al., 2019). These scholars stressed that the utilization of this theory should be expanded to a wider context of the investigation. Furthermore, the impact of consumption values on passenger satisfaction in a rail transit system, particularly in the emerging economies context, comes across as scant throughout the literature stream. Rail transit leads to lesser usage of private vehicles, subsequently reduces air pollution and transforming cities to become more environmentally sustainable (Abdallah, 2023). Considering that both green products and public transit have the similar ecological function, hence the use of the theory of consumption value as the underpinning theory is deemed necessary.

By selecting Kuala Lumpur as a case study, this study also sheds light on the unique dynamics of an integrated and multifaceted rail system in a rapidly urbanizing and growing population. The study's findings are expected to offer practical recommendations for enhancing passenger satisfaction, addressing issues like overcrowding, integration, reliability, safety, accessibility, and fare affordability. Ultimately, this study aims to bridge the theoretical and practical understanding of how consumption values drive satisfaction in rail transit systems, providing a comprehensive framework that can be applied to other emerging economies. It seeks to contribute to the literature on sustainable urban mobility and inform policymakers and transit authorities about the critical factors influencing passenger experiences and satisfaction.

The subsequent sections of this paper are structured as follows; a review of the literature pertaining to the theory of consumption values is reviewed, followed by formulation of hypotheses. Next, the methodology employed in this study is described in Section 3. The next section deliberates on the results followed by the implications and recommendations for future studies before concluding with a final remark.

2. Literature review and hypotheses development

2.1. Rail transit system and passenger satisfaction

Rail transit systems play a crucial role in providing efficient and sustainable transportation solutions worldwide, facilitating the movement of people and goods across urban, suburban, and intercity regions. From traditional heavy rail systems to modern light rail and high-speed rail networks, the global rail transit landscape encompasses diverse technologies, infrastructure, and operating models (Djordjević et al., 2023). Extensive high-speed rail networks connecting major cities have revolutionized long-distance travel, offering fast and efficient alternatives to air and road transport. Additionally, comprehensive metro systems in major cities provide vital urban transit services, reducing congestion and pollution while enhancing mobility for residents and visitors (Umrigar and Pitroda, 2023).

Huang et al. (2024) emphasized that, due to rapid urbanization and population growth, significant investments in rail transit infrastructure have boasted extensive high-speed rail networks connecting major cities in the world, providing essential urban transit services for millions of passengers daily, enhancing intercity connectivity and stimulating economic development. Rail transit systems are prevalent in major cities serving as critical routes for urban mobility. Additionally, commuter rail networks provide essential regional connections, linking suburban areas with city centres and supporting economic growth. Hence, rail transit systems continue to evolve and expand globally, driven by the need for sustainable, efficient, and reliable transportation solutions (Lu et al., 2018). With ongoing investments in infrastructure, technology, and operational excellence, rail transit will remain a vital component of the global transportation landscape, contributing to economic development, environmental sustainability, and enhanced mobility for communities worldwide (Joseph and Elias, 2024).

As rail transit systems play a crucial role in urban transportation, offering efficient, sustainable, and reliable travel options for millions of passengers worldwide is vital. The satisfaction of passengers using these systems is paramount for ensuring their continued usage and success. Passenger satisfaction in rail transit is influenced by various factors, including reliability, comfort, safety, accessibility, affordability, communication, and environmental sustainability (Jamei et al., 2022). Reliability and punctuality are fundamental, as passengers expect trains to adhere to schedules and minimize delays. Moreover, comfortable facilities, such as clean trains and stations with adequate seating and amenities, enhance the overall travel experience (Song et al., 2024). Passengers also demand a high level of safety and security measures, including surveillance cameras and emergency response protocols. Additionally,

accessibility features, such as ramps and elevators, ensure that all passengers, including those with disabilities, can navigate stations and trains comfortably.

Likewise, Vickerman (2024) highlighted that transparent fare structures and convenient payment options contribute to affordability and accessibility. Passengers are also looking for an effective communication channel, such as digital displays and announcements, to provide passengers with timely information about schedules and service disruptions. Furthermore, investments in environmental sustainability, such as energy-efficient technologies and reduced emissions, align rail transit systems with passengers' values and expectations By prioritizing these aspects and continuously improving service quality, rail transit systems can enhance passenger satisfaction, foster loyalty, and ultimately increase ridership. Through customer feedback mechanisms and data-driven decision-making, operators can identify areas for improvement and implement measures to address passenger needs and preferences. Ultimately, a satisfied passenger base is crucial for the success and sustainability of rail transit systems, contributing to more efficient and environmentally friendly urban mobility solutions (Yanik et al., 2017).

2.2. Public transportation systems in emerging economies

Public transportation systems in emerging economies play a crucial role in urban mobility, providing essential services to large populations. Passenger satisfaction with these systems can be effectively analyzed through the consumer value theory. Applying this theory helps in understanding and enhancing passenger satisfaction in countries like India, Brazil, and Malaysia. Applying consumer value theory to public transportation systems in emerging economies reveals the complex nature of passenger satisfaction (Mogaji and Nguyen, 2021). By addressing it, public transit authorities can create a more user-centric approach, improving service quality and fostering greater acceptance and usage among passengers. This holistic approach ultimately contributes to sustainable urban development and improved quality of life in these emerging economies (Mugion et al., 2018).

Consumer value theory defines functional value as the efficiency, reliability, and convenience of public transit services. In India, for example, the Delhi Metro's punctuality, extensive network, and affordability significantly contribute to high passenger satisfaction (Kar et al., 2024). Similarly, in Brazil, the São Paulo Metro is valued for its speed and coverage, which are crucial in reducing traffic congestion and travel time in a busy city (Fontoura et al., 2019). Social value involves the perceived social benefits of using public transit, such as environmental consciousness and social responsibility. In Malaysia, the government's investment in the MRT system is seen as a step toward reducing carbon emissions and promoting sustainable transportation (Kalhoro et al., 2021). Passengers who feel they are contributing to societal well-being by using eco-friendly transit options report higher satisfaction levels.

On the other hand, emotional value is tied to the comfort, safety, and overall experience of using public transit. The Kuala Lumpur LRT in Malaysia provides air-conditioned coaches, clean stations, and a safe travel environment, enhancing passenger satisfaction (Kalhoro, 2023). Similarly, the Rio de Janeiro Metro in Brazil focuses on cleanliness and safety, making the commuting experience more pleasant and emotionally satisfying (Fontoura et al., 2019). Moving on, the conditional value refers to the benefits derived from the context-specific features of public transit, such as availability during peak hours or special services. In India, the Mumbai local trains' frequent services during rush hours cater to the high commuter demand, addressing conditional value by meeting specific passenger needs (Kar et al., 2024). While epistemic value involves the novelty and knowledge passengers gain from using the transportation system. Clear signage, real-time updates, and informative announcements are crucial. For instance, the integration of digital information systems in MRT Malaysia provides passengers with real-time updates, enhancing their knowledge and overall satisfaction (Kalhoro et al., 2021).

2.3. Theory of consumption values

The theory of consumption values emphasizes the consumption values that explain the reasons consumers purchase or use a specific product, service or brand. The motive behind one's purchase of a product or service can be explained by five different benefits derived from its consumption namely functional, social, emotional, conditional, and epistemic value. Collectively, these values provide distinctive contributions in a variety of decision-making situations encountered by the consumer (Sheth et al., 1991). In the field of consumer behaviour, the concept of consumption values applies across different social segments and leads consumers to engage in specific consumption-related actions (Lee and Lee, 2024). A review of the extant literature reveals that this theory has not been widely adopted in examining the consumer's behaviour in using rail transit as compared to other models specifically, the theory of planned behaviour (Saleh et al., 2023), the service quality framework (Isikli et al., 2017), the theory of random utility (Muro-Rodr'iguez et al., 2017), and the expectation-confirmation theory (Fu et al., 2018).

The rationale of this study in adopting the theory of consumption values as its theoretical foundation is drawn on the assumption that consumers perform voluntary choices that are reflected in different facets of values when deciding on whether to utilize the rail transit service (Sheth et al., 1991). Besides, numerous studies that incorporated the theory are concentrated on ecological and pro-environmental behaviours. Since reducing private vehicle use is widely viewed as an eco-friendly behaviour, the theory's application in assessing passenger satisfaction in rail transit is reasonably warranted. These values serve as the primary motivators for passengers to feel satisfied with the rail transit service.

2.4. Functional value

Functional value is defined as the perceived usefulness derived from an alternative's ability to fulfil functional or utilitarian needs and was believed to stem from the prominent characteristics of the product (Gupta et al., 2024). In this study context, functional value

relates to the provision of rail transit quality by the operators to the passengers. Passengers are satisfied with the performance of the rail transit system in terms of its punctuality, frequency, and ride comfort. Besides, a transport system that is fast-moving, convenient, and affordable has better potential to increase its ridership (Wahab et al., 2018). Hence, a rail transit system that offers a greater choice of destinations and time savings is seen as an attractive, functional proposition for passengers to opt for public transportation rather than private vehicles. Additionally, attributes like onboard cleanliness, comfort, safety, punctuality, and frequency of service represent the functionality, and utilitarian performance of the rail transit system, and contribute to influencing passengers' satisfaction. Therefore, meeting functional needs is key to ensuring the success and effectiveness of rail transit services (Van Lierop et al., 2018). In light of the discussion described above, this study derives the following hypotheses:

H1. Functional value positively affects passengers' satisfaction in rail transit.

2.5. Social value

Social value means the perceived value gained from an alternative's connection with particular social circles, measured by its association with diverse reference groups (de la Cruz Jara and Spanjol, 2024). The social value within the rail transit system pertains to the significance passengers attach to the social aspects of their travel experience. It encompasses factors such as the opportunity for social interaction, a sense of community, and perceptions of safety and belongingness. Passengers often value the chance to connect with friends, family, or colleagues during their journey, fostering a sense of friendship and social cohesion (Habich-Sobiegalla et al., 2018). Additionally, the presence of diverse individuals from various backgrounds contributes to a vibrant and inclusive atmosphere, enriching the overall travel experience. Moreover, perceptions of safety and security within the transit environment play a crucial role in enhancing social value, as passengers feel more comfortable and confident interacting with others. Hence, ensuring a supportive and inclusive environment, along with promoting positive social interactions, is essential for maximizing social value within the rail transit system, ultimately leading to higher levels of passenger satisfaction and loyalty (Fu et al., 2018). Based on the statements above, it is posited that:

H2. Social value positively affects passengers' satisfaction in rail transit.

2.6. Emotional value

Emotional value refers to the perceived benefit obtained from an alternative's ability to evoke emotions or affective responses in individuals (Aravind et al., 2024). Emotional values can influence consumers' choice behaviour as they are concerned about the environment. Scholars like Hamzah et al. (2023) and Abdallah (2023) asserted that a person who cares about environmental issues is more likely to use public transit and is inclined to accept sustainable transport as these measures can help them to behave more responsibly in preserving the environment. Ensuring that customers are obligated to choose public transit over other modes of transportation. Choosing rail transit over other transportation options evokes feelings of pride, responsibility, and fulfilment, knowing they are contributing to reducing carbon emissions and alleviating traffic congestion. Moreover, the scenic views, smooth rides, and overall ambience of rail travel often prompt a sense of relaxation, tranquillity, and enjoyment, providing passengers with relief from the stresses of daily life. These emotional experiences contribute to a more positive perception of sustainable transportation, encouraging individuals to embrace and advocate for rail transit as a preferred mode of travel (Yusoff et al., 2021). In light of such understanding, the subsequent hypothesis is put forward:

H3. Emotional value positively affects passengers' satisfaction in rail transit.

2.7. Conditional value

Conditional value is the perceived benefit obtained from an alternative based on the particular circumstances or conditions confronting the decision-maker (Cheng et al., 2024; Sheth et al., 1991). Rail transit passengers are very much concerned about their safety and security onboard and at rail transit stations. Indeed, safety has a positive relationship with the choice behaviour on using rail transit. For instance, during bad weather or heavy traffic congestion, passengers may perceive greater conditional value in using rail transit due to its reliability, efficiency, and ability to avoid road-related delays (Devries et al., 2018). Similarly, individuals with limited mobility or those seeking to reduce their environmental impact may place a higher value on rail transit's accessibility and sustainability compared to other modes of transportation. Furthermore, factors such as the availability of parking, proximity to transit stations, and ease of transferring between different modes of transit can also influence passengers' perceptions of conditional value (Van Lierop et al., 2018). By addressing these specific circumstances and conditions, rail transit systems can better meet the diverse needs and preferences of passengers, ultimately enhancing their overall satisfaction and loyalty. Consequently, the following hypothesis is postulated:

H4. Conditional value positively affects passengers' satisfaction in rail transit.

2.8. Epistemic value

Epistemic value refers to the perceived benefit obtained from an alternative's ability to stimulate curiosity, offer novelty, or fulfil a desire for knowledge (Le, 2024; Sheth et al., 1991). Knowledge is recognized as a factor that influences consumers' choices decision process. Passengers with high epistemic value tend to have more knowledge about environmental concerns and have a high consumption of sustainable products and services such as using rail transit (Rahman, 2018). It involves the perceived benefits

passengers gain from the system's ability to educate, inform, and raise awareness about environmental issues and sustainable practices. This value may manifest through educational campaigns, informational signage, or interactive displays at transit stations, stimulating curiosity and fostering a deeper understanding of the environmental impact of transportation choices. By providing passengers with opportunities to learn about sustainability and encouraging them to make informed decisions, rail transit systems can contribute to a broader cultural shift towards more environmentally conscious behaviours and attitudes. A study by Shen et al. (2016) found a positive link between passenger's curiosity and desire for knowledge, and their choice behaviour and satisfaction in rail transit. Hence, this study posits the following hypothesis:

H5. Epistemic value positively affects passengers' satisfaction in rail transit.

3. Methodology

3.1. Participants and survey procedure

The rail transit passengers in the Kuala Lumpur city centre were selected to examine the research model and hypotheses. Kuala Lumpur was chosen as a case study in the context of emerging economies in the Asia-Pacific region due to its diverse and integrated rail transit system, which includes LRT, MRT, KTM Komuter, ERL, and Monorail networks. This comprehensive infrastructure not only supports efficient urban mobility but also reflects Malaysia's commitment to sustainable development and economic growth (Yusoff et al., 2021). Studying passenger satisfaction within this system provides insights into how such infrastructure enhances connectivity, promotes economic activities, and improves quality of life, crucial for informing similar developments in other emerging economies across the region. Moreover, Kuala Lumpur, with a population of over 1.8 million, showcases a diverse and dense urban environment (Hamzah et al., 2023). Hence, studying passenger satisfaction in its rail transit system provides valuable insights into meeting the transportation needs of a rapidly growing and urbanizing population, essential for sustainable development in emerging Asia-Pacific economies.

The respondents were approached at key stations within the transit lines using convenience sampling. This method leverages the high traffic of passengers at these locations to efficiently gather data from a diverse group of rail transit users within a specified timeframe. Respondents were offered RM20 (roughly USD4.50) transit fare vouchers as a reward to encourage higher participation and engagement from rail transit users. This amount covers a substantial portion of their fare, making it a valuable incentive. For optimal data collection, this study survey was conducted during peak commuting hours, which are from 6am to 9am and 4pm to 7pm, when passenger flow is highest, particularly on weekdays, Monday to Friday. The data collection was focused on key stations with high passenger volumes and diverse demographics, such as major interchange points or central transit hubs. This is to ensure a representative sample and maximize respondent reach.

The sample obtained comprises 818 respondents. Data collection took place between September to December of 2023. Out of the 418 passengers surveyed, only 260 provided legitimate responses, resulting in a response rate of 62 %. The responses were vetted by cross-referencing with criteria such as completeness, consistency, and relevance to the survey questions. Incorrect or incomplete answers were identified and excluded during data cleaning. Standards applied included logical coherence, adherence to question context, and absence of contradictory information to ensure the legitimacy and reliability of responses. Based on the research conducted by (Faul et al., 2009), it is suggested to have a minimum sample size of 92 for a thorough analysis utilising G*power 3.1 statistical analysis. The sample size was determined using a power of 0.80, a medium effect size of 0.15, and an α error of 0.05, as Cohen recommended. This research sample size exceeds the required minimum. Furthermore, this sample size is adequate, as noted by (Hair Jr et al., 2021). Hence, the research adheres to past conventions by employing a sample size of 260.

The Smart-PLS technique validated the causal link between several latent components outlined in the framework due to the superiority features it upholds. Moreover, Smart-PLS is suitable for analyzing complex relationships and handling data with non-normal distributions, which is common in social science research. The Smart-PLS approach is effective for exploring causal relationships in exploratory research, making it ideal for assessing the impact of consumption values on passenger satisfaction. Additionally, it provides robust results even with smaller sample sizes and is user-friendly, facilitating detailed examination of structural relationships in the context of emerging economies (Hair Jr et al., 2021). This study followed the two-stage process made up of the assessment of the measurement model and the assessment of the structural model as recommended by Anderson and Gerbing (1988).

3.2. Questionnaire development and instrument

After a thorough assessment of the literature, the measurements for each construct were created and modified by preceding scholars (Lai and Chen, 2011; Suki, 2016). The measures that signify factors affecting passengers' satisfaction in rail transit were grounded by the theory of consumption values literature. In order to guarantee the precision and suitability of the instruments, content validation was conducted. Two experts were selected to evaluate the questionnaire's instruments. One of the experts has over 30 years of industrial expertise in the transport and logistics field and is a director affiliated with a multinational logistics company. The other expert is a professor in transportation planning. Both experts' input was incorporated into the final questionnaire by thoroughly reviewing their feedback and suggestions. The industrial expert's practical insights ensured relevance and applicability, while the professor's academic expertise refined the theoretical and methodological aspects. Their combined recommendations were integrated to enhance the questionnaire's clarity, validity, and comprehensiveness. The measures utilised a five-point Likert scale, with responses ranging from 1 (strongly disagree) to 5 (strongly agree). A five-point Likert scale was chosen for its simplicity and ease of understanding, facilitating higher response rates and reliability. It balances granularity and respondent burden, making it effective

Table 1
Respondents' socio-demographic profile.

Category	$n = 260$	%
Gender		
Male	90	34.6
Female	170	65.4
Age		
<18 years old	18	6.9
18–35 years old	148	56.9
35–50 years old	90	34.6
>51 years old	4	1.5
Marital Status		
Single	70	58.3
Married	50	41.7
Occupation		
Government	31	25.8
Private	48	40.0
Others	41	34.2
Income per month		
Less than RM1,500	69	26.5
RM1,501–RM3,000	134	51.5
RM3,001–RM4,500	31	11.9
More than RM4,501	26	10.0
Frequency of using rail transit		
1 time per week	20	7.7
2–3 times per week	150	57.7
4–5 times per week	59	22.7
>5 times per week	31	11.9

for capturing nuanced opinions without overwhelming participants, unlike seven- or ten-point scales, which can be more complex and time-consuming (Alabi and Jelili, 2023).

4. Results

4.1. Socio-demographics profile of respondents

Of the 260 respondents, 65.4 % of respondents were female, and 34.6 % were male. Table 1 indicates that more than half of the respondents (56.9 %) were aged 18 to 35 years old. Passengers who were <18 years old (6.9 %) and >51 years old (1.5 %) formed the minorities in this study. In terms of salary, 78.1 % had a monthly income of below RM3,000 (roughly USD660), while the rest made more than that amount. With Malaysia's median monthly salary at RM2,900, most respondents earn at or below the median, indicating modest economic status. This economic reality likely increases reliance on public transportation, as it is a more affordable option compared to private vehicle ownership, emphasizing the importance of efficient and accessible public transit systems for lower-income populations. In terms of the frequency of using rail transit, 57.7 % used it two to three times per week, 22.7 % used it four to five times per week, and 11.9 % used it more than five times per week. These findings suggest a diverse demographic profile with a significant portion of working individuals using rail transit regularly, indicating a potential demand for rail transit among the surveyed population.

4.2. Measurement model

In the measurement model, several analyses were verified prior to furnishing the path estimates of the hypothesized relationships of the proposed model, namely reliability analysis, convergent validity, and discriminant validity of the construct measures. As shown in Table 2, the readings of Cronbach's alpha and the composite reliability surpass the threshold of 0.70, thus establishing the internal consistency of all constructs (Hair Jr et al., 2021). Additionally, all measurements had item loadings greater than 0.60. Prior to that, three items were removed due to low loadings i.e. "*The public transport is value for money*" (FV1), "*I learned so much about the rail transit from my friends and family*" (SV1), and "*I will choose to use rail transit when there is a good safety precaution while taking rail transit*" (CV3). Besides, the average variance extracted (AVE) values were beyond 0.50. Both results confirmed the convergent validity of the construct measures used in the present study (Bagozzi et al., 1991). This robust validation process implies a solid foundation for understanding and predicting rail transit demand, enhancing the credibility of the study's conclusions.

4.3. Discriminant validity and common method bias

Discriminant validity was also checked to ensure that the square root of AVE exceeds the inter-construct correlation, and the heterotrait-monotrait (HTMT) ratios are <0.85. Table 3 details that correlation coefficients vary between 0.256 and 0.643, and the

Table 2
Factor loadings, CR and AVE.

Items	Loadings	CR	AVE
Functional Value (FV)		0.775	0.536
"The rail transit is performing consistently"	0.654		
"The rail transit is s always on schedule"	0.742		
"The rail transit has an acceptable standard of quality"	0.793		
Social Value (SV)		0.747	0.500
"I will follow the advice of my family pertaining to rail transit"	0.810		
"My friends recommend me to use rail transit"	0.664		
"Reliable information or news from social media will motivate "me to use the rail transit"	0.633		
Emotional Value (EV)		0.790	0.556
"I like to take rail transit because I have a good experience with it"	0.732		
"I like the feeling of taking rail transit"	0.763		
"I am using rail transit because I am aware of environmental issues"	0.741		
Conditional Value (CV)		0.740	0.588
"I will choose to use rail transit when there is a subsidy by the government for the rail transit"	0.720		
"I will choose to use rail transit when there is a promotion of rail transit"	0.811		
Epistemic Value (EPV)		0.775	0.536
"I want to know the development of rail transit"	0.753		
"I want to gain different experiences in travelling"	0.767		
"I am curious about the rail transit operation"	0.673		
Satisfaction (SATIS)		0.898	0.598
"I am satisfied with the rail transit's ease of payment"	0.711		
"I am satisfied with the rail transit's network coverage"	0.666		
"I am satisfied with the rail transit's cost of travel"	0.801		
"I am satisfied with the rail transit's staff behaviour"	0.856		
"I am satisfied with the rail transit's journey time"	0.726		
"I am satisfied with the rail transit's waiting time"	0.858		

Table 3
Discriminant validity.

Variables	FV	SV	EV	CV	EPV	SATIS
FV	(0.732)					
SV	0.522	(0.707)				
EV	0.270	0.416	(0.746)			
CV	0.474	0.385	0.323	(0.767)		
EPV	0.511	0.450	0.256	0.370	(0.732)	
SATIS	0.643	0.569	0.417	0.472	0.447	(0.773)

square root of AVE topped the inter-construct correlation. These results infer that discriminant validity was established (Henseler et al., 2015). The subsequent test of measuring the HTMT ratio produced results below the cut-off value of 0.85, indicating the existence of discriminant validity (Hair Jr et al., 2021). It is confirmed that the measurement model accurately distinguishes between different constructs, enhancing the reliability of the study's findings. This instils confidence in the identified relationships between consumption values and passenger satisfaction within the rail transit context. Stakeholders can utilize these insights to better understand passenger preferences and tailor services to meet their needs, ultimately boosting rail transit demand.

As the single-respondent nature of the survey was used in this study, further statistical verification was measured in terms of common method bias via two statistical tests. A Harman's single-factor test was executed through exploratory factor analysis on all measurement items, with the emergence of a single factor being taken as evidence of common method bias. Five factors emerged, with the largest factor accounting for 33 % of the total variance. Subsequently, the correlation matrix was assessed to observe any potential signs of common method bias (Bagozzi et al., 1991). Based on this evaluation, the correlations between the constructs were not too large (correlation coefficients ranged from 0.32 to 0.64). Furthermore, a full collinearity test was conducted where the obtained VIF values fell below the 3.3 threshold (range from 1.259 to 1.726). Hence, common method bias was not a severe concern in the present study (Kock, 2017).

4.5. Hypotheses testing

A structural model was executed to evaluate the proposed hypotheses of the conceptual model by checking the standardized beta coefficients and *t*-statistics of all paths. The result of PLS-SEM in Table 4 indicates that among the five relationships tested, four paths were statistically significant at a 5 % level of significance. Functional value had a significantly positive impact on passengers' satisfaction in rail transit ($\beta_1 = 0.395$, *t*-value = 7.431, $p < 0.05$). In consequence, H1 was supported. Likewise, H2 was also verified as the linkages between social value, and passengers' satisfaction in rail transit was statistically significant ($\beta_2 = 0.220$, *t*-value = 3.944, $p < 0.05$). Likewise, emotional value had a positive impact on passengers' satisfaction in rail transit as the connection was significant at $p < 0.05$ with $\beta_3 = 0.126$, and *t*-value = 2.373, thus sustaining H3.

Table 4
Hypotheses results.

Hypo.	Relationship	β	SE	t-value	f^2	Results
H1	FV → SATIS	0.395	0.053	7.431	0.193	Supported
H2	SV → SATIS	0.220	0.056	3.944	0.063	Supported
H3	EV → SATIS	0.126	0.053	2.373	0.024	Supported
H4	CV → SATIS	0.164	0.037	4.430	0.045	Supported
H5	EPV → SATIS	0.058	0.049	1.178	0.005	Not supported

Notes: $^{*}p < 0.05$; $R^2 = 0.533$.

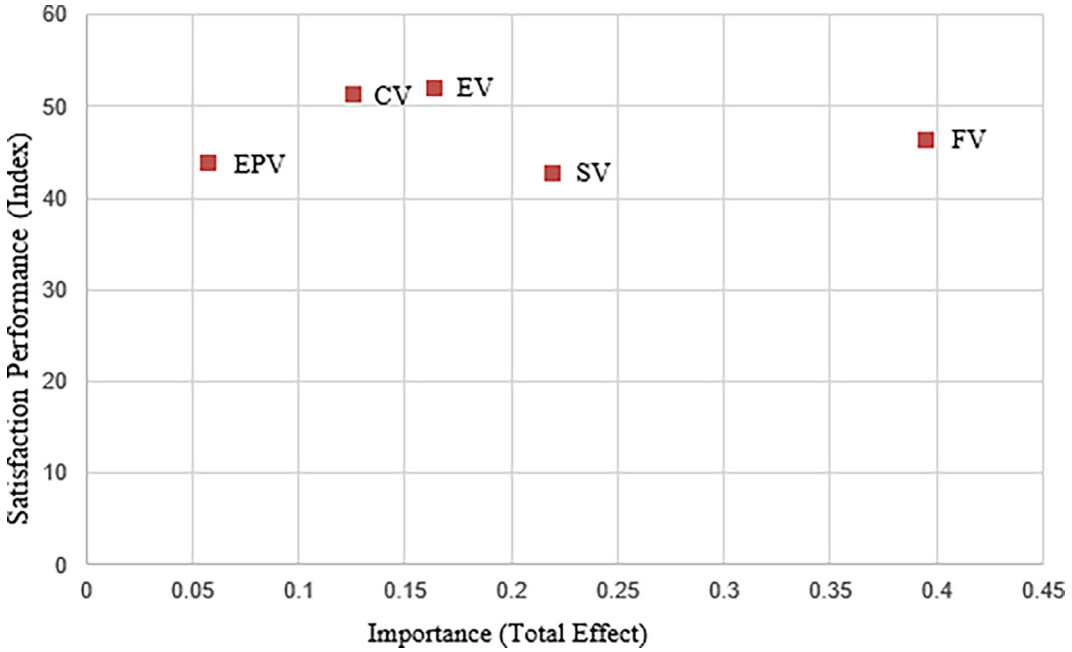


Fig. 2. The Importance-Performance Analysis Matrix.
Notes: FV = Functional Value, SV = Social Value, EV = Emotional Value, CV = Conditional Value, EPV = Epistemic Value, SATIS = Satisfaction

The ensuing hypothesis, H4, tests the relationship between conditional value and passengers' satisfaction in rail transit. A standardized beta value of $\beta_4 = 0.164$, with t-value = 4.430, and $p < 0.05$ specified that this relationship was significant, providing support for H4. However, the effect of epistemic value on rail transit satisfaction was found to be insignificant ($\beta_5 = 0.058$, t-value = 1.178, $p > 0.05$). Thus, H5 is not supported and divergent from what was predicted. The R^2 of the structural model was 0.533, signifying that a 53.3 % variance in passengers' satisfaction in rail transit could be explained by the five consumption values. An examination of the PLS-SEM approach further specified that of the four significant relationships, the functional value had the largest reading of effect size (f^2) of 0.193, inferring a medium effect on the dependent variable which is in line with Cohen's (1988) guideline. However, a small effect was embodied in social value ($f^2 = 0.063$), emotional value ($f^2 = 0.024$), conditional value ($f^2 = 0.045$), and epistemic value ($f^2 = 0.005$). In terms of predictive relevance, a Q value of 0.29 was derived based on the pre-determined omission distance (D) of 7. Since Q is greater than zero, the model is considered to have sufficient predictive relevance (Fornell and Cha, 1994).

Next, Importance-Performance Analysis (IPMA) was performed, in which the y-axis denotes the importance of an attribute while the x-axis symbolizes whether that attribute is either underperforming or overperforming (Esmailpour et al., 2020). The IPMA chart, as illustrated in Fig. 2, shows that functional value is exerting the strongest effect towards the satisfactory performance of rail transit passengers, meanwhile, emotional and conditional values are relatively seen to be distant and underperforming when compared with social and functional values. The results of the IPMA highlight the critical role of functional value in driving passenger satisfaction within the rail transit system. This suggests that meeting functional needs, such as reliability and convenience, is paramount for enhancing the overall travel experience. However, the underperformance of emotional and conditional values indicates areas for improvement. By addressing these aspects and aligning service offerings with passenger expectations, rail transit operators can effectively enhance satisfaction levels among passengers, ultimately increasing rail transit demand by providing a more comprehensive and fulfilling travel experience.

6. Conclusion and future study

6.1. Discussion

This study aimed to explore the influence of various consumption values on passengers' satisfaction with rail transit systems in emerging economies, with a particular focus on Malaysia. Using the theory of consumption values (Sheth et al., 1991) as the guiding principle, the study tested five hypotheses corresponding to functional value, social value, emotional value, conditional value, and epistemic value. The Smart-PLS approach was applied to assess the relationships between these values and passenger satisfaction. The results revealed that four out of the five hypothesized relationships were supported, providing valuable insights into how different factors contribute to passengers' satisfaction with rail transit systems. This discussion section provides a detailed analysis of these results, compares them with previous research, and highlights their implications for real-world applications in the rail transit sector.

The results revealed that four out of the five hypothesized relationships were supported, providing valuable insights into how different factors contribute to passengers' satisfaction with rail transit systems. The study's findings indicated that functional value significantly affects passengers' satisfaction with rail transit, supporting H1. This result aligns with previous studies by (Wang et al., 2020) and (Van Lierop et al., 2018), which also found that passengers' perceptions of a transit system's functionality, such as timeliness and reliability, are crucial determinants of their overall satisfaction. The functional value of rail transit services is linked to practical aspects, such as departure and arrival schedules, punctuality, and the availability of digital information boards. These elements contribute to the overall efficiency of the service and shape passengers' experiences, particularly in terms of meeting their expectations for reliable and convenient transportation. Therefore, it is important for rail transit operators to ensure that trains run on time and provide accurate real-time information to passengers to maintain and improve satisfaction levels. Operators should prioritize investments in technology that enhances the precision of scheduling and communication, such as advanced tracking systems and mobile apps that provide live updates on train arrivals and departures (Jiang, 2021). Additionally, service recovery efforts, such as timely notifications of delays and disruptions, can mitigate the negative impact of service issues and help preserve passenger trust. For companies operating in the rail transit sector, focusing on improving the functional aspects of their services is essential to sustaining long-term ridership and customer loyalty (Vicente et al., 2020).

The analysis also demonstrated that social value has a positive influence on passengers' satisfaction, confirming H2. This finding is consistent with previous research by Habich-Sobiegalla et al. (2018) which emphasized the role of social influences in shaping commuting behaviors. Social value in this context refers to the recommendations and endorsements passengers receive from friends, family, and social networks, as well as the information they gather from social media platforms like TikTok, Instagram, and Facebook. The increasing reliance on these platforms for real-time updates on rail transit services highlights the growing importance of social media in shaping public perceptions and trust in public transportation. Fu et al. (2018) affirmed that passengers prefer to gather current rail transit situational updates from social media. These social media influences are highly capable of motivating and instilling trust among the public in using the rail transit system. Hence, from an operational perspective, rail transit companies should leverage social media as a powerful tool for engagement and communication with passengers. By actively participating in social media conversations, providing timely updates, and responding to customer feedback, transit operators can foster a sense of community and trust among passengers (Golightly and Houghton, 2021). Furthermore, social media campaigns that promote positive passenger experiences and highlight the benefits of using rail transit can encourage more people to use public transportation. Building strong social value through digital channels not only enhances passenger satisfaction but also contributes to a positive brand image for rail transit operators (Borowski et al., 2020).

The study also found that emotional value positively affects passengers' satisfaction with rail transit, supporting H3. This result is in line with the works of (Abdallah, 2023) and (Yusoff et al., 2021), who highlighted the role of environmental awareness and self-obligation in influencing individuals' transportation choices. Emotional value in this context refers to passengers' feelings and emotional connections with rail transit services, particularly those related to environmental preservation and sustainability. Passengers who are conscious of their ecological impact may choose rail transit over private vehicles due to its lower carbon footprint and contribution to reducing traffic congestion and air pollution. For rail transit operators, this finding suggests that promoting the environmental benefits of using public transportation can be an effective strategy for enhancing emotional value and attracting environmentally conscious passengers. Marketing campaigns that emphasize the positive ecological impact of rail transit, such as reducing greenhouse gas emissions and supporting sustainable urban development, can resonate with passengers who prioritize sustainability (Golightly and Houghton, 2021). Additionally, rail operators can implement green initiatives, such as using renewable energy sources or introducing eco-friendly trains, to further enhance the emotional value of their services and strengthen their commitment to environmental stewardship (Vicente et al., 2020).

Pertaining to the effect of conditional value on passengers' satisfaction with rail transit, this connection is significant, thus sustaining H4. The results suggest that attractive conditions outlined by rail transit operators and the government, such as subsidies, promotional discounts, and monetary benefits, contribute to passengers' satisfaction with rail transit. This encounter conforms with the findings of past scholars (Van Lierop et al., 2018). Other than that, conditional value characteristics (i.e., assurance of safety and security onboard and at stations through provisions of surveillance cameras) are also imperative to impact passengers' satisfaction in rail transit (Devries et al., 2018). This finding highlights the importance of creating favourable conditions that encourage public transportation usage. Governments can play a crucial role by offering subsidies and incentives, such as discounted fares for students, senior citizens, and low-income passengers, to make rail transit more affordable and accessible (Guzman and Hessel, 2022). Furthermore, ensuring safety and security within the transit system is paramount. This can be achieved through the installation of surveillance cameras, improved lighting at stations, and the presence of security personnel. By addressing passengers' concerns about

safety and providing financial incentives, rail transit operators can enhance the conditional value of their services and boost overall satisfaction (Nguyen-Phuoc et al., 2021).

Contrary to expectations, epistemic value did not have a significant impact on passengers' satisfaction, leading to the rejection of H5. This result contradicts what was discovered in Shen et al. (2016) and Rahman's (2018) study. In the present research, the insignificant findings imply that epistemic value facets (i.e., curiosity, knowledge and concern about the environment, and consumption of sustainable products and services) do not successfully influence passengers' satisfaction in rail transit. In essence, commuters' desire for the uniqueness of experience and their inquisitiveness for knowledge related to transit operations are not instrumental in shaping their pleasure and gratification in using rail transit services. The concept of epistemic values is comparable with hedonic values, where people consume services to satisfy their affective and multi-sensory needs (S. Lee and Kim, 2018). Historically, utilitarian values were shown to have a higher predictive ability in predicting satisfaction, as compared to hedonic values (Sun and Duan, 2019). Hence, this phenomenon may explain the lack of support for the connection between the epistemic value of rail transit satisfaction. This insight suggests that while promoting the educational and experiential aspects of rail transit may appeal to a niche market, operators should focus more on enhancing the core functional and conditional aspects of their services to satisfy the majority of passengers.

6.2. Implications

The findings of this study have several practical implications for rail transit operators and policymakers in emerging economies. First, enhancing the functional value of rail transit services is essential for improving passenger satisfaction. Operators should prioritize investments in technology, infrastructure, and service quality to ensure that trains run on time and provide reliable, efficient transportation (Jiang, 2021). Second, leveraging social value through digital engagement and social media platforms can help build trust and foster positive relationships with passengers. By maintaining active communication and addressing passenger concerns in real-time, operators can enhance satisfaction and encourage continued ridership (Vicente et al., 2020). Third, promoting the environmental benefits of rail transit can appeal to passengers' emotional values, particularly those who are environmentally conscious. Marketing campaigns and green initiatives that emphasize sustainability can enhance the emotional connection passengers feel toward public transportation (Golightly and Houghton, 2021).

Fourth, creating beneficial conditions through subsidies, discounts, and safety measures can significantly impact passenger satisfaction. Policymakers should consider offering financial incentives to make rail transit more accessible, while operators should prioritize safety and security to address passengers' concerns (Guzman and Hessel, 2022). Finally, while epistemic value may not have a significant impact on passenger satisfaction in this context, it remains an area for potential exploration in niche markets. Rail transit operators interested in appealing to passengers seeking unique experiences or knowledge about sustainability could explore targeted campaigns or initiatives to cater to this segment (Rahman, 2018). Generally, this study highlights the complex relationship of consumption values in determining passenger satisfaction in rail transit systems. By focusing on functional, social, emotional, and conditional values, rail transit operators can enhance satisfaction and contribute to more sustainable urban mobility in emerging economies.

Moreover, the study enriches theoretical implications by elucidating the nuanced dynamics of passenger satisfaction in rail transit systems of emerging economies through a consumption values perspective. By confirming the significance of functional, social, and conditional values while exposing the relevance of epistemic value, the research refines existing theoretical frameworks. This deeper understanding enhances scholars' comprehension of consumer behaviour within public transportation contexts, providing a foundation for the development of more meticulous theoretical models. Additionally, the study offers valuable insights into the relationship between consumption values and sustainable transportation, contributing to theoretical advancements in this growing field of study. Tthe study also emphasises the importance of considering contextual factors, such as socioeconomic status and cultural norms, in understanding passenger preferences and behaviours within transportation systems. These insights enrich theoretical frameworks within consumer behaviour and transportation studies, offering valuable perspectives for future theoretical development and empirical research. Overall, this study refines the theoretical framework and encourages further research on the application of consumption values in public services and sustainability-related industries.

6.3. Limitations and future research

Despite the valuable insights provided, the study is not without limitations. Firstly, the research focused solely on rail transit systems within emerging economies, limiting the generalizability of findings to other contexts. Longitudinal studies could be conducted to explore how passenger satisfaction evolves over time and identify long-term trends within rail transit systems. Additionally, comparative studies across different economic and cultural contexts could provide deeper insights into the influence of consumption values on passenger satisfaction. Next, the study relied on self-reported data, which may be subject to biases and inaccuracies. Qualitative research methods, such as interviews or focus groups, could complement quantitative findings by offering richer insights into passengers' experiences and perceptions. Exploring the role of contextual factors, such as urban development and policy interventions, could also enrich the understanding of passenger satisfaction dynamics within rail transit systems. Moreover, the cross-sectional nature of the study design restricts the ability to establish causal relationships between variables. Hence, investigating the effectiveness of specific interventions, such as service improvements or marketing strategies, in enhancing passenger satisfaction could offer practical guidance for rail transit operators. Furthermore, advanced statistical analysis by assessing the effect of mediating variables and moderating variables in the proposed model would contribute to increasing the explanatory power of the existing model.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Siti Norida Wahab: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Muhammad Iskandar Hamzah:** Writing – review & editing, Writing – original draft, Investigation. **Norazah Mohd Suki:** Writing – review & editing, Visualization. **Yueh Suan Chong:** Writing – original draft, Methodology. **Chin Pei Kua:** Writing – original draft, Methodology.

Supplementary materials

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References

Abdallah, T., 2023. Sustainable mass transit: Challenges and opportunities in urban public transportation, Second Edition Elsevier.

Alabi, A.T., Jelili, M.O., 2023. Clarifying likert scale misconceptions for improved application in urban studies. Qual. Quant. 57 (2), 1337–1350.

Anderson, J.C., Gerbing, D.W., 1988. Structural equation modeling in practice: a review and recommended two-step approach. Psychol. Bull. 103 (3), 411.

Aravind, A., Mishra, S., Meservy, M., 2024. Nudging towards sustainable urban mobility: exploring behavioral interventions for promoting public transit. Trans. Res. D Trans. Environ. 129, 104130.

Azmi, N.A., Isa, H.M., Nor, O.M., Utama, W.P., 2023. Key Accessibilities Issues (KAIs) for People with Disabilities (PwDs) at Electric Train Service (ETS) Station. Int. J. Sustain. Constr. Eng. Technol. 14 (3), 353–365.

Bagozzi, R.P., Yi, Y., Phillips, L.W., 1991. Assessing construct validity in organizational research. Adm. Sci. Q. 421–458.

Borowski, E., Chen, Y., Mahmassani, H., 2020. Social media effects on sustainable mobility opinion diffusion: model framework and implications for behavior change. Travel Behav. Soc. 19, 170–183.

Chakraborty, D., Paul, J., 2023. Healthcare apps' purchase intention: A consumption values perspective. Technovation 120, 102481.

Chen, W., Tan, Z., Wu, Y., Biljecki, F., Liao, S., Zhou, Q., Li, H., Zheng, Y., Gao, F., 2024. Decarbonizing megacities: a spatiotemporal analysis considering inter-city travel and the 15-minute city concept. Cities. 152, 105252.

Cheng, X., Zhang, S., Ran, Y., Ma, B., 2024. Enhancing the perceived resilience of the road transportation system: utilizing cues from ridesharing. Trans. Res. A Policy Pract. 186, 104131.

Cohen, J., 1988. Set correlation and contingency tables. Appl. Psychol. Meas. 12 (4), 425–434.

de la Cruz Jara, M.F., Spanjol, J., 2024. Understanding multiple perspectives on social value in business: an integrative review and typology. J. Bus. Ethic. 1–29.

Devries, D., Iroz-Elardo, N., Hong, A., Winters, M., Brauer, M., & Frank, L.D. (2018). The health effects of fixed-guideway transit investment: a review of methods and best practice [report].

Diab, E., Shalaby, A., 2020. Metro transit system resilience: understanding the impacts of outdoor tracks and weather conditions on metro system interruptions. Int. J. Sustain. Transp. 14 (9), 657–670.

Djordjević, B., Fröidh, O., Krmac, E., 2023. Determinants of autonomous train operation adoption in rail freight: knowledge-based assessment with Delphi-ANP approach. Soft. comput. 27 (11), 7051–7069.

El Ouadi, J., Malhene, N., Benhadou, S., Medromi, H., 2021. Shared public transport within a physical internet framework: reviews, conceptualization and expected challenges under COVID-19 pandemic. Iatss Res. 45 (4), 417–439.

Esmailpour, J., Aghabayk, K., Vajari, M.A., De Gruyter, C., 2020. Importance–Performance Analysis (IPA) of bus service attributes: a case study in a developing country. Trans. Res. A Policy Pract. 142, 129–150.

Faul, F., Erdfelder, E., Buchner, A., Lang, A., 2009. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. Behav. Res. Methods 41 (4), 1149–1160.

Fontoura, W.B., Chaves, G., de, L.D., Ribeiro, G.M., 2019. The Brazilian urban mobility policy: the impact in São Paulo transport system using system dynamics. Transp. Policy. (Oxf) 73, 51–61.

Fu, X., Zhang, J., Chan, F.T.S, 2018. Determinants of loyalty to public transit: a model integrating satisfaction-loyalty theory and expectation-confirmation theory. Trans. Res. A Policy Pract. 113, 476–490.

Ghadiri, M., Newell, R., 2024. Rethinking public transit networks using climate change mitigation and social justice lenses: great victoria area case study. Sustainability. 16 (6), 2414.

Golightly, D., Houghton, R.J., 2021. Social media as a tool to understand behaviour on the railways. In: Research Anthology on Strategies for Using Social Media as a Service and Tool in Business. IGI Global, Pennsylvania, USA, pp. 793–808.

Gupta, P., Zhang, F., Chauhan, S., Goyal, S., Bhardwaj, A.K., Gajpal, Y., 2024. Understanding small and medium enterprises' behavioral intention to adopt social commerce: a perceived value perspective. J. Enterp. Inf. Manag. 37 (3), 959–992.

Guzman, L.A., Hessel, P., 2022. The effects of public transport subsidies for lower-income users on public transport use: a quasi-experimental study. Transp. Policy. (Oxf) 126, 215–224.

Habich-Sobiegalla, S., Kostka, G., Anzinger, N., 2018. Electric vehicle purchase intentions of Chinese, Russian and Brazilian citizens: an international comparative study. J. Clean. Prod. 205, 188–200.

Hair Jr, J.F., Hult, G.T.M., Ringle, C.M., Sarstedt, M., 2021. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). Sage publications, Kennesaw State University, USA.

Hamzah, M.I., Wahab, S.N., Abd Rashid, M.H., Voon, B.H., 2023. Switching intention, WOM and quality of public transport services: a case of the Kuala Lumpur conurbation. Multimodal Trans. 2 (3), 100082.

Henseler, J., Ringle, C.M., Sarstedt, M., 2015. A new criterion for assessing discriminant validity in variance-based structural equation modeling. J. Acad. Mark. Sci. 43 (1), 115–135.

Hizam, S.M., Ahmed, W., Akter, H., Sentosa, I., 2021. Understanding the public rail quality of service towards commuters' loyalty behavior in Greater Kuala Lumpur. Trans. Res. Proc. 55, 370–377.

Huang, C., Zhu, H., Su, M., 2024. Transportation infrastructure and economic growth: evidence from" new nighttime light data" in the Yangtze River Delta. PLoS. One 19 (8), e0306477.

Isikli, E., Aydin, N., Celik, E., Gumus, A.T., 2017. Identifying key factors of rail transit service quality: an empirical analysis for Istanbul. J. Public Trans. 20 (1), 63–90.

Jamei, E., Chan, M., Chau, H.W., Gaisie, E., Lättman, K., 2022. Perceived accessibility and key influencing factors in transportation. Sustainability. 14 (17), 10806.

Jiang, J., 2021. Intelligent city traffic scheduling optimization based on internet of things communication. Wirel. Commun. Mob. Comp. 2021 (1), 7823982.

Fornell, C., Cha, J., 1994. Partial least squares. In: Advanced Methods of Marketing Research. Blackwell Business, pp. 52–78.

Joseph, G., Elias, A.A., 2024. Assessing the sustainability and resilience of urban transit: the case of Kochi water metro. In: Sustainable and Resilient Supply Chain: Environmental Accounting and Management Focus. Emerald Publishing Limited, England, UK, pp. 141–157.
Kalhoro, M., 2023. Determining Factors to Use Urban Rail Transport in Greater Kuala Lumpur: A behavioral Framework. UTAR, Kuala Lumpur, Malaysia.
Kalhoro, M., Au Yong, H.N., Ramendran SPR, C., 2021. Understanding the factors affecting pro-environment behavior for city rail transport usage: territories' empirical evidence—Malaysia. Sustainability. 13 (22), 12483.
Kar, M., Sadhukhan, S., Parida, M., 2024. A comparative MADM approach for prioritizing factors influencing service quality of Intermediate Public Transport as access mode to metro stations in Delhi, India. Sustain. Transp. Livability 1 (1), 2345620.
Kock, N., 2017. Common Method Bias: a Full Collinearity Assessment Method for PLS-SEM. In: Rigdon, E. (Ed.), Partial Least Squares Path Modeling. Springer, New York City, US.
Lai, W.-T., Chen, C.-F., 2011. Behavioral intentions of public transit passengers—The roles of service quality, perceived value, satisfaction and involvement. Transp. Policy. (Oxf) 18 (2), 318–325.
Le, X.C., 2024. Switching to green vehicles for last-mile delivery: why perceived green product knowledge, consumption values and environmental concern matter. Int. J. Logist. Manag. 35 (6), 2012–2031.
Lee, N., Lee, K., 2024. Travelers' viewpoints on machine translation using Q methodology: a perspective of consumption value theory. Information Technology\& Tourism 30 (3), 1–22.
Lee, S., Kim, D.-Y., 2018. The effect of hedonic and utilitarian values on satisfaction and loyalty of Airbnb users. Int. J. Contemp. Hosp. Manag. 30 (3), 1332–1351.
Li, J., Xu, L., Tang, F., Yao, D., Zhang, C., 2024. The impact of public transport priority policy on private car own and use: a study on the moderating effects of bus satisfaction. Trans. Res. F Traffic Psychol. Behav. 106, 112–127.
Lu, K., Han, B., Zhou, X., 2018. Smart urban transit systems: from integrated framework to interdisciplinary perspective. Urban. Rail. Transit. 4, 49–67.
Masirin, M.I.M., Salin, A.M., Zainorabidin, A., Martin, D., Samsuddin, N., 2017. Review on Malaysian rail transit operation and management system: issues and solution in integration. IOP Conf. Ser. Mater. Sci. Eng. 226 (1), 12029.
Mogaji, E., Nguyen, N.P., 2021. Transportation satisfaction of disabled passengers: evidence from a developing country. Trans. Res. D: Trans. Environ. 98, 102982.
Mugion, R.G., Toni, M., Raharjo, H., Di Pietro, L., Sebathu, S.P., 2018. Does the service quality of urban public transport enhance sustainable mobility? J. Clean. Prod. 174, 1566–1587.
Muro-Rodr'iguez, A.I., Perez-Jiménez, I.R., Gutiérrez-Broncano, S., 2017. Consumer behavior in the choice of mode of transport: a case study in the Toledo-Madrid corridor. Front. Psychol. 8, 1011.
Nguyen-Phuoc, D.Q., Tran, A.T.P., Van Nguyen, T., Le, P.T., Su, D.N., 2021. Investigating the complexity of perceived service quality and perceived safety and security in building loyalty among bus passengers in Vietnam–a PLS-SEM approach. Transp. Policy. (Oxf) 101, 162–173.
Rahman, S., 2018. Urbanisation trends and sustainable transport. The Daily Star 22.
Saleh, S., Tithi, A.S., Sakib, N., Paul, T., Anwari, N., Amin, S., 2023. Theory of planned behavior to understand commuter's perception towards mass rapid transit in Dhaka city, Bangladesh. Sustainability 15 (14), 11270.
Shen, W., Xiao, W., Wang, X., 2016. Passenger satisfaction evaluation model for Urban rail transit: a structural equation modeling based on partial least squares. Transp. Policy. (Oxf) 46, 20–31.
Sheth, J.N., Newman, B.I., Gross, B.L., 1991. Why we buy what we buy: a theory of consumption values. J. Bus. Res. 22 (2), 159–170.
Song, R., Shi, W., Qin, W., Xue, X., Jin, H., 2024. Exploring passengers' emotions and satisfaction: a comparative analysis of airport and railway station through online reviews. Sustainability 16 (5), 2108.
Suki, N.M., 2016. Consumer environmental concern and green product purchase in Malaysia: structural effects of consumption values. J. Clean. Prod. 132, 204–214.
Sun, S., Duan, Z., 2019. Modeling passengers' loyalty to public transit in a two-dimensional framework: a case study in Xiamen, China. Trans. Res. A Policy Pract. 124, 295–309.
Talwar, S., Dhir, A., Kaur, P., Mäntymäki, M., 2020. Why do people purchase from online travel agencies (OTAs)? A consumption values perspective. Int. J. Hosp. Manage 88, 102534.
Umrigar, N., Pitroda, J.R., 2023. Multimodal urban transportation system for medium size cities. J. Inst. Eng. (India) A 104 (4), 1005–1021.
Van Lierop, D., Badami, M.G., El-Geneidy, A.M., 2018. What influences satisfaction and loyalty in public transport? A review of the literature. Transp. Rev. 38 (1), 52–72.
Vicente, P., Sampaio, A., Reis, E., 2020. Factors influencing passenger loyalty towards public transport services: does public transport providers' commitment to environmental sustainability matter? Case Stud. Transp. Policy. 8 (2), 627–638.
Vickerman, R., 2024. The transport problem: the need for consistent policies on pricing and investment. Transp. Policy. 149 (2024), 49–58.
Wahab, S.N., Sham, R., Hussin, A.A.A., Ismail, S., Rajendran, S.D., 2018. Urban transportation: a case study on bike-sharing usage in Klang Valley. Int. J. Supp. Chain Manag. 7 (5), 470–476.
Wang, Y., Zhang, Z., Zhu, M., Wang, H., 2020. The impact of service quality and customer satisfaction on reuse intention in urban rail transit in Tianjin, China. Sage Open 10 (1), 2158244019898803.
Yanik, S., Aktas, E., Topcu, Y.I., 2017. Traveler satisfaction in rapid rail systems: the case of Istanbul metro. Int. J. Sustain. Transp. 11 (9), 642–658.
Yusoff, I., Ng, B.-K., Azizan, S.A., 2021. Towards sustainable transport policy framework: a rail-based transit system in Klang Valley, Malaysia. PLoS. One 16 (3), e0248519.
Zailani, S., Iranmanesh, M., Sean Hyun, S., Ali, M.H., 2019. Applying the theory of consumption values to explain drivers' willingness to pay for biofuels. Sustainability. 11 (3), 668.