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The Role of Psychological Factors, Service Quality, and Environmental Concern in MRT Usage: Insights from a Preliminary Study in Malaysia

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Abstract. The aim of this study was to examine factors affecting mode-switching behaviour among users of private vehicles in Malaysia to use the Mass Transit System (MRT). A total of 489 respondents from Klang Valley participated in the study, which was conducted from January 2023 to April 2023. The Statistical Package for Social Sciences (SPSS) software was used to perform two types of analysis: (i) the Pearson correlation test to examine the association between factors affecting the behavioural intention to utilise rail transit among users of private vehicles, and (ii) multiple linear regression to examine factors affecting users of private vehicles in terms of their behavioural intention and switching behaviour to ride the MRT. The findings indicate that all the factors had significantly positive relationships: concerns for the environment, perceived behavioural control, attitude, subjective norms, quality of service, behavioural intention and behaviour to use the MRT. Attitude and subjective norms strongly influence behaviour intention, while behaviour intention and service quality strongly influence the switching behaviour of private vehicle users to use the MRT in Malaysia. This preliminary study provides details to different parties, like service providers, authorities, policymakers, planners and academics, who could collaborate to formulate better approaches to attract users of private vehicles to change to sustainable forms of transport, like the MRT.

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1 Introduction

A society's mobility is dependent on how the country develops its model of public transport. Some promote public transport use, such as Singapore, Japan and China, while others rely heavily on private vehicle ownership, such as the United States, Indonesia and India; these can be termed car-centric countries. Both modes of transportation have positive and negative impacts on quality of life, time management and the environment. Successful urbanisation benefits communities and promotes sustainable cities.

The rapid economic boom has led to phenomenal urbanisation, changing city landscapes and challenging the global urban transport system, whether a country relies on public or private transport. One of Southeast Asia's most developed countries [1, 2], Malaysia has, since 2019, undergone swift urbanisation and clustering of its cities, reaching 76.61%.
The high dependence on private vehicles for travelling has reached 80%, whereas the rate of public transport usage is only 20% [3]. These rates demonstrate that Klang Valley residents have adopted an unsustainable mode of travel. This has been a contributor to various economic and social disadvantages, such as extremely congested roads, considerable potential for road accidents, lengthy journeys, and expensive travel. Moreover, environmental issues have occurred, like highly polluted air and higher emissions of carbon dioxide [4]. Sustainable transport, such as public transportation, is the most effective alternative, making it a pivotal element in resolving traffic-related problems [5]. Global concerns with issues concerning sustainability, especially sustainable transport, have led to an expansion of rail transit systems in most high-density cities [6]. For instance, the Klang Valley's public transport services via its rail network offer an alternative form of transport characterised by efficiency, reliability, affordability and environmental friendliness. It has considerable potential to mitigate the issues linked to traffic. The emphasis is on encouraging the public to use this service as an alternative mode of travel.

When predictions were made concerning factors behind shifts in modes of public transport, less attention was devoted to the perspectives of users of private vehicles regarding ongoing limitations. This was because the majority of the research focused on the perspectives of those using public transport but ignored those of private vehicle users, even though they would be potential future users of this type of transport. The present study focuses on private vehicle users to undertake a comprehensive assessment of the perspective of non-public transport users and their behaviour in selecting a transport mode, as well as determine the critical factors influencing the mode selection of public transport. These findings will contribute to raising usage rates of public transport, particularly the rail transit network. There could be limitations in applying mode transition models that have been developed based on the contexts of other countries, such as Poland [7], Canada [8] and China [9], to the Malaysian population. The conditions and socio-demographic characteristics of the Malaysian population differ from these countries, which influences their perspectives [10]. This makes it essential to undertake a careful validation of the models developed in other countries and their applications when translating them to rail transit transport in Malaysia.

This study bridges the research gap by developing a comprehensive model to evaluate the factors influencing the behaviour of rail transit use from the perspective of Malaysian private vehicle users. If these associations were better understood, especially from the perspectives of users of private vehicles, this would be highly advantageous for different stakeholders—like service providers, authorities, policymakers, planners and academics—in their development of more successful approaches to sustainable transport policies and their implementation.

The remainder of the paper is organised as described: Section 2 contains a literature review concerning the factors leading to choices of travel mode and those influencing private

vehicle users' behaviour intentions to utilise the Mass Rapid Transit in Malaysia. The sample design and research tool are described in Section 3, which also reports the technique adopted, the processes used to select respondents and the research methods. Sections 4, 5 and 6 present the research findings, the discussion of the findings and the conclusion, respectively.

2 Literature Review

2.1 The Theory of Planned Behaviour

The study of human psychology began in the late 1980s when social psychology professor Icek Ajzen introduced the Theory of Planned Behaviour (TPB). The TPB is a theory of social psychology that aims to offer explanations for and predictions of people's behaviour by incorporating the impacts of attitudes, subjective norms and perceived behavioural control [11, 12]. According to the theory, a person's behavioural intentions are affected by the attitude they adopt toward that behaviour [13], how they perceive the social norms connected to the behaviour and whether they perceive they can control their performance of the behaviour. These intentions strongly influence the likelihood of engaging in a behaviour. The TPB has been widely employed to understand and modify human behaviour in various fields, such as health promotion, consumer behaviour and organisational psychology.

2.2 Factors Influencing the Behavioural Intentions of Private Vehicle Users to Use the Mass Rapid Transit in Malaysia

2.2.1 Attitude (AT)

Attitude is one way that a person develops psychologically, whereby the attitude towards human behaviour has a close connection to the emotions of positivity or negativity they experience to take or not take an action [11, 12, 14]. Everyone develops an attitude towards objects and other people, which leads to the generation of ideas in their daily lives. Those with a positive attitude often have beliefs, feelings and behaviours that are favourable to a particular subject [14]. In the case of transportation, attitude can be summarised as the contentment of travellers with their chosen travel modes, such as driving a new car or taking the train or another mode of transport. When the theory of planned behaviour (TPB) was implemented in regard to their travel mode choices, attitude was assessed as a key factor behind advantageous, unwanted, satisfying and disagreeable feelings [11, 14, 15].

Academics have come to similar conclusions regarding the ways that attitudes of positivity or negativity affect community members such that they utilise public transportation, especially rail networks. A study in Libya found that attitudes influenced 36% of Libyan drivers to try high-speed trains for their inter-city travel [14]. The hypothesis proposed by the Libyan researchers was supported when each prediction was proven by structural equation modelling (SEM). A study by American researchers in the urban area of Houston, Texas formulated a hypothesis on attitudes by introducing conceptual models that were closely related to an individual's intentions to use rail transit, especially the new lines for the LRT services in the city [16]. Relevant journal articles frequently refer to a generally positive attitude towards public transportation and its quality of service [16–20]. On the basis of the literature review, the authors propose the following hypothesis:

H1: Attitude (AT) has a positive influence on behaviour intentions to use the MRT service.

2.2.2 Subjective Norms (SN)

Subjective norms indicate someone's apparent social pressure from key people in their life, like a parent, marital partner or friend, who persuade the individual to admit to or deny a behaviour [21]. Any individuals or teams forming a reference group might strongly affect the views, actions and choices made by other people, who could defer to this group depending on the subjective norms applied by the group [17, 21, 22]. A positive tendency to increase the intention is associated with subjective norms, and subjective norms build the influence of support or social acceptance to use rail transit and public transport [16].

Studies by Chen and Chao [23] and Irtema et al. [24] revealed that the intentions of private users to change to other transportation modes were positively affected by subjective norms. The interpersonal impacts of a friend, colleague or family member are referred to as subjective norms. Meanwhile, the public aspects considered when one performs a behaviour, such as mass media reports, expert opinions and other non-personal information, are referred to as external influences. Bhattacherjee [25] stated that external influence is a critical predictor of subjective norms. There are two beliefs of subjective norms, unique belief and normative belief. The former is when people use public transport primarily because they are abiding by the advice of their loved ones, while the latter is when people take public transport because those close to them also prefer to do so [26]. Based on such previous studies, the following hypothesis was proposed:

H2: Subjective norms (SN) have positive impacts on the behaviour intention to use the MRT service.

2.2.3 Perceived Behavioural Control (PBC)

The efforts needed and ease or difficulty of undertaking a specific task are referred to as perceived behavioural control (PCB). For example, an individual having a greater interest in a transport option is likely due to a positive experience when using the mode of transport [26]. PBC is also linked to intentions, and it gives an indication of experience, as well as anticipated difficulties and resources, like opportunity, timing, outcomes and competence. These are the key factors for those performing a desired behaviour. Generally, a person with a higher perception of behavioural control believes that if they have more access to resources and opportunities, they will face fewer obstacles in determining behavioural intentions [21]. PBC has a close relationship with how the user performing a behaviour perceives it, irrespective of whether the task is easy or hard [12, 27]. It means a person believes their increasing concern for the environment strengthens their intention to switch to public transport. This process is known as shifting psychology [13, 27]. When studying perceived behavioural control (PBC), the questions asked in a survey must be related to the respondents' attention and ability to perform the behaviour [13]. In the present study, this referred to believing in something in order to change one's mode of transportation. Therefore, two hypotheses were proposed:

H3: Perceived behavioural control (PBC) has a positive impact on the behaviour intention to use the MRT service.

H4: Perceived behavioural control (PBC) has a positive impact on the behaviour to use the MRT service.

2.3 Extended Theory of Planned Behaviour

In this study, the theory of planned behaviour's original framework was extended. Initially comprising attitude, subjective norms and perceived behavioural control, two innovative constructs were added: environmental concern and service quality. This was to assist in predicting the mode-changing behaviour of users of private vehicles with regard to utilising the travel alternative of mass rapid transit. The theory of planned behaviour framework was extended in this way so that the theory's predictive capability could be enhanced, as proposed by [28].

2.3.1 Environmental Concern (EC)

Environmental concern refers to the growing awareness and worry about the state of the natural environment and its impact on human health, the ecosystem and the planet. Researchers often cite environmental concerns, especially issues concerning pollution, climate change, deforestation, loss of biodiversity, water shortage and waste management, which contribute to environmental degradation [29]. Environmental worries derive from our comprehension that the ecosystem is adversely impacted by human actions like industrialisation and fossil fuel burning. Human activities are depleting non-renewable resources and causing pollution and climate change, all of which result in ecological, social and economic problems.

Dramatic rises in the global population and urbanisation have resulted in major increases in vehicle numbers in developing nations [30]. The transport sector contributes only a small percentage of the carbon dioxide emissions per capita. An effective step in reducing the environmental impact of this is increasing public transport usage [31, 32]. Some researchers believe that present-day environmental worries arise from previous pro-environmental behaviour. Environmental concern also influences the wishes and intentions of passengers to use public transport. [33, 34]. Therefore, this study posited the following hypothesis:

H5: Environmental concern (EC) has a positive impact on the behaviour intentions to use the MRT service.

2.3.2 Service Quality (SQ)

Quality of service has become a benchmark for how quality is provided to users and whether it meets their expectations. It is essential to consistently fulfil users' needs with the best service quality to prevent declining expectations of public services [35] since falling user expectations will reduce the ridership of public services over time. Most business owners recognise that service quality is dependent on the products and services delivered by a seller [19]. Service quality can also be regarded as an assessment of a firm's services or, in the context of transport, its performance relative to a user's expectations before using it [19]. SQ is also an indication of users' evaluations of a service compared to their expectations of it; in this case, this means the public transport service quality they experience when using it.

Researchers have investigated quality of service, especially in the context of public transportation. Structural equation modelling (SEM) instruments have been used to determine this form of service quality. The outcomes indicated that the wish to change from private vehicles to public transport is directly and positively influenced by service quality and perceived value [24]. Enhanced quality of public transport service significantly affects user satisfaction and loyalty to continue using this mode of transport [24]. Work undertaken in Malaysia revealed that the country's low public transport use rate can be explained by users strongly perceiving that its service quality is poor [36]. Spanish researchers discussed

service quality as a pivotal factor in users' mode of transport. They contended that this concept is difficult to translate because it is often confused with the level of satisfaction [20, 35, 37]. A review of previous studies shows that some researchers agreed that users are the main critics of the quality of a service itself [16, 20, 35–38]. According to the literature review, the following hypotheses are proposed:

H6: Service quality (SQ) has a positive influence on behavioural intentions to use a rail transit service.

H7: Behaviour intention has a positive impact on the behaviour to use the MRT service.

3 Methodology

In this section, the methodology used for the study is outlined. It was selected to ascertain which factors influence the behavioural intention of users of private vehicles in Malaysia to utilise the MRT. Subsequent subsections present the research area, the development of the questionnaire, the collected gathered and the data analysis.

3.1 Research Area

This study was conducted in the Klang Valley, Malaysia, an area consisting of Kuala Lumpur and the surrounding towns in the state of Selangor. This metropolitan area is also known as the Greater Klang Valley (Lembah Klang). The Klang Valley has a population of more than seven million and a comprehensive public transport network comprising trains, light rail transit (LRT) systems, a mass rapid transit (MRT) system, high-speed airport links (KLIA Express and Transit) and KL Monorail. The major cities in the region include Kuala Lumpur, Gombak, Petaling Jaya, Shah Alam, Ampang, Selayang and Cheras. The Klang Valley was chosen as the study area because it has the highest population concentration and provides all types of facilities (social, economic, transport and infrastructure).

3.2 Measurement

A cross-sectional questionnaire was used to collect data from the respondents. The instrument consists of three sections. The first has eight questions about the respondents' profiles (gender, age, level of study, vehicle ownership, profession, nationality, distance of workplace to house/hostel and monthly income range). The second section concerns the MRT service quality, and the third section has 23 questions related to six constructs. The items in Sections 2 and 3 were adopted from a previous study (Table 1). Prior to the main data collection, a pilot test was undertaken. To measure the instrument's weaknesses and enhance the questionnaire before it was administered in the full survey, questionnaire copies were issued to 30 users of private vehicles at UKM, who were chosen at random, between 18 and 20 May 2023 [39]. The results of the pilot test are presented in Table 1. All the items in Sections 2 and 3 were assessed using five-point Likert scales ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Overall, a higher score indicated greater interest in a specific measure.

Table 1. Results of pilot test

Constructs (No. of Items)	Cronbach's Alpha Value	Adopted from:
Attitude (3)	0.877	Ibrahim et al. [40–42], Ng & Phung [43], Fu & Juan [44], Ali, Nakayama & Yamaguchi [45]
Subjective norms (4)	0.815	
Perceived behavioural control (4)	0.863	
Behaviour intention (3)	0.89	
Behaviour (5)	0.877	
Perceived quality (15)	0.932	
Environmental concern (4)	0.885	

3.3 Data Collection

The full-scale data collection was conducted using Google Forms, which were distributed to non-MRT users (those who had not used the MRT for over six months) from 18 May 2023 to 10 August 2023 using a convenience random sampling technique. As proposed by Borhan et al. (2018), the questionnaire was issued only if a respondent was happy to take part, which ensured that the answers they gave to all the questionnaire items were accurate and reliable. This strategy might also achieve a better response rate [39]. While 567 questionnaires were returned, 78 were removed because their responses were either invalid or incomplete or both. The 489 responses summarised in Table 2 were used for further analysis.

Table 2. Socio-demographic profile of the respondents

No.	Categories	Subcategories	Percentage (%)
1	Gender	Men	43.6
		Woman	56.4
2	Age	< 20	26
		21 – 40	63.6
		41 – 60	8.6
		> 60	1.8
3	Level of Study	Secondary School	12.9
		Bachelor	79.6
		Master	6.5
		PhD	1
4	Vehicle Ownership	Yes	70.1
		No	29.9
5	Profession	Full–Time Job	49.3
		Part-Time Job	7.4
		Not Working	3.1

		Student	39.7
		Others	0.6
6	Nationality	Malaysian	97.8
		Non – Malaysian	2.2
7	Distance from house to MRT Station (km)	< 5	83.64
		5 – 10	8.38
		> 10	7.36
		> 60	0.61
8	Monthly Income (RM)	0 – 2500	50.1
		2501 – 5000	48.5
		5001 – 7500	1
		> 7501	0.4

3.4 Tools and Procedures for Data Analysis

In this study, the data was analysed using the Statistical Package for Social Sciences (SPSS) version 27.0. The data analysis was conducted in several stages. The initial type of analysis was descriptive analysis or descriptive statistics. This was used to summarise the socio-demographic details of the respondents according to frequency and percentage, as Table 2 shows.

Possible significant connections between the independent and dependent variables were investigated using a Pearson's correlation test. Based on Guilford's Rule of Thumb, the link between variables strengthens as the r value nears one, whereas r values near to 0 indicate weak relationships. In this study, r values below 0.2 were used to indicate very weak relationships between variables. Relationships were weak when r was between 0.20 and 0.40, moderate when r ranged from 0.41 to 0.7, strong when r ranged from 0.71 to 0.90, and very strong when r was above 0.9 [46].

Based on the conceptual framework shown in Figure 1, two predictive models were developed using multiple linear regression analyses. The association between a dependent variable and many independent variables was examined using the multiple linear regression models. A dependent variable is affected by at least two independent variables in a multiple linear regression. In the model, a linear relationship was assumed between the variables. The model used the least squares method in aiming to minimise the differences between anticipated and real values [16, 43, 47].

4 Results of the Study

4.1 Pearson's Correlation Analysis

Pearson's correlation is a correlation coefficient that is used to gauge whether two datasets have a linear connection. It effectively measures the covariance in a normalised manner and gives a result between -1 and +1. In this study, Pearson's correlation was deployed to investigate the links between the constructs: environmental worry, behaviour, perceived behavioural control, attitude, behaviour intention, subjective norms and quality of service.

The relationship between each variable is shown in Table 3. The coefficient correlations show that all the variables were positive and significant to each other, meaning that if one

variable showed an increasing value, another variable would show a proportional increase [48]. Also revealed in the findings are the differences and connections between the factors affecting the behavioural intentions of users of private vehicles to use local rail networks. For example, the highest coefficient correlations in Table 3 are for intention and behaviour ($r = 0.546$, $\rho = 0.01$), intention and attitude ($r = 0.522$, $\rho = 0.01$), and subjective norms and attitude ($r = 0.514$, $\rho = 0.01$), all of which have a strong positive linear relationship.

The Pearson's correlation test results showed a moderate relationship, with a correlation coefficient between 0.3 and 0.494. Six relationships between the variables were moderate, namely attitude and behaviour ($r = 0.398$, $\rho = 0.01$), subjective norms and behaviour ($r = 0.438$, $\rho = 0.01$), subjective norms and intention ($r = 0.451$, $\rho = 0.01$), service quality and environmental concern ($r = 0.348$, $\rho = 0.01$), service quality and intention ($r = 0.339$, $\rho = 0.01$), and service quality and subjective norms ($r = 0.366$, $\rho = 0.01$).

The results show that the weak relationships between certain variables have a coefficient correlation between 0.087 and 0.29. These relationships are between behaviour and environmental concern ($r = 0.229$, $\rho = 0.01$), perceived behavioural control and environmental concern ($r = 0.247$, $\rho = 0.05$), perceived behavioural control and behaviour ($r = 0.174$, $\rho = 0.01$), attitude and environmental concern ($r = 0.245$, $\rho = 0.01$), attitude and perceived behavioural control ($r = 0.215$, $\rho = 0.01$), intention and environmental concern ($r = 0.263$, $\rho = 0.01$), intention and perceived behavioural control ($r = 0.227$, $\rho = 0.01$), subjective norms and environmental concern ($r = 0.224$, $\rho = 0.01$), subjective norms and perceived behavioural control ($r = 0.284$, $\rho = 0.01$), service quality and perceived behavioural control ($r = 0.225$, $\rho = 0.01$), service quality and perceived behavioural control ($r = 0.227$, $\rho = 0.05$), and service quality and attitude ($r = 0.195$, $\rho = 0.05$).

Table 3. Summary of Correlation Analysis on Variables

Variable	Correlation Analysis						
	EC	BEV	PBC	ATT	INT	SN	SQ
Environmental Concern (EC)	1	.229**	.247**	.245**	.263**	.224**	.348**
Behaviour (BEV)	.229**	1	.174*	.398**	.546**	.438**	.225**
Perceived Behavioural Control (PBC)	.247**	.174*	1	.215**	.227**	.284**	.227*
Attitude (ATT)	.245**	.398**	.215**	1	.522**	.514**	.195*
Intention (INT)	.263**	.546**	.227**	.522**	1	.451**	.339**
Subjective Norms (SN)	.224**	.438**	.284**	.514**	.451**	1	.366**
Service Quality (SQ)	.348**	.225**	.227*	.195*	.339**	.366**	1
**. Correlations are significant at level 0.01 (2-tailed).							
*. Correlations are significant at level 0.05 (2-tailed).							

4.2 Multiple Linear Regression (MLR)

The statistical technique of multiple linear regression (MLR) involves using a number of independent variables to predict a dependent variable. In this study, MLR was deployed to locate the factors causing private vehicle users to change to using the MRT. Two multiple linear regression models were developed based on the proposed framework. The differences between the models are the dependent variable, behavioural intention (Model 1) and behaviour to use the MRT (Model 2).

The first model shows that multiple linear regression predicted the influence of the independent variables (environmental concern (EC), perceived behaviour control (PBC), attitude (AT) and subjective norms (SN)) on the dependent variable (behaviour intention

(BI)). The results show a significant regression equation ($F(4, 159) = 19.957$, $p < .001$) with a predictive capability value (R^2) of 0.337.

Table 4 summarises the first MLR model. It shows that two independent variables, attitude and subjective norms, are significant since they positively influenced the intention of private vehicle users to use the MRT, while environmental concern and perceived behaviour control are not significant. The findings presented in Table 4 show that behaviour intention to use the MRT corresponds with the function of 1.760 + 0.332 (attitude) + 0.181 (subjective norms).

Among the users of private vehicles, their behavioural intention increased by 0.332 units for each unit rise in attitude and 0.181 units for each unit rise in subjective norms. These factors were deemed to have the greatest influence in convincing these individuals to change to the MRT. The findings demonstrate the potential to affect the behavioural intention of these individuals to make this switch by altering their attitudes via the influence of important people in their lives, like a parent, spouse or friend.

Table 4. Summary of First MLR Model

Model		Unstandardized Coefficient		Standardized Coefficient			Confidence Intervals Bias Corrected (95%)	
		B	Std. Error	Beta	t	Sig.	Lower Limit	Upper Limit
1	(Constant)	1.76	0.312		5.641	<.001	1.144	2.376
	AT	0.332	0.069	0.37	4.844	<.001	0.197	0.468
	SN	0.181	0.064	0.219	2.833	0.005	0.055	0.308
	PBC	0.04	0.047	0.059	0.85	0.397	-0.053	0.134
	EC	0.072	0.045	0.109	0.1595	0.113	-0.017	0.161
a. Dependent variable: Intention (IT)								

The second model was used to investigate how perceived behaviour control, behaviour intention and quality of service influenced the mode-altering behaviour of users of private vehicles to ride the MRT network. The results show a significant regression equation ($F(3, 160) = 23.127$, $p < .001$), with an value $R^2 = 0.302$. The mode-switching behaviour of private vehicle users to the MRT is 1.953 + 0.509 (behavioural intention) + 0.339 (service quality), as shown in Table 5.

After analysing the outcomes, two variables (behavioural intention and quality of service) were deemed to have considerable and direct impacts on private vehicle users' behaviour regarding MRT use. Perceived behaviour control was not significant as it had no direct influence on this behaviour. As summarised in Table 5, behaviour to use the MRT increased by 0.509 units for every unit of behaviour intention and 0.339 units for every unit of service quality.

Table 5. Summary of Second MLR Model

Model		Unstandardized Coefficient	Standardized Coefficient			Confidence Intervals Bias Corrected (95%)

		B	Std. Error	Beta	t	Sig.		
1	(Constant)	1.953	0.339		5.766	<.001	1.284	2.622
	PBC	0.035	0.046	0.052	0.764	0.446	-0.055	0.125
	IT	0.509	0.07	0.519	7.229	<.001	0.37	0.647
	SQ	0.339	0.061	0.344	4.633	<.001	0.187	0.458
a. Dependent variable: Behaviour (BI)								

5 Discussion

The main objective of this paper was to encourage private vehicle users to use the MRT. In this study, Pearson's correlation was used to comprehend the connection between two variables and their significance [49]. The analysis indicates that every variable (environmental worry (EC), behavioural intention (BI), perceived behavioural control (PBC), attitude (AT), intention (IT), subjective norms (SN) and quality of service (SQ)) had positive and substantial relationships with each other. The findings suggest that every variable is crucial in persuading users of private vehicles to change to the MRT. This should encourage the providers of the MRT service to improve their system and services.

For example, increasing the MRT frequency will affect its ridership, thus confirming the Pearson's correlation result that the most significant coefficient correlation relationship is between intention and behaviour. Other relationships with high coefficient correlations are those between intention and behaviour, intention and attitude, and subjective norms and attitude, while the other relationships are weak to moderate, with a coefficient correlation ranging between 0.494 and 0.174.

Two multiple linear regressions were developed with different dependent and independent variables, obtaining different results. The first model shows that attitude and subjective norms, particularly attitude, had a significant positive impact on users' intentions. This result differs slightly from previous studies, which found that all adopted variables (AT, SN and PBC) strongly influenced the intention to use MRT services [45]. The differences could be due to countries having different socio-demographics and cultures [39].

A major finding was the substantial effect that attitudes had on behavioural intentions to utilise the MRT. Positive attitudes towards the MRT could be fostered through strategic public awareness campaigns that emphasise its benefits, such as environmental sustainability, cost savings, and reduced traffic congestion. Besides, the study reveals that subjective norms significantly influence behavioural intentions, highlighting the importance of leveraging social influences to promote MRT adoption.

This trend should be capitalised on by the government and providers of the service by promoting use of the MRT among the population. Moreover, various strategies could be introduced to boost the intention among users of private vehicles to change to the MRT within the Klang Valley. These could include engaging community leaders, social media influencers, and public figures to endorse MRT usage and foster a perception of MRT as a socially desirable choice. Moreover, community-based programmes could be organised such as car-free days to encourage families and groups to explore the MRT together and foster collective participation. Meanwhile, MRT education could be incorporated into school curricula to instil, from an early age, positive perceptions of public transportation and its societal benefits.

The second model of multiple linear regression showing intention and quality of service demonstrates that these factors have significant positive impacts on behaviour, with the former being the most vital. Previous studies have shown that travel intention strongly

influences travel behaviour, while service quality has a moderately weak relationship with travel behaviour [50].

Service quality was identified as a factor influencing both behavioural intention and actual usage. Improvements to MRT services might address perceived barriers and enhance user satisfaction, increasing ridership. Making the MRT more accessible, increasing its frequency, and adding more connections with other public transport, such as buses, monorails, LRTs or pedestrian walkways to residential buildings and workplaces, would encourage private vehicle users to use the MRT system [38, 41].

In addition, carrying out regular maintenance, expanding the connectivity of the MRT system and forming creative environments, such as thematic and colourful stations, could help improve the service quality of the MRT system. This strategy should be undertaken by the government and providers of the service because they must cooperate to induce higher numbers of MRT system riders among users of private vehicles, even if the only purpose is leisure.

It is interesting to note that these findings suggest no significant influence of perceived behavioural control on the behavioural intention to switch or actual switching behaviour to MRT use among users of private vehicles in the Klang Valley. This diverges from several studies that have highlighted the significance of PBC in shaping behavioural intentions across different contexts [15, 43, 45, 51].

This non-significance of PBC was attributed to the cultural and contextual factors mentioned by Borhan et al. [39] and Jamaluddin et al. [52]. Malaysia's urban transport culture is heavily car-dependent, particularly in the Klang Valley. Private vehicle ownership is often associated with convenience, status, and perceived autonomy in managing travel routes and schedules. These factors may weaken the relevance of PBC in the decision-making process for MRT usage. Even when an individual feels they can switch to public transport, ingrained cultural preferences favouring private vehicles might mean that this perceived control may not be realised in actual behavioural intentions.

Additionally, the infrastructure supporting MRT usage in Malaysia may play a role. Limited connectivity between MRT stations and residential areas, insufficient feeder services, and parking challenges at MRT stations can create perceived barriers that undermine the effectiveness of PBC as a motivational factor.

Meanwhile, the findings reveal that behavioural intentions to use the MRT are significantly influenced by attitude and subjective norms. This suggests that these stronger predictors in the Malaysian context might have overshadowed the effects of PBC. For instance, positive views on the advantages of the MRT, like its environmental sustainability or lower price, might supersede thoughts about personal capability or convenience (attitude). The impacts of social groups, families, or friends might affect intentions substantially, reducing the direct impacts of SN (subjective norms).

6 Conclusion and Limitations

In this study, analysis was undertaken of the factors affecting the mode-switching behaviour of users of private vehicles in Malaysia to utilise mass rapid transit (MRT). The modified theory of planned behaviour (TPB) was used, and several tests were conducted. The Pearson correlation analysis showed a significant and positive relationship between all the variables in the TPB: attitude (AT), subjective norms (SN), perceived behavioural control (PCB), behavioural intention (BI), environmental concern (EC), and service quality (SQ). Additionally, multiple linear regression analysis showed that behaviour intention is significantly influenced by attitude and subjective norms. Meanwhile, the behaviour of users of private vehicles in Malaysia is strongly affected by behaviour intentions and service quality in terms of switching to the MRT. The outcomes of this research present

advantageous insights to stakeholders (like policymakers, local authorities, the government and service providers) that could help them improve the MRT services and influence users of private vehicles to ride the MRT.

Nevertheless, more in-depth investigations would be facilitated if the major limitations of this study were acknowledged. First, the focus on the Klang Valley, Malaysia's most urbanised region, limits the generalisability of its findings to other regions with differing socioeconomic conditions and transport systems. Future research should replicate the study in regions like Penang or Johor Bahru to explore geographical variations and offer a nationwide perspective on MRT adoption. Second, while psychological and service quality factors were examined, practical determinants such as travel time, cost, convenience, and safety were omitted. Nevertheless, these variables are critical in transportation decisions, especially for private vehicle users who prioritise efficiency and affordability. Incorporating these factors into future research would provide a more comprehensive understanding of how practical and psychological elements interact to influence mode-switching behavior. Lastly, the reliance on self-reported data introduces potential biases, such as social desirability bias, with respondents perhaps overstating their willingness to use public transportation. To address this, future studies could complement self-reported surveys with alternative methods such as observational data or travel behavior simulations to validate the findings and enhance their reliability.

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