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Charting a sustainable course: how normative factors shape intentions for Autonomous Rapid Transit commuting

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Abstract: With the continuous advancement of technology, transportation methods have undergone significant transformation, giving rise to innovative solutions like Autonomous Rapid Transit (ART). ART systems are designed to utilize hydrogen energy, serving as an efficient and eco-friendly power source. This not only addresses issues related to traffic congestion but also presents a promising solution to environmental challenges. However, the success of implementing such technologies to mitigate these challenges relies heavily on the support and acceptance of potential users. This study aims to explore the intention of users to adopt ART as a mode of transportation in the context of Sibu, Sarawak, Malaysia. This study conducted a comprehensive survey involving 350 respondents and employed Partial Least Squares Structural Equation Modelling (PLS-SEM) to analyse the data. The findings of this study reveal that several critical factors significantly influence the behavioural intention to use ART for commuting. Specifically, subjective norms, perceived behavioural control, and individual attitudes have a significant impact on the intention to embrace ART as a sustainable mode of transportation. However, the study also finds that personal norms do not exhibit a significant relationship with behavioural intention. This insight underscores the pivotal role of societal influences compared to individually internalized values in shaping user decision-making with regard to the adoption of ART for commuting. It is imperative for policymakers to take into account the perspectives and considerations of users when formulating policies related to the introduction and promotion of new public transportation modes where private transportation has traditionally been prevalent.

1 Introduction

The rising economic growth worldwide has led to a tremendous increase in the need to travel and has changed how societies commute. Generally, greater travel needs lead to greater demand for transport. In developed Asian countries, the reliance on private transport coincides with the usage of public transport such as trains, trams, and public buses as well as non-motorized transport (NMT) like walking and cycling. This is contrary to many developing Asian countries, where the main mode of transport relies heavily on private vehicles such as cars and motorcycles. Statistically, there is a high level of vehicle ownership in developing countries (e.g., Malaysia: 542 motor vehicles per 1000 inhabitants; Brunei: 614 motor vehicles per 1000 inhabitants). Furthermore, there is a substantial growth in the level of car ownership, rising by approximately 64% from 2010 to 2021. High traffic flow indirectly contributes to environmental problems, including CO_2 emissions and air pollution [1]. According to [2], the transport sector is the third-highest contributor of CO_2 emissions (24.5%) in Malaysia, behind manufacturing and construction (35.1%) and electricity and heat production (29.3%). To solve these problems, urban road resources need to be redistributed, and a diverse, three-dimensional, and modern public transportation system needs to be established. The implementation of such measures is expected to mitigate the environmental impact of traffic congestion and promote sustainable transportation alternatives.

The Malaysian government developed its National Transport Policy to "Ensure efficient and sustainable use of resources and minimise environmental pollution" and to "Increase modal share for public transport". This has resulted in the Kuching Urban Transportation System (KUTS) being implemented in the Malaysian state of Sarawak with the aim of lessening traffic congestion on the roads while encouraging economic productivity. The Autonomous Rapid Transit (ART) system is one of the KUTS's efforts aimed at transforming public transportation in the state. This innovative public transportation system is powered by hydrogen energy and utilizes artificial intelligence (AI) technology. The introduction of ART is proposed to bring various benefits, such as energy efficiency by utilizing renewable energy source, reduced operational costs, and more, making it a promising addition to the transportation landscape. ART is set to be introduced in Kuching, Sarawak, connecting several key cities, including Serian and Kota Samarahan, by 2025 [3,4]. This development targets the provision of a public transportation option that supports the community's livelihood and fulfils its essential requirements. The benefits of using ART can be viewed from different angles. From an economic perspective, ART provides benefits such as reduced traffic congestion, increased productivity, and financial benefits to society. From an environmental perspective, ART is expected to contribute to a cleaner environment and the prevention of global warming. In terms of the advantages for society, taking public transportation, including ART, can improve health and meet the needs of an ageing population. Sarawak, the largest state in Malaysia, includes thriving urban centres such as Sibu, where rapid population growth and urban development have led to a sharp increase in road traffic and transport demand, resulting in significant traffic congestion, especially during peak hours. A positive disposition toward ART can signify reduced traffic congestion, lower carbon emissions, improved public health, and enhanced economic productivity, aligning with global Sustainable Development Goals (SDGs).

The benefits of ART on the environmental and urban transportation prompted this study to investigates users' intentions to commute by ART in Sibu, Sarawak. As the world faces urbanization on an unprecedented scale, understanding how individuals perceive and intend to use ART contributes to the transition to more sustainable, eco-friendly, and efficient public transportation systems. By assessing the readiness of a community like Sibu specifically to use ART, this research could inform policymakers and stakeholders on a path towards greener, healthier, and economically vibrant urban centres not only in Sibu but also in other regions. Furthermore, this study also contributes to the growing body of knowledge on transitioning urban mobility to a sustainable and green transport.

2 Literature review

2.1 Research elaboration

In 1980, the Theory of Reasoned Action (TRA) was introduced as the Theory of Planned Action (TPA) to predict an individual's intention to engage in a specific behaviour at a particular time and location. This theory not only offers insights into the factors that influence human actions but also provides a framework for understanding the likelihood of intentional behaviour being repeated. [5] further expanded upon this to formulate the Theory of Planned Behaviour (TPB) by introducing three key components for mapping individual preferences: subjective norms, attitude, and perceived behavioural control. These components provide a framework for analysing how subjective norms influence attitudes, which in turn impact behavioural intentions [1]. [5] asserted that behavioural intention is insufficient to fully explain a person's behaviour, adding the idea of perceived behavioural control to the current model to overcome this drawback. A more complete picture of the element influencing behaviour is provided by perceived behavioural control, which represents a person's confidence in their capacity to carry out a specific behaviour.

Personal norms are perceived as sentiments of a moral obligation to engage in a particular conduct and are connected to the self-concept [6,7]. To examine the influence of personal norms on people's decision to use public transportation, [8] employed the integrated theoretical framework, which focuses on theories regarding the social and psychological mechanisms that activate personal norms and moderate their influence on behaviour. The authors revealed that personal norms significantly predict the intention to use public transportation across different economic and socio-cultural backgrounds in German urban areas. Furthermore, the results were reported to link to expected emotions of guilt and perceived societal norms.

Using a sample of 465 responses gathered in Shanghai, [9] studied the potential role of norms and how an understanding of the challenges brought by auto traffic can affect decisions about the purchase of a car and choosing a form of transportation. The findings showed that descriptive norms have a negative relationship with car ownership. Moreover, personal and subjective social norms play a crucial role in fostering the intention to use public transportation and ultimately increase its actual usage. The results imply that the use of public transportation is influenced by an awareness of social problems that shapes personal norms and other people's expectations.

The impact of social and individual norms on people's intentions to use ecologically friendly transport alternatives was examined by [10] using a survey with 762 participants. The results showed that injunctive societal norms and behavioural intentions are not as strongly correlated as personal norms, which also reduces the

relationship between them. Injunctive social norms have a significant indirect impact on behavioural intentions through personal norms.

[11] investigated the relationship between social norms, happiness, and uses of public transport in six European cities. The results showed network coverage, trip speed, and service frequency are significantly linked with travel pleasure. Travel satisfaction is also influenced by perceptions of expenses, particularly reasonable ticket pricing, and norms, highlighting the significance of public transit in society and the environment. A study conducted by [12] provided evidence that moral norms have a positive association with the use of public transportation while pro-environmental norms have a limited link with travel behaviour.

[13] focused on the physical environment and fundamental service aspects of Kaohsiung's mass rapid transit system. The authors concluded that factors like engagement, satisfaction, and perceived value all play a role in how much service quality affects a person's conduct. With service attributes as the explanatory variable, psychological elements were added to the TPB model, with habit serving as the dependent variable. [14] examined the influence of psychological factors on mode choice behaviours in Khon Kaen's Bus Rapid Transit (BRT) system using the extended model. The findings revealed that the elements impacting mode choice behaviour and the customer's decision to employ a particular mode include service qualities, perceptions of attitudes, and social factors.

[15] was the first study to investigate behaviour intention focusing on autonomous vehicles in Hungary. According to the results, users with high and low personal information technology have considerably different perceptions of behavioural control when using autonomous vehicles. [16] assessed user behaviour using perceived attitude factors, subjective norms, and behavioural control on pro-behavioural intentions for urban rail transport. The results showed that in the Klang Valley region of Malaysia, perceptions of behavioural control, subjective norms, and environmental concerns are the most effective predictors of people's intentions to use public transport. [17] investigated Phnom Penh residents' urban rail transportation behaviour intentions in a similar setting. According to the study, the behavioural intentions of commuters in Phnom Penh are influenced by a variety of elements, including subjective norms, perceived behavioural control, moral obligations, knowledge of the consequences, attitude aspect variables, socioeconomic variables, and travel-related aspects.

[18] analysed the similarities and differences of attitudes between public and private vehicle users in Kuala Lumpur city centre. The findings indicated that both men and women believe that travelling with others, especially strangers, can affect the time of their trips because of potential delays caused by other passengers.

[19] investigated the relevance of behavioural determinants behind the desire to utilize the rail transportation system among road users in Kuala Lumpur, Malaysia. The researchers concluded that positive views on service quality and the benefits of using rail transportation are strongly associated with an intention to use it, with attitudes playing a partial mediating role. Furthermore, the study found that service quality has a greater impact on the intention to use for older age groups, while attitudes play a more significant role for high-income groups. Conversely, poor service quality results in negative attitudes, especially among high-income groups.

Despite the extensive body of research examining various determinants of travel behaviour and public transportation, a notable research gap exists concerning the specific context of ART in Malaysia. While previous studies have explored factors such as personal norms, subjective norms, perceived behavioural control, and attitudes in the context of traditional public transportation systems, the introduction of innovative modes particularly the ART, which incorporate cutting-edge technologies and sustainability elements, showed the importance of this study. Furthermore, Malaysia especially Sarawak, has been focussing on the implementation of ART and its potential to address pressing urban transportation and environmental challenges, it is essential to understand the unique factors influencing individuals' intentions to embrace this mode of transport. Research on this topic is particularly timely as it can provide insights into whether the public is receptive to the adoption of ART, thereby contributing to the success of Sarawak sustainable urban transportation initiatives. Additionally, examining the role of personal norms, attitudes, and other behavioural determinants in the specific context of ART in Malaysia will extend our understanding of how these factors may differ when applied to innovative and eco-conscious transit systems, which aligns with the global imperative of transitioning towards sustainable and green urban mobility solutions.

2.2 Hypotheses

The purpose of this study is to look at users' intentions to use ART in Sibu, Sarawak. Based on the literature review, the conceptual framework shown in Figure 1 is used. Subjective norms, personal norms, perceived behavioural control, and attitude are the independent variables and behavioural intention is the dependent variable.

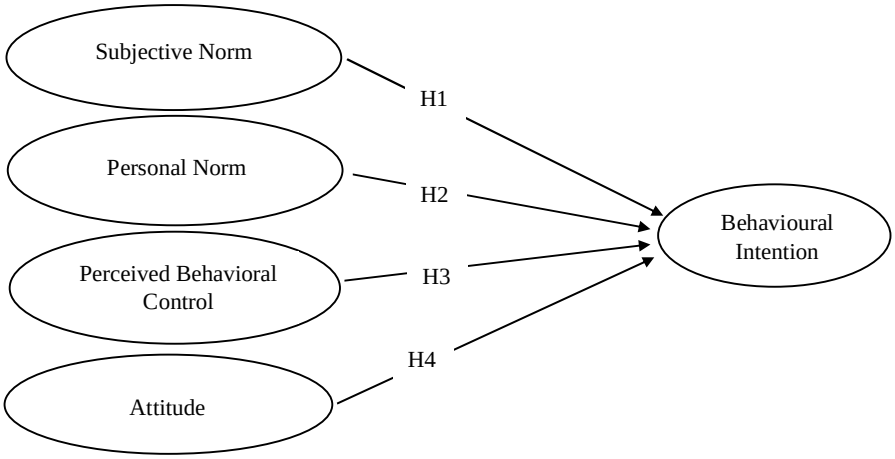

Figure 1 Conceptual framework

Accordingly, this study opted for the framework proposed by [5]. As depicted in Figure 1, the behavioural intention to use ART in Sarawak is possibly influenced by subjective norms, personal norms, perceived behavioural control and attitude. The factors are discussed as follow:

Subjective norms, which represent the social factors affecting individuals' decisions to engage in specific actions, are particularly imperative. Subjective norms are important social aspects that influence people's intention to engage in or refrain from specific acts. These norms, shaped by influential individuals and organizations, have demonstrated a significant impact on behavioural intent, despite some conflicting research findings several research show that they have a considerable and beneficial impact on behavioural intent. For instance, [14] encompass public expectations and perceptions of influences from significant others which may include family, friends, and others. This reflects an individual's perception of normative pressures and peer beliefs, influencing behavioural intention towards using public transit. [5] highlights the importance of subjective norms in influencing intentions to adopt and attitudes, emphasizing their significance in theoretical frameworks. Overall, subjective norms emerge as vital variables influencing the intention to adopt, attitude, and perceived control of behaviour in various behavioural models. Hence in the case of societal norms that gravitates towards private transport, users are less likely to use public transport. The hypothesis is given as:

Hypothesis 1: There is a negative relationship between subjective norms and behavioural intention.

Based on [7], "Self-expectations are experienced as feelings of moral obligation generated when perception of another's need activates the internalized structure of values and norms. The self-expectation process may be characterized as a normative explanation of helping based on internalized or "personal" norms." This is further elucidated by [8] in which they defined personal norms as the personal belief held by an individual on the moral correctness or incorrectness of a certain course of action. Their study also has proven that personal norm is significant in explaining public transport use. Thus, the hypothesis is postulated as follows:

Hypothesis 2: There is a positive relationship between personal norms and behavioural intention.

In the modern version of the reasoned action theory, perceived control of behaviour is defined by [20] as people's beliefs about their ability to perform a particular conduct or their level of control over it. On the other hand, [21] views perceived behavioural control as analogous to self-efficacy, which is the belief in one's own capacity to plan and carry out a specific task. Believing that one is capable of carrying out an action encourages people to attempt it and increases the possibility that they will follow through and complete their tasks. [22] have proven that perceived behavioural control significantly influences the intention to use public transportation. Consequently, the hypothesis is written as follows:

Hypothesis 3: There is a positive relationship between perceived behavioural control and behavioural intention.

[8] assert a connection between attitudes and the inclination to utilize public transport, suggesting that individuals' perspectives and opinions play a pivotal role in shaping their intention to engage with public transportation services. Similarly, [22] contribute to this perspective by reporting a relationship between attitudes and the intention to use public transportation. This collective body of research underscores the significance of individuals' attitudes in influencing their intention to opt for public transportation alternatives. The hypothesis derived from these findings can be posited as follows:

Hypothesis 4: There is a positive relationship between attitude and behavioural intention.

3 Research methodology

3.1 Respondents, procedure and measurements

A questionnaire was distributed to 350 respondents from April 2022 until May 2022. The questionnaires were created utilizing data collection tools and comprised closed questions with set answers. The survey questionnaires were used to study user intent to commute via ART in Sibu, Sarawak. A Likert scale was used to rank the respondents' level of agreement with all assertions, with 1 representing strongly disagree, 2 representing disagree, 3 representing neutral, 4 representing agree, and 5 representing strongly agree. The scales measurement from the questionnaire are derived from [22] and [23].

3.2 Partial least squares structural equation modelling (PLS-SEM)

The suggested model presented in Figure 1 was assessed using PLS-SEM, which was chosen because of its non-parametric character and prediction-based objectives. This was accomplished using SmartPLS 3.0, created by [24]. PLS-SEM is a two-step method that requires evaluating both the measurement and structural models. The fit indices evaluate the measurement model's indicator reliability, internal consistency, and convergent and discriminant validity. This material is delivered in an educational and unbiased tone, making it appropriate for a competent audience with a neutral formality in a wide domain intended to inform.

4 Results and discussions

4.1 Descriptive analysis

Of the 350 questions that were fully completed, 185 (52.86%) were completed by female respondents, while the remaining 165 (47.14%) were done by male respondents. In terms of age groups, 24 respondents (6.86%) were below 20 years old. Of the remainder, 267 (76.29%) were aged between 21 and 40 years old, 50 (14.28%) were aged between 41 and 60 years old, and 9 (2.57%) were above 60 years old. In terms of ethnicity, Malays had the highest number of respondents with 174, making up 49.71% of the total. Following them, there were 102 Melanau respondents (29.14%), 24 Iban respondents (8.29%), 20 Chinese respondents (5.71%), and 1 Indian respondent (0.29%). The respondents' educational status was taken into consideration and classified as primary school, secondary school, STPM or matriculation, diploma or equivalent, bachelor's degree, master's degree, and doctor of philosophy (PhD). No respondent had a PhD status. There were 2 respondents with a primary school education (0.58%), 97 respondents with a secondary school education (27.71%), 74 (21.14%) with an STPM or matriculation, 73 (20.86%) with a diploma or equivalent, 98 (28%) with a bachelor's degree and 6 (1.71%) with a master's degree. In terms of occupational status, the respondents were divided into the following categories: government sector with 89 respondents (25.43%), private sector with 21 respondents (6%), self-employed with 91 respondents (26%), retired with 8 respondents (2.29%), outside labour force with 5 respondents (1.43%), and others with 39 respondents (11.14%). Almost 80% of the respondents (n = 280) had a household income of less than RM4,850 while the remaining 70 respondents (20%) had an income of RM4,851 to RM10,970. The number of respondents with households comprising 1 to 3 people was 27.43% (n = 96), those with 4 to 6 people were 66% (n = 231), and those with 7 to 9 people were 6.57% (n = 23). Considering the presence of seniors in the family, 288 respondents (82.29%) did not live with a senior citizen, 34 respondents (9.71%) lived with one senior citizen, and 8% lived with two senior citizens. Meanwhile, 52 respondents (14.86%), 68 respondents (19.43%), 11 respondents (3.14%), 3 respondents (0.86%), and 4 (1.14%) respectively had one, two, three, four, or five children under the age of 12, while 212 (60.57%) had no children in their household. Table 1 describes the descriptive statistics of the respondents' profiles.

Table 1 Respondents' profiles

Background	Category	Frequency, N	Percentage (%)
Gender	Male	165	47.14%
	Female	185	52.86%
Age	< 20	24	6.86%
	21 – 40	267	76.29%
	41 – 60	50	14.28%
	> 61	9	2.57%
Ethnicity	Malay	174	49.71%
	Chinese	20	5.71%
	Indian	1	0.29%
	Melanau	102	29.14%
	Iban	24	6.86%
	Others	29	8.29%
Educational Status	Primary School	2	0.58%
	Secondary School	97	27.71%
	STPM or Matriculation	74	21.14%

	Diploma or equivalent	73	20.86%
	Bachelor's Degree	98	28%
	Master	6	1.71%
Occupational Status	Student	97	27.71%
	Government Sector	89	25.43%
	Private Sector	21	6.00%
	Self-Employed	91	26.00%
	Retired	8	2.29%
	Outside Labour Force	5	1.43%
	Others	39	11.14%
Household Income	< RM4,850	280	80.00%
	> RM4,850	70	20.00%
Number of people in a Household	1 – 3	96	27.43%
	4 – 6	231	66.00%
	>7	23	6.57%
Number of Senior Citizens	0	288	82.29%
	1	34	9.71%
	2	28	8.00%
Number of Children	0	212	60.57%
	1	52	14.86%
	2	68	19.43%
	3	11	3.14%
	4	3	0.86%
	5	4	1.14%

4.2 Assessment of the measurement model

The measuring model can be assessed via convergent validity and discriminant validity [25]. Convergent validity is the extent to which a set of indicators for a concept converge or illustrate a significant amount of shared variance, and it is assessed by examining the loading factor value, composite reliability (CR), and average variance extracted (AVE) [25,26]. Table 2 portrays the loading, CR and AVE values used to assess the convergent validity. The outer loadings indicate the strength of the relationship between each item and its respective construct. The CR scores evaluate the constructs' internal consistency reliability, whereas the AVE values quantify the amount of variance explained by the items regarding their respective constructs. The construct of attitude is made up of four elements (ATT1, ATT2, ATT3, ATT4), the construct of intention is made up of one item (BI), the construct of personal norms is made up of three items (PN1, PN2, PN3), and the construct of subjective norms is made up of two items (SN1, SN2). Table 2 shows that the outer loading for attitude is 0.697 to 0.829, for intention it is 1.000, for personal norms it is 0.475 to 0.970, for perceived behaviour it is 0.697 to 0.813, and for subjective norms it is 0.472 for SN1 and 0.917 for SN2.

Table 2 Convergent validity

Construct	Items	Loadings	CR	AVE
Attitude	ATT1	0.788	0.864	0.614
	ATT2	0.813		
	ATT3	0.697		
	ATT4	0.829		
Intention	BI	1.000		
Personal norms	PN1	0.970	0.740	0.509
	PN2	0.600		
	PN3	0.475		
Perceived behavioural control	PBC1	0.782	0.840	0.568
	PBC2	0.718		
	PBC3	0.697		
	PBC4	0.813		
Subjective norms	SN1	0.472	0.673	0.532
	SN2	0.917		

This measurement also provides an overview of the CR and AVE values for the four different constructs: Attitude, Personal Norms, Perceived Behavioural Control, and Subjective Norms. The construct of "Attitude" consists of four items (ATT1, ATT2, ATT3, ATT4); the CR for this construct is 0.864, indicating good internal consistency. The construct of "Personal Norms" constitutes PN1, PN2 and PN3. The construct also exhibits good internal consistency with a CR value of 0.740, suggesting that the items (PN1, PN2, PN3) within the Personal Norm construct are reliable and consistently measure the concept of personal norms. Similarly, the construct of "Perceived Behavioural Control" demonstrates good internal consistency with a CR value of 0.840 while "Subjective Norm" indicates an acceptable value of 0.673. The AVE value for attitude, personal norms, perceived behavioural control and subjective norm are 0.614, 0.509, 0.568 and 0.532 respectively which are greater than 0.5 that is adequate for convergent validity.

Table 3 presents the results for discriminant validity. The results in the table suggest that the discriminant validity is validated because none of the credibility ranges contain cohesion.

Table 3 Discriminant validity

	Attitude	Personal norms	Intention	Perceived behavioural control	Subjective norms
Attitude	0.783				
Personal norms	0.656	0.714			
Intention	0.254	0.138	1.000		
Perceived behavioural control	0.774	0.653	0.230	0.754	
Subjective norms	0.366	0.331	0.200	0.414	0.729

4.3 Assessment of the structural model

Figure 2 displays the results for the structural model. To test the relevance of the pathway coefficient, 5,000 bootstrapping runs were used in the PLS algorithm. This procedure was carried out to determine how consumer intention and ART are related. The PLS model's R^2-value of 0.178 shows that the independent variables and the dependent variable have a moderate relationship. The results support three of the hypotheses. Attitude, perceived behavioural control, and subjective norms have a strong association with the reported behavioural intention to commute using ART in Sibu, Sarawak. However, the results fail to support the hypothesis (H2), suggesting that personal norms do not influence the user intention to commute using ART. In summary, the PLS-SEM approach was successful in confirming hypotheses H1, H3, and H4.

Table 4 Hypothesis testing

	Hypothesis	Result
H_1	There is a negative relationship between subjective norms and behavioural intention.	Supported
H_2	There is a positive relationship between personal norms and behavioural intention.	Not Supported
H_3	There is a positive relationship between perceived behavioural control and behavioural intention.	Supported
H_4	There is a positive relationship between attitude and behavioural intention.	Supported

Figure 2 details the results for the relationship between subjective norms, perceived behavioural control, attitude, and personal norms towards behavioural intention. The variables' attitude and perceived behavioural control had a significant effect on behavioural intentions in this model. The effect of attitude on behavioural intentions was significantly positive ($\beta = 0.249$, $p < 0.10$), followed by perceived behavioural control ($\beta = 0.220$, $p < 0.10$). Then, subjective norms were recorded as significantly negative ($\beta = -0.367$, $p < 0.10$). However, the direct effect of personal norms on behavioural intention was insignificant ($\beta = -0.048$, $p > 0.10$).

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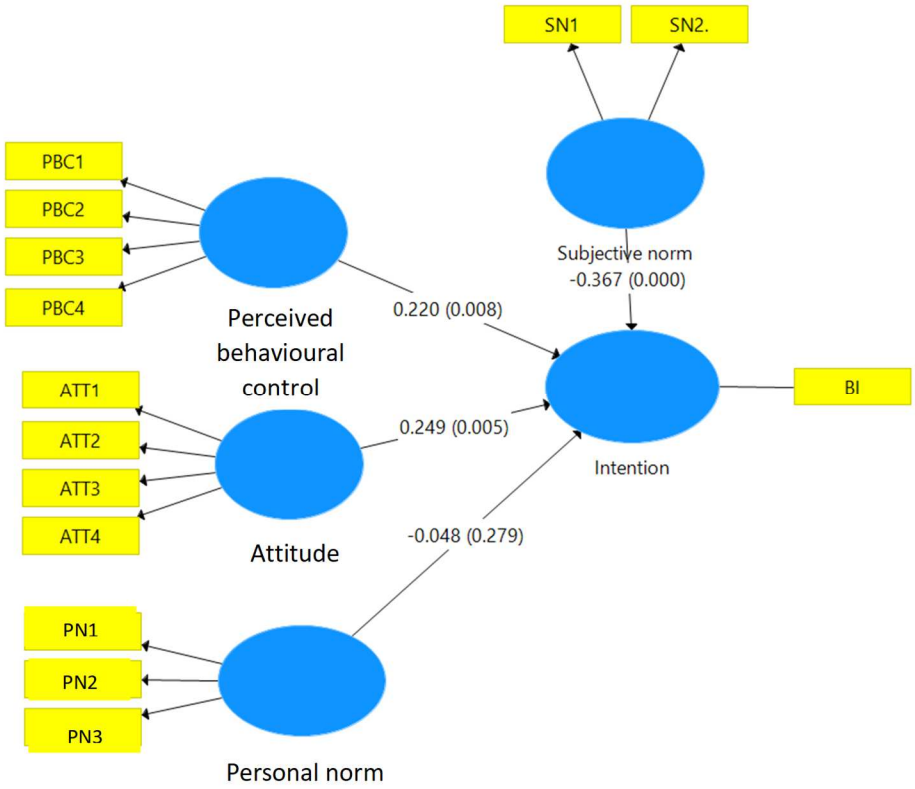

Figure 2 Structural equation model

4.4 Discussion

This study aimed to investigate the user intention to commute using ART in Sibu, Sarawak by analysing the role of subjective norms, perceived behavioural control, attitude, and personal norms. The TPB model served as the framework for this study, which used PLS-SEM to analyse data collected using a self-administered survey. Utilizing measurement evaluation and structural model assessment, the model was validated and evaluated.

The outcomes reported here are in agreement with the assumption that lies at the foundation of the hypotheses. This postulate asserts that there is a strong link between the variables of concern (attitude, perceived behavioural control, and subjective norms) and the desire to behave in a certain way. The TPB, which was mapped out by [5], is consistent with the obtained findings. According to this concept, attitude, subjective norms, and perceived behavioural control are all significant aspects that play a role in determining a person's intention towards their actions. The findings are consistent with [8-10] and [14].

The results of the study reveal that there is a positive association between attitude, perceived behavioural control, and behavioural intention concerning the mode of transportation that one chooses to use for the daily commute. It is hypothesised that a person's frame of mind has a significant role in determining the form of transportation that they choose, particularly for individuals who have a favourable frame of mind towards options that are better for the environment, such as ART, which is a transportation system that runs on hydrogen energy. The findings also indicate that people who have a greater perception of their own behavioural control are more likely to select public transport options that are convenient and dependable, such as ART. Furthermore, interventions aimed at promoting sustainable transport are associated with perceived behavioural control. Those who are aware of the positive impacts that using ART, which runs on renewable energy, has on the surrounding ecosystem are more likely to consider making their daily commute using this more sustainable alternative. The study also finds an inverse connection between an individual's subjective norms and their behavioural purpose. To put it another way, when people in Sibu, Sarawak are subjected to social pressure from those around them, their inclination to use ART for their everyday travel declines. This indicates the strong influence of the society that relies heavily on private based transport. On the other hand, personal norms, also known as individual-level standards, do not appear to have any influence on customers' intentions to commute via ART in Sibu, Sarawak. This insight underscores the pivotal role of societal influences compared to individually internalized values in shaping user decision-making with regards to the adoption of ART for commuting.

5 Conclusion

The introduction of ART in the Malaysian state of Sarawak is a significant step towards realizing the United Nations Sustainable Development Goal 11.2, targeting the provision of "access to safe, affordable, accessible and sustainable transport systems for all" by 2030. ART's role is also deeply rooted in the Malaysian National Transport Policy 2019-2030, which promotes the idea of delivering reliable, affordable, and sustainable transport for its populace. In alignment with Policy Thrust 4, "Advance towards a green transport ecosystem", this study resonates with strategy 4.5, which underscores the importance of "developing effective communication, education, and public awareness (CEPA) to create behavioural change towards sustainable transport". This study will assist policymakers in identifying factors that drive users' intentions or behavioural changes regarding ART. As ART is the most recent green transport initiative for Sarawak, it is crucial to understand which factors should be targeted and how an appropriate set of policies can be devised for the public. This is imperative considering that Malaysia, especially Sarawak, has a very high private transport dependency which may impose severe challenges to influencing the behavioural change regarding public transport.

Specifically, the findings of this study highlight the need to establish favourable attitudes and perceived behavioural control towards ecologically friendly options to promote sustainable mobility like using ART. This can be accomplished through awareness campaigns, education, and regulations that emphasise the benefits of environmentally friendly transportation for the environment and society as a whole. More people may be persuaded to select environmentally friendly commuting options by cultivating positive attitudes and improving their perceived behavioural control concerning the choice of sustainable transportation. This will contribute to a more sustainable future. Moreover, the finding of subjective norms shows a diminished impact on individuals' decisions regarding their choice of transportation depend upon the main preference of the society. Further research and exploration could shed light on the specific factors that shape individuals' transportation choices in Sibu, Sarawak and how various socio-economic, cultural, and environmental influences interact to impact sustainable commuting behaviours. Understanding these dynamics would be valuable for the development of effective strategies to promote and encourage the adoption of eco-friendly transportation options like ART in the region.

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