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Determinants of the Intention to Use Sustainable Public Transport: Examining the Role of Fuel Subsidy in Malaysia

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ABSTRACT

The road transport sector represents the second-largest contributor to carbon emissions, particularly significant in developing nations where sustainable transport plays a crucial role in managing environmental pollution. There is an urgency to address the risks posed by transportation, including land degradation, carbon emissions, noise pollution and climate change. To combat the detrimental impact of personal vehicles on the environment, it's essential to promote the use of sustainable transport. This research aims to investigate the factors influencing the adoption of sustainable transport among Malaysian workers and to examine the potential consequences of providing fuel subsidy to them. Conducted in the Klang Valley, Malaysia, the study gathered data from 433 residents and working individuals using a questionnaire and analysed it using structural equation modelling. The findings revealed that the perceived behavioural control significantly influenced the use of sustainable transport, while fuel subsidy showed no direct impact on moral obligation, environmental awareness and the intention to use sustainable transport. This research has made a substantial contribution by promoting environmental sustainability while fostering efficient and accessible sustainable transport options. By examining the potential impact of fuel subsidy on the adoption of sustainable transport, this study sheds light on its potential influence.

1. Introduction

Sustainable transport stands as a cornerstone for a thriving city, enable of mitigating t the adverse effects of transportation on the environment. The sustainable transport is important because it contributes to the reduction of damaging carbon dioxide (CO2) emissions which directly benefit the environment, further decreasing atmospheric pollution and improving air quality in cities. An efficient sustainable transport network plays a pivotal role in fostering social well-being, economic prosperity and good governance. According to Gilbert and Tanguay (2000), sustainable transport should satisfy the following criteria – which encompass the basic needs of societies; maintaining economic accessibility while operating efficiently; and minimizing emissions, waste, land use and noise generation, particularly in public transport systems.

The utilisation of sustainable transport including bicycle, electric vehicles and public transport including buses and railway network, has garnered widespread attention for their potential to conserve the environment. The Netherlands, Sweden, Belgium, Luxembourg and Denmark are among the leading countries in pioneering green transport initiatives and infrastructure. This impact isn't confined solely to the global stage; it extends to Malaysia as well. However, the growing number of vehicles in the market has raised environmental concerns, leading to heightened carbon (CO2) emissions and greenhouse gas (GHG) discharges. In Malaysia, the transport industry contributed 28.8 percent of all fossil fuel consumption, significantly more than the average for the world of 24.5 percent. The transport sector stands as the second-largest contributor of CO2 emissions in the atmosphere after the energy sector (Küfeoğlu, 2024). Adding to this, the International Energy Agency (IEA) highlights that within the transport sector, road transport emerges as the largest carbon emitter among all its subsectors. Hence, switching from personal vehicle to sustainable modes of transport has proven effective in reducing CO2 emissions.

Governments often provide fuel subsidies to strengthen systems and alleviate the financial strain on people by reducing production costs and consequently, the prices of goods. In Malaysia, fuel subsidies have been in place since 1983, primarily aimed at supporting low-income Malaysians and fostering economic activity and growth. For instance, in 2021, the allocated subsidies amounted to RM11 billion, a significant increase from the RM2.16 billion in 2020. This strategy aims to ease the financial burden on Malaysians dealing with high living costs, particularly in terms of petrol expenses. While these subsidies have been instrumental in lowering fuel prices and improving societal welfare, their distribution can pose adverse effects on the environment, contributing to the acceleration of climate change (Bárány & Grigonytė, 2015; Mustapa & Bekhet, 2016; Rentschler & Bazilian, 2017).

The growing number of vehicles available in the market has led to ecological concerns, including heightened carbon emissions and greenhouse gas (GHG) discharges. As illustrated in Table 1, spanning from 2013 to 2017, passenger cars dominated the overall vehicle sales and production figures, with only a minor contribution from commercial vehicles. Sales and production reached their peak in 2015 before gradually declining for three successive years. While there was a subsequent rebound in the total number of vehicles manufactured in 2019, there was a downward trend for two consecutive years due to the enforcement of the Movement Control Order (MCO) in 2020 and the national lockdown in 2021.

Table 1. Summary of New Passenger and Commercial Vehicles for the year 2017 to 2021

Year	Passenger Cars	Commercial Vehicles	Total Vehicles
2013	576,640	79,104	655,744
2014	588,348	78,139	666,487
2015	591,275	75,402	666,677
2016	514,594	65,491	580,085

Year	Passenger Cars	Commercial Vehicles	Total Vehicles
2017	514,675	61,950	576,625
2018	533,202	65,512	598,714
2019	550,179	54,108	604,287
2020	480,971	48,543	529,514
2021	452,663	56,248	508,911

Sources: Malaysian Automotive Association (2022)

As per the findings of the International Energy Agency (IEA) in 2019, the transportation sector emerged as the second most substantial contributor to carbon emissions in Malaysia for the year 2018, following electricity and heat production. The transport industry in Malaysia accounts for 28.8% of all fossil fuel consumption, which is higher than the global average of 24.5%, making it the second most substantial contributor to carbon emissions in the country.

In 2022, Malaysia's total subsidy bill surged to RM77.7 billion, with fuel subsidies consuming the largest portion at RM41.7 billion (RON95 alone accounted for RM27 billion). Because the price of RON95 is capped at US$0.466 per litre, it is among the cheapest in the world. The government is currently finalizing a targeted fuel subsidy mechanism to save up to RM17 billion by removing subsidies for the Top 20% (T20) income group, while maintaining them for the B40 and M40 groups (who utilize 24% and 41% of the subsidies, respectively). Despite the availability of public transport networks in the Klang Valley (LRT, monorail, buses), private vehicle ownership continues to rise (e.g., car ownership increased by 2.6% and motorcycles by 2.3% from 2019 to 2020).

As the price of fuel become lower, people will tend to use their own private vehicles rather than adopting energy efficient vehicles which may lead to environmental consequences (Bárány & Grigonytė, 2015; Mustapa & Bekhet, 2016; Rentschler & Bazilian, 2017). Moreover, it is also making fuel investments more competitive compared to investments in clean alternatives, such as renewable energies or electric vehicles (Kuehl et al., 2021). as long as petrol remains artificially cheap, it may override individuals' moral obligation and environmental awareness

In accordance to that, encouraging the use of sustainable transport among Malaysians is important in helping to reduce emissions resulting from several strategic focuses in the National Automotive Policies (NAP) 2006-2020; and Low Carbon Mobility Blueprint (LCMB) 2021 - 2030. Sustainable environmental protection saved the cities by reducing the impact of climate sustainable transport is essential to improve air quality in cities.

Prior researchers have examined sustainable transport usage using the TPB model (Nguyen-Phuoc et al., 2022; Zainuddin et al., 2016). Studies have explored the domain of fuel subsidies (Bárány & Grigonytė, 2015; Coady et al., 2006). However, there exists a gap in knowledge concerning the application of the TPB model to sustainable transportation usage in the presence of fuel subsidy distribution. This study seeks to investigate the behavioural intentions of Malaysians towards sustainable transportation utilization within the framework of fuel subsidy presence, while extending the TPB model to include two additional variables - awareness and moral obligation. The study aims to introduce fuel subsidy as a moderating factor in the extended model.

The research objectives are as follows: (i) to determine the relationship between people’s attitudes, subjective norms, perceived behavioural control, moral obligation and environmental awareness and their intention to use sustainable transport; (ii) to determine the moderating effect of fuel subsidy on the relationship between moral obligation and intention to use sustainable transport; and (iii) to determine the

moderating effect of fuel subsidy on the relationship between environmental awareness and intention to use sustainable transport.

Previous studies have highlighted a noticeable gap in the existing literature, particularly concerning a comprehensive examination of the intent to adopt sustainable transport within the subset of private vehicle users, in relation to the influence of the fuel subsidy dynamic in Malaysia. This study seeks to address this specific gap by delving into the aforementioned scenario. This research intends to make a substantial contribution to sustainable transport sector in enhancing the environment by reducing carbon emissions. It has the potential to elevate environmental awareness among individuals and motivate them to transition from private transport to more sustainable alternatives. Lastly, the rationale behind conducting this study is also aligned with the Sustainable Development Goals (SDGs), particularly SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Production and Consumption) and SDG 13 (Climate Action).

2. Literature review

2.1 Theoretical underpinning

This theory was proposed by Ajzen (1991) which aims to explain and predict behaviour in specific context. In the TPB, the predictor of behaviour is intention to engage in that behaviour. Therefore, the stronger the intention, the more likely the behaviour will follow. The intention in this theory is predicted by attitude, subjective norm and perceived behavioural control.

In this context, the reliability theory will be maintained meanwhile to increase the explanatory power of the outcome (Engels, 2022). In modifying the model, the environmental awareness on sustainable transports usage came to the foreground. According to Rotaris et al. (2021) environmental awareness has a significant positive impact on the choice of electric cars among Italians. The stronger sense of awareness towards the impact of private transportation on the environment, the higher the behavioural intention to use sustainable transport (Abdul Sukor et al., 2014).

2.2 Conceptual Framework

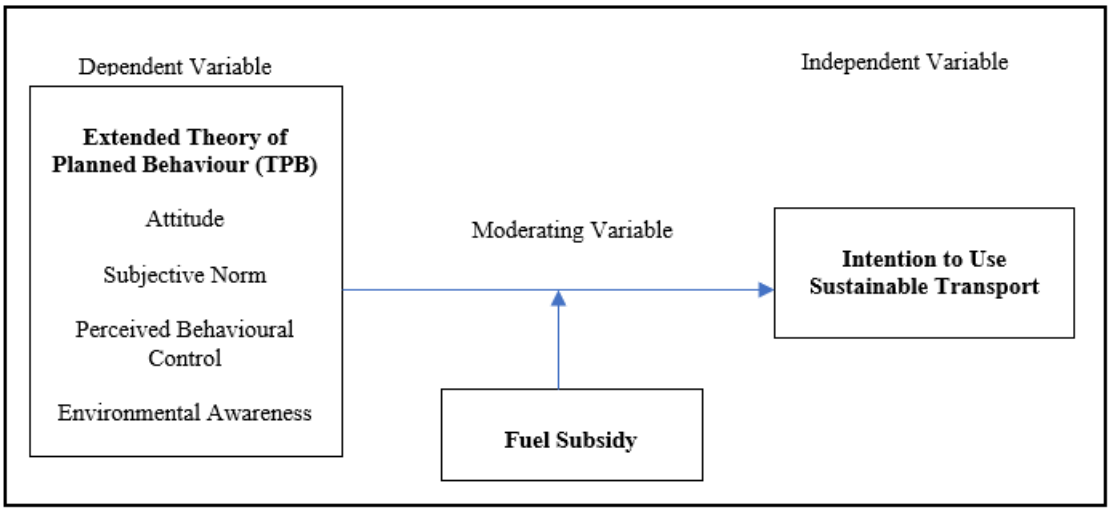


Figure 1. Conceptual Framework
Source: Adapted from the author's work

The figure illustrates the study's conceptual framework, comprising the dependent variables derived from the extended Theory of Planned Behaviour (including attitude, subjective norm, perceived behavioural control, environmental awareness and moral obligation), the independent variable of intention to adopt sustainable transportation and the moderating variable of fuel subsidy.

2.3 Literature review of the variables used in the study

According to Ajzen (1991), intentions are assumed to catch the motivational factors that influenced a behaviour. Ng and Phung (2021) conducted a study to examine the behavioural intention to use public transport system in Hanoi by applying TPB. The result showed that behavioural intention to use bus significantly influenced by attitude, perceived behavioural control, personal norm and descriptive norm. Meanwhile, subjective norm is the only variable in TPB model that had no significant impact on intentional behaviour. Another TPB based study performed by Dirgahayani and Sutanto (2020) to identify the factors that affect motorists' behavioural intentions to use sustainable transport specifically light rail transit (LRT) system in Bandung. Similar with Ng and Phung (2021), they also adopted PLS method to run analysis on the data. They observed that control belief, perceived norm and acceptance significantly influenced intention to use LRT. They do add some arguments where good LRT station accessibility and relatively inexpensive LRT fare were the most influential factors on the intention to use LRT. In the case of Malaysia, Kang et al. (2019) studied the predictors of drivers' intention to switch from car driving to public transport and their readiness to use public transport in Penang. They decided to adopt the Theory of Interpersonal Behaviour (TIB) to understand the behavioural readiness of the drivers. The result showed that convenience, flexible service and commute impedance were positively related to intention to switch among drivers.

While attitude is a core component of the TPB model, its influence on sustainable transport adoption yields mixed results in the literature. Some evidence indicates that positive personal attitudes strongly predict the intention to adopt systems such as bike-sharing. Conversely, other research demonstrates that positive attitudes alone are insufficient drivers of behaviour; for instance, attitude showed the weakest effect among predictors for dockless bike-sharing and only a small fraction of individuals with positive feelings toward new transport technologies are actually likely to adopt them. This inconsistency suggests that favorable internal feelings are often overridden by practical barriers, making attitude a less reliable predictor on its own. Based on previous justification, hence the first hypothesis was postulated:

H1: Attitude positively affects the behavioural intention to use sustainable transportation.

The role of social pressure or subjective norm in shaping transport choices is heavily debated. While some studies suggest that subjective norms can successfully predict the intention to use both personal cars and public transport. A growing body of literature argues that external social approval frequently fails to translate into direct pro-environmental travel behaviour. For example, receiving approval from friends, family and peers does not inherently give individuals the courage to act pro-environmentally, nor does it directly influence public transport usage without the mediation of habit and satisfaction. This indicates that external social pressures are often insufficient to change daily commuting habits. Thus, the following hypothesis was developed:

H2: Subjective Norm positively affects the behavioural intention to use sustainable transportation.

In contrast to the mixed findings regarding internal attitudes and social pressures, literature consistently demonstrates that perceived behavioural control is the most critical factor driving sustainable transport adoption. Studies across various mobility contexts from daily public transport usage in Iran to ride-hailing services in Vietnam reveal that perceived behavioural control has the most meaningful impact on behavioural intention. Furthermore, perceived behavioural control acts as a crucial boundary condition; when perceived behavioural control is low due to poor accessibility or inconvenience, it can hinder individuals from acting on their moral obligations to the environment. Therefore, the intention to adopt

sustainable alternatives heavily relies on the practical capability and infrastructure available to the commuter. Considering this, the following hypothesis was derived:

H3: Perceived Behavioural Control positively affects the behavioural intention to use sustainable transportation.

The relationship between environmental awareness and sustainable behaviour is complex and highly context-dependent. While possessing a general awareness of environmental issues is often considered a prerequisite for behavioural change, evidence suggests that it does not automatically translate into a high level of actual pro-environmental behaviour, especially if individuals are primarily motivated by financial savings rather than true ecological concerns. However, when awareness is specifically tied to the impacts of carbon emissions and climate change, it becomes a potent driver. Individuals with a high level of environmental awareness exhibit a significantly higher likelihood of adopting zero-emission modes, such as cycling, over high-emission private cars and tend to reduce wasteful consumption patterns. Therefore, a strong, specific understanding of transportation's ecological impact is essential to foster sustainable commuting choices. Thus, the following hypothesis was developed:

H4: Environmental Awareness positively affects the behavioural intention to use sustainable transportation.

Beyond general awareness, internalized moral obligation serves as a critical, overriding driver for adopting sustainable transport. Research demonstrates that when individuals perceive environmental protection not just as a preference but as a fundamental personal and societal duty, they exhibit much stronger intentions to reduce their personal emissions at all costs. This internalized duty often mediates how people value natural resources and motivates them to restrict their consumption for the benefit of society. In the context of transportation, moral obligation frequently emerges as one of the most important predictors driving the shift away from private vehicles toward sustainable alternatives, with higher levels of moral responsibility successfully increasing the willingness to adopt eco-friendly habits. Thus, cultivating a sense of moral responsibility is vital to translating environmental concerns into tangible behavioural changes. As a result of the prior reasoning, the subsequent hypothesis is established:

H5: Moral Obligation positively affects the behavioural intention to use sustainable transportation.

While psychological and moral factors drive sustainable intentions, economic interventions such as fuel subsidies often act as a contradictory barrier. Government fuel subsidies are traditionally implemented as a socioeconomic safety net to alleviate financial strain, lower production costs and stimulate economic growth. However, this economic benefit comes at a severe environmental cost. By artificially capping fuel prices, such as Malaysia's RON95 price at US$0.466 per litre, which cost the government RM41.7 billion in 2022, subsidies make private vehicle usage highly affordable and encourage wasteful fossil fuel consumption. This immense financial incentive can make clean energy investments and public transport alternatives far less competitive. Given that blanket subsidies in Malaysia disproportionately benefit higher-income groups who own more vehicles (with the T20 and M40 groups utilizing 35% and 41% of the subsidy, respectively), the government's push toward a targeted subsidy mechanism highlights the intense friction between economic welfare and environmental sustainability. Consequently, this deep-rooted economic incentive is hypothesized to interfere with the psychological and moral drivers of commuters, acting as a crucial moderating variable that could weaken or alter the intention to use sustainable transport.

H6: Attitude positively affects the behavioural intention to use sustainable transportation moderated with the fuel subsidy.

H7: Subjective Norm positively affects the behavioural intention to use sustainable transportation moderated with the fuel subsidy.

H8: Perceived Behavioural Control positively affects the behavioural intention to use sustainable transportation moderated with the fuel subsidy.

H9: Environmental Awareness positively affects the behavioural intention to use sustainable transportation moderated with the fuel subsidy.

H10: Moral Obligation positively affects the behavioural intention to use sustainable transportation moderated with the fuel subsidy.

3 Research Methodology

Population can be understood as a targeted community or group of people which is involved or selected by researchers for their study (Reid, 2014). The population for this study comprises individuals residing or working within the Klang Valley area of Malaysia, who rely on private transportation for both their daily commutes and travel to their workplaces. These population seems to be appropriated to achieve the objectives of the study since they are received and utilizing fuel subsidy from the government. Furthermore, the public transport in Klang Valley does extends from public bus services, railway services, light rail transit (LRT) and monorail. Upon this wide array of options, private transport users can opt for public transportation in anytime (Mohamed Noordin, Abdul Manan & Ghani, 2022). However, despite of the development of public transport in Klang Valley, some population still refuse to shift their mode of transport from private to public and according to Mohamed Noordin et al. (2022) it is because of variety reasons such as slow, too far, connectivity issues and unpredictable timing. Thus, this study would like to investigate the intention among Malaysian towards sustainable transport usage in the presence of fuel subsidy effect.

Self-administered and online questionnaires were distributed to get respondents. The survey was conducted and only took one (1) month; from 14 April until 14 May in 2023, therefore 433 respondents were successfully obtained. This was in line with Faul et al. (2017) whom proposed a minimum sample size of 103 based on G*Power software. In research, having an adequately powered study is crucial to ensure that the results are reliable and meaningful. G*Power assists researchers in making these calculations, contributing to the robustness of their findings and the overall quality of their research. In addition, the respondents were chosen for all residents and working individuals in Klang Valley either they used own transport or public transport for daily commuting. The profile of respondents is summarised in Table 1.

The primary objective of this study is to analyse the determinants that impact the intention to adopt sustainable transportation within the context of Malaysia's fuel subsidy program. This investigation is grounded in the Theory of Planned Behaviour (TPB) model, expanded to incorporate supplementary variables including environmental awareness and moral obligation. To achieve the study's objective, the participants selected for the survey consist of citizens who rely on private transportation, encompassing both cars and motorcycles, for their daily commuting. This approach is adopted due to the fact that only private transportation users, benefiting entirely from the governments fuel subsidy, are best suited to provide relevant insights through the survey. This study adopts a quantitative approach to measure the factor of attitudes, subjective norms, perceived behavioural control, moral obligation and environmental awareness as independent variables towards intention to use sustainable transportation (dependent variable). The questionnaire for this study contains 35 questions with a five-point Likert scale, which are; strongly disagree, disagree, neutral, agree and strongly agree, were used for all variables. Convenient random sampling was used and the data were coded and analysed using SmartPLS. There consist of 4 sections whereby Section A – demographic, Section B – independent variables, Section C – moderating variables and Section D – dependent variable. The data were analysed using the following steps; first, the model measurement was examined using confirmatory factor analysis and secondly the structural model measurement was assessed by examining the standard path coefficient and t-statistics ($t > 1.645$). A one-tailed test ($t > 1.645$) was used because the hypotheses (*H1-H10*) are directional (predicting a positive effect). This data of this study was analysed by using the partial least squares structural equation model (PLS-SEM). This approach is also known as causal-predictive approach to SEM which to explain the variance in the model's dependent variables (Chin et al., 2020). Moreover, it is also involving appropriate statistical analysis such as measuring the model, establishing the discriminant validity and hypothesis testing.

4. Results

4.1 Demographic Characteristics of Respondents

The results presented in Table 2 indicate the characteristics of the respondents of the study. The distribution of respondents is rather equally consisting of male (48 per cent) and female (52 per cent). The age of respondents is 18-24 years old (27.9 per cent), 25-34 (45.5 per cent), 35-44 (16.6 per cent), 45-54 (7.6 per cent) and 55 and above (2.3 per cent). Majority of the respondents are Malays (82.4 per cent), followed by Chinese (8.1 per cent), Indian (5.1 per cent) and others (4.4 per cent). Most respondents hold a bachelor's degree (56.6 per cent). According to the survey, most respondents work in a private sector (45 per cent). Moreover, it shows that their monthly income ranges below RM2,000 (36.5 per cent) while RM2,001-RM4000 (31.9 per cent).

Table 2. Characteristics of the Sample.

	Frequency (n=433)	Percentage (%)
Gender		
Male	208	48
Female	225	52
Age		
18 - 24	121	27.9
25 - 34	197	45.5
35 – 44	72	16.6
45 – 54	33	7.6
55 and above	10	2.3
Race		
Malay	357	82.4
Chinese	35	8.1
Indian	22	5.1
Others	19	4.4
Education		
SPM	55	12.7
Diploma	81	18.7
Bachelor's degree	245	56.6
Master's degree	35	8.1
Ph.D	6	1.4
Others	11	2.5
Occupation		
Private	195	45
Government	97	22.4
Entrepreneur	21	4.8
Others	120	27.7
Income		
Less than RM 2,000	158	36.5
RM 2,001 - RM 4000	138	31.9
RM 4,001 - RM 6000	69	15.9
RM 6,000 and above	68	15.7

4.2 Measurement Model

The results of the measurement model assessment are reported in Table 3. All factor loadings were greater than 0.5 (ranged from 0.730 to 0.894). Also, composite reliability of the constructs (CR) was greater than 0.7 indicating good construct reliability (Chin et al., 2003). Moreover, average variance extracted (AVE) of greater than 0.5 established convergent validity of the constructs (Pahlevan Sharif & Sharif Nia, 2018). Fornell and Larcker (1981), convergent validity was determined by calculating item reliability, internal consistency and average variance extracted (AVE).

Table 3. Measurement Model

Construct	Items	Loading	CR (>0.7)	AVE (0.5)
Intention	IN1	0.865	0.922	0.703
	IN2	0.879		
	1N3	0.763		
	1N4	0.852		
	1N5	0.829		
Attitude	ATT3	0.892	0.808	0.679
	ATT5	0.751		
Subjective Norm	SN1	0.777	0.907	0.662
	SN2	0.726		
	SN3	0.855		
	SN4	0.886		
	SN5	0.813		
Perceived Behavioural Control	PBC1	0.750	0.877	0.642
	PBC2	0.824		
	PBC3	0.849		
	PBC5	0.778		
Moral Obligation	MO1	0.769	0.913	0.679
	MO2	0.788		
	MO3	0.821		
	MO4	0.893		
	MO5	0.843		
Environmental Awareness	EA1	0.816	0.932	0.733
	EA2	0.894		
	EA3	0.871		
	EA4	0.864		
	EA5	0.833		
Fuel Subsidy	FS1	0.816	0.899	0.640
	FS2	0.776		
	FS3	0.879		
	FS4	0.730		
	FS5	0.793		

Note: ATT1, ATT2, ATT4, PBC4 were deleted due to low loadings.

Table 4 presents the respondents' use of public transport and ownership of electric vehicles (EVs). Of the 433 respondents, 233 (53.8%) reported using public transport, while 200 (46.2%) did not. Regarding EV ownership, 23 respondents (5.3%) reported owning an electric vehicle, whereas 410 (94.7%) did not. These findings indicate that public transport use was relatively common among the respondents, while EV ownership was limited.

Table 4. Public Transport Use and Electric Vehicle Ownership Among Respondents.

	Frequency (n=433)	Percentage (%)
Use Public Transport		
Yes	233	53.8
No	200	46.2
Having Electric Vehicle		
Yes	23	5.3
No	410	94.7

Table 5. Discriminant Validity

	1	2	3	4	5	6	7
1. Attitude							
2. Environmental Awareness	0.617						
3. Fuel Subsidy	0.503	0.583					
4. Intention	0.651	0.655	0.445				
5. Moral Obligation	0.797	0.816	0.580	0.722			
6. Perceived Behavioural Control	0.887	0.701	0.539	0.797	0.899		
7. Subjective Norm	0.890	0.466	0.364	0.508	0.623	0.824	

Barclay et al. (1995) specified that discriminant validity is achieved when the square root of the AVE of a construct is larger than its correlation with other constructs.

Table 6 shows that all four variables for standard path coefficients are positive. The results are accepted at t > 1.645. In conclusion, 3 of the hypotheses (*H2, H4 and H5*) were statistically significant. The failure of attitude and subjective norms aligns with previous literature - Ng & Phung (2021) and Ateş (2020), suggesting that personal feelings and peer pressure are not enough to overcome the physical inconvenience of changing travel habits. For PBC, in the context of Malaysian infrastructure, actual capability i.e accessibility, connectivity, predictable timing outweighs personal attitude.

Table 6. Hypothesis Testing

Hypothesis	Relationship	Beta	SE	t-value	LL	UP	Decision	R^2	f^2
H1	ATT -> Intention	0.056	0.060	0.933	-0.033	0.159	Not Supported	0.543	0.004
H2	PBC -> Intention	0.459	0.086	5.315	0.320	0.598	Supported	0.543	0.143
H3	SN -> Intention	-0.067	0.052	1.296	-0.161	0.015	Not Supported	0.543	0.005
H4	MO -> Intention	0.145	0.083	1.749	0.013	0.109	Supported	0.543	0.014
H5	EA -> Intention	0.201	0.053	3.817	0.118	0.287	Supported	0.543	0.038

Note: *p< 0.05

The results in Table 7 indicate that fuel subsidy did not significantly moderate the relationships between moral obligation, environmental awareness, and intention. Therefore, hypotheses *H6* and *H7* were not supported. One possible explanation is that Malaysians may view fuel subsidies primarily as a means of

easing the cost of living rather than as a factor influencing the relationship between environmental considerations and behavioural intention. This suggests that fuel subsidies alone may be insufficient to strengthen the influence of moral obligation and environmental awareness on intention. However, this interpretation should be considered cautiously, as the statistical results establish a lack of significant moderation rather than directly explaining respondents' motivations.

Table 7. Moderating Effects of Fuel Subsidy on the Relationships Between Moral Obligation, Environmental Awareness and Intention

Hypothesis	Relationship	Beta	SE	t-value	LL	UP	Decision
H6	MO -> Intention moderated by FS	-0.096	0.064	1.494	-0.122	0.187	Not Supported
H7	EA -> Intention moderated by FS	-0.029	0.027	1.082	-0.074	0.013	Not Supported

5. Discussions

The findings reveal that perceived behavioural control is the strongest factor that influences the intention to use sustainable transport. In the context of Malaysian transport, actual capability that driven by adequate infrastructure, reliable services and practical alternatives, is what truly dictates private transport user's choices. It is consistent with Nguyen-Phuoc et al. (2022) who found the perceived behavioural control to be the most critical driving factor for transport adoption. In addition, Dirgahayani & Sutanto (2020) and Kang et al. (2019) found that good station accessibility, commute convenience, flexible services and inexpensive fares are the tangible factors that make up this behavioural control. Individuals are more likely to intend to use sustainable transport when they perceive that adequate infrastructure, reliable services and practical alternatives are available.

In contrast, heavy reliance on practicality with the failure of attitude did not support the hypothesis. Having a favourable feeling or positive attitude toward sustainable transport is insufficient to overcome the physical inconveniences of using it. It is supported by the findings of Si et al. (2020), who also demonstrated that attitude had the lowest effect among predictors when it comes to sustainable transport usage. Furthermore, the subjective norm also failed to influence intention. Social pressure and approval from family or peers do not translate into actual pro-environmental travel behaviour if the transport system itself is difficult to use. It is aligned by Ateş (2020) who explains that receiving approval from friends and family does not actually give commuters the practical means or "courage" to act pro-environmentally. Ng & Phung (2021) and Fu & Juan (2017) also demonstrate that subjective norm frequently fails to directly influence public transport usage. Private transport users are highly pragmatic, no matter how much a they care about the environment (attitude) or what their social circle thinks (subjective norm), they will not switch to sustainable transport unless the network is efficient, affordable and highly accessible (perceived behavioural control).

Apart from that, moral obligation and environmental awareness also serve as a primary role in affecting the use of sustainable transport and vital for the model, as supported by Abdul Sukor et al. (2014) and Si et al. (2020). Individuals who perceive environmental protection as a moral duty are more inclined to consider public transport, carpooling or non-motorized transport as they understand that transport activities contribute to carbon emission and environmental harm. However, contrary to expectations, the findings indicate that the fuel subsidy has no moderating effect on moral obligation, environmental awareness or the intention to use sustainable transport

While shifting to sustainable modes may reduce these impacts. However, the findings indicate that fuel subsidy have no effect on moral obligation and environmental awareness or intention to use sustainable transport. This suggests that economic incentives alone are insufficient to shape environmental values. In addition, price mechanisms without accompanying awareness or infrastructure reforms may fail to alter behavioural intention. Fuel subsidies in Malaysia have been deeply entrenched since 1983 as a socioeconomic safety net designed to alleviate the high cost of living. With the price of RON95 artificially capped at US$0.466 per litre, making it among the cheapest globally and costing the government RM41.7 billion in 2022. Malaysians largely view this subsidy as a fundamental economic right and financial baseline. Because private transport users evaluate the subsidy purely as a financial survival mechanism, it does not interact with or dilute their internal environmental conscience. Therefore, a private transport user's moral obligation to the environment exists independently of the fuel price; the subsidy neither weakens their pro-environmental values nor provides the necessary push to strengthen their intention to change travel modes.

Furthermore, this failure of the moderating effect highlights the reality of behavioural costs and infrastructure constraints in the Klang Valley. This suggests that economic incentives or price mechanisms alone are insufficient to shape environmental values or alter behavioural intention. Even if an individual possesses high environmental awareness and a strong moral obligation, they are unlikely to abandon their heavily subsidized private vehicles if the alternative public transport network presents high behavioural costs, such as connectivity issues, slow travel distances or unpredictable timing. Ultimately, tweaking price mechanisms without accompanying systemic infrastructure reforms will fail to overcome the practical barriers of adopting sustainable transport.

6. Conclusions and policy recommendation

The results of this research provide useful insights for the formulation of future sustainable transport policies in Malaysia. The empirical evidence can provide some guidance to the authorities and requires careful reconsideration. This implies that fuel subsidy may reduce people financial burden in the short term but are unlikely to raise pro-environmental behavioural change. Policymakers may therefore consider more targeted subsidy mechanisms aimed at protecting vulnerable groups while gradually redirecting fiscal resources toward improving sustainable transport infrastructure. Such an approach could help reduce adverse environmental effects while balancing social equity concerns.

The findings of this research will provide valuable insights for policymakers and stakeholders to design effective strategies to encourage the adoption of sustainable transportation for commuting among Malaysian workers, even if they are provided with fuel subsidy. The role of perceived behavioural control shows the importance of providing efficient and accessible arrangements. It can be implemented by improving public transport network, service frequency, integrated ticketing and scheduling systems and ensuring affordability. Individuals are more likely to perceive sustainable transport as a viable an alternative to private vehicles when systems are efficient.

Finally, this study will provide empirical evidence on the relationship between attitudes, subjective norms, perceived behavioural control, moral obligation and environmental awareness on the intention to use sustainable transportation with existing fuel subsidy. Behavioural changes cannot rely solely on economic incentives as subsidy, but it need awareness campaigns, environmental education and social norm reinforcement work together as a complement. However, it's essential to note that implementing sustainable transport measures may also face some challenges, including initial infrastructure costs, resistance to change and the need for effective long-term policy and urban planning. Additionally, the specific consequences can vary depending on the scale and effectiveness of the sustainable transport initiatives and the local context.

In future, the fuel subsidy rationalization may contribute to energy security by reducing the dependency to fossil fuel while encouraging towards cleaner energy utilisation. At the same time, promoting sustainable transport such as use of public transport, e-bike, cycling and walking promote physical activity and a healthier lifestyle among residents. Hence, this study is necessity not only for the policy sustainability planning but environmental sustainability that combines behavioural improvement and moral responsibility. Future study could focus on actual behaviour rather than behavioural intention and expanding theoretical frameworks.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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Ethics Approval

Not applicable.

Conflict of Interest

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

Author Contributions

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Disclosure of AI Use

AI tools were not used in the preparation of this manuscript.

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