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Disrupting Oil Markets and Electric Vehicles (EVs) as Game Changers: Examining The EV Purchase Intention of Malaysian Gen Z

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Abstract

The ongoing conflicts in West Asia are expected to be a catalyst for a surge in electric vehicle (EV) sales in the country, with the market forecast to double to 8% this year. The problem of environmental pollution has also forced the transportation sector to accelerate the adoption of environmentally friendly EVs. This research aims to examine the relationship between factors influencing EV purchase intention among Malaysian Gen Z in the Southern region. Research data were collected via an online questionnaire distributed through cluster and convenience sampling. Data were processed using Structural Equation Modeling (SEM). Based on a sample of 258 respondents, perceived cost savings, car attributes, subjective norms, and personal environment norms positively influence purchase intention. In contrast, personal environment norms moderate the relationships between car attributes, subjective norms, and EV purchase intentions. Thus, the Malaysian government and relevant agencies need to support the transition to EVs through a series of policies, ranging from subsidies and fiscal incentives to regulations that support the development of charging infrastructure to accelerate EV adoption across all levels of society.

1. Introduction

Higher fuel consumption, coupled with almost daily commutes, has caused travel costs to rise rapidly. The recent rise in unsubsidized petrol prices in Malaysia reflects higher global oil prices. The increase in global oil prices from US$60 to US$65 per barrel to around US$110 currently makes price adjustments inevitable (The Star, 2026). The public generally understands that petrol prices have increased due to higher global oil prices. However, there is still a perception that prices should not increase because Malaysia is an oil-producing country. Although Malaysia exports crude oil and earns revenue, it still imports refined petroleum for domestic consumption, making it vulnerable to global price movements (The Star, 2026). In March 2026, the country declared an energy emergency following a surge in global oil prices and supply disruptions due to conflicts in West Asia. With limited fuel stocks, the government was forced to take emergency measures, including controlling energy consumption, limiting certain operations, and preparing for increased electricity tariffs (The Edge Malaysia, 2026). In some areas, the risk of power outages has become a major concern for the people. This situation has also been felt in other

Southeast Asian countries, as energy costs have risen and governments have begun encouraging cost-saving measures such as reducing electricity consumption and non-essential travel (Reuters, 2026).

Malaysia is driving towards a sustainable future, with electric vehicles (EVs) expected to take the lead. EVs contribute significantly to cleaner air and a greener Malaysia, and electricity is cheaper than petrol in the long run, especially as fuel prices rise (Malaysian Investment Development Authority, 2024). It reduced reliance on imported fossil fuels and strengthened Malaysia's energy self-sufficiency. Ambitious government goals, coupled with growing environmental awareness and the recent surge in oil prices, are paving the way for a significant shift towards electric mobility (Karuppiah & Ramayah, 2023). The Low Carbon Mobility Blueprint (LCMB) is charting the EV journey in Malaysia. The plan aims for EVs to make up 15% of total industry volume (TIV) by 2030 and a remarkable 80% by 2050 (Malaysian Green Technology and Climate Change Corporation, 2024). This ambitious target is supported by strong government support, with initiatives such as import tax and road tax exemptions for EVs making them a more attractive option for buyers, especially with rising fuel costs, and a target of 10,000 public charging stations by 2025 is underway, addressing range concerns, a key concern for potential EV owners (Poh et al., 2025). The government is committed to procuring EVs for ministries and government-related companies.

While Malaysia is on the right track, there are obstacles to overcome. While the target is high, the current number of charging stations is still low (Ramachandaran et al., 2023). If abroad, especially in developed countries such as the United States or China, their charging infrastructure may be sufficient. Each EV has an estimated driving range set by the manufacturer and the government (Komnos et al., 2022). However, achieving this figure is difficult in real driving conditions. The official distances for the estimate are determined by testing drivers' expertise and patience under ideal conditions. In cold temperatures, driving distance can be reduced by 40 percent. EVs are also not the vehicle of choice for those who must face snowy winters and even require less aggressive driving to get the maximum travel distance (Alganad et al., 2023). Concerns about distance and long charging times compared to petrol vehicles are still a barrier for some (Hensher et al., 2022). Despite advances in battery technology, EV travel distances remain limited compared to those of conventional vehicles (Xie et al., 2022).

While incentives help, EVs can still be more expensive than traditional cars (Alganad et al., 2023). Although EVs are expected to become more affordable over time, their initial purchase price remains higher than that of a regular car (Ramachandaran et al., 2023). Although EVs generally have lower operating costs because electricity is cheaper than gasoline, their upfront costs are much higher, including the cost of battery technology (Noordin & Zailani, 2025). Problems also arise in stratified residential areas such as apartments and condominiums, where installing personal chargers often faces regulatory hurdles from building management or joint management bodies (Ji & Gan, 2022; Wicki et al., 2022). Many residents are not permitted to install chargers in their own parking spaces, leaving EV users with no choice but to rely on public chargers (Mutarraf et al., 2022).

The Malaysian automotive industry is embracing the EV revolution. Major manufacturers are introducing electric car models to meet the growing demand for eco-friendly transportation. Additionally, companies like TNB are advancing their EV roadmaps, which outline plans to establish a robust charging network (Malaysian Green Technology and Climate Change Corporation, 2024). Malaysia’s commitment to EVs is a positive step towards a sustainable future. While challenges remain, the government and private sector are working together to overcome them (Vafaei-Zadeh et al., 2022). As battery technology advances, charging infrastructure expands, and costs become more competitive, especially with the rising cost of traditional fuels, EVs are set to become a dominant force on Malaysia’s roads (Hamzah et al., 2022).

Therefore, the purpose of this study is to examine the internal and external determinants of EV purchase intention among Malaysian Gen Z in the Southern region of Malaysia. These determinants include perceived cost savings, car attributes, subjective norms, and personal environment norms. Second, examine the moderate influence of personal environment norms. Concern for the environment is an integral part of an individual's mental attitude, reflected in their behaviour (Alganad et al., 2023; Mohd Noor & Nordin, 2023). Daily positive activities, such as the wise use of resources and concern for the environment, can be reflected in responsible waste management and in involvement in conservation and environmental restoration (Karuppiah & Ramayah, 2023; Kottala et al., 2025). Pollution is the main enemy in the era of global development towards the environment. The main cause is excessive smoke production from vehicles or industrial factories. This is because motorized vehicles in our country use conventional combustion engines. The smoke produced from this combustion system has polluted the air and thinned the ozone layer (Rehman, 2025). An individual with a strong set of personal environmental norms could strengthen the inclination to purchase an EV (Hamzah et al., 2022; Vafaei-Zadeh et al., 2022). Despite numerous empirical studies on EV adoption and its benefits, EV adoption remains below expectations (Sukma et al., 2023).

Although customer preferences for EVs vary depending on a combination of symbolic, environmental, economic, and prosocial benefits (Hamzah et al., 2022; Purwanto & Irawan, 2024; Sobiech-Grabka et al., 2022), there is a lack of research that discusses the various variables that influence intention to purchase EVs among Gen Z. Generation Z or Gen Z is known as the generation that grew up amid rapid technological development, easily accessible information, and increasingly urgent environmental issues. Gen Z generally has a higher level of

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environmental awareness than previous generations (Gomes et al., 2023). They are more open to environmental issues such as climate change, deforestation, pollution, and sustainability. This is due to easy access to information via the Internet and social media, as well as the increasing prevalence of environmental education across educational institutions (Ghouse et al., 2025). In addition, these variables differ across countries and cultures. There are also not many previous studies that cover Malaysia. Malaysia's unique environment as a developing market can differ significantly from that of other developed countries in terms of geography, culture, infrastructure, and living standards. Thus, there is a need for research in Malaysia on the factors influencing Malaysian Gen Z's interest in using EVs, so that EV adoption can increase in line with the government's plan.

2. Literature Review

2.1 Underpinning Theories of EV Purchase Intention

Purchase intention is a behavioral response to objects that signal the consumer's desire to purchase (Schiffman & Kanuk, 2008). Before making purchases, consumers generally gather information from personal experience and their surroundings. Purchase intention is a state in which a customer is ready and intends to purchase a product in the future. In examining the EV purchase intention, this study relied on three models (see Figure 1). First is the Theory of Planned Behavior (TPB). It is an expansion of the Theory of Reasoned Action. Under TPB, subjective norm is an individual's perception of others' expectations regarding behaviour (Ajzen, 1991). The normative belief, which is an individual's belief about the expectations of other people who are references, such as family, friends, or superiors, to agree or refuse to purchase EV, could influence their inclination to purchase EV.

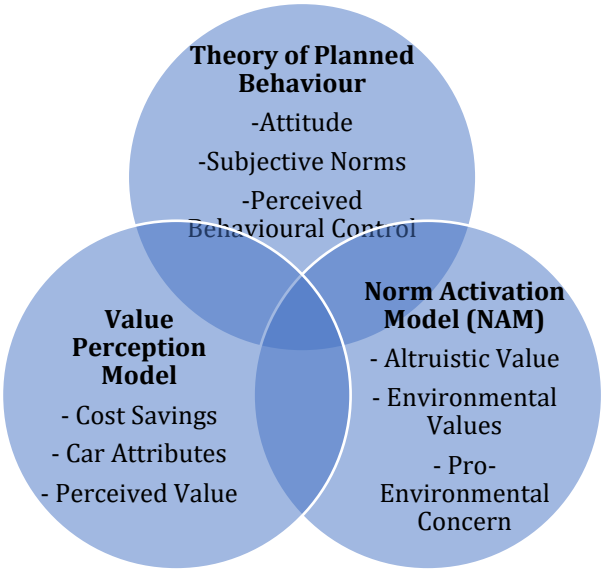

Fig. 1 *Underpinning theories of EV purchase intention*

The second theory is value perception, a model. The model explains the impacts of perceived cost savings and car attributes. This approach is not just about selling products or services, but about providing real added value to the customers. By understanding and prioritizing customer needs, they will feel valued and more inclined to continue buying and recommending the products (Luo et al., 2022). When customers understand the value they get by purchasing EVs, they will be more willing to pay more. Marketers and manufacturers need to focus on providing solutions and benefits that divert the customer's attention from price to the value obtained. This makes price a secondary consideration, not the primary one. Finally, the norm activation model (NAM) explains a person's willingness to sacrifice his or her personal interests (self-interest) for the survival or well-being of others. NAM theory is rooted in the study of altruistic behaviour (De Groot & Steg, 2009). The NAM scale assesses altruistic behaviours, but many researchers use it in fields related to pro-environmental behaviour. Those with environmental norms will feel an obligation to appreciate the natural resources, respect the rights, needs, and sustainable interests of all living beings in this world, and to preserve this natural environment so that the next generation can still enjoy nature with the same good quality (Alganad et al., 2023; Mohd Noor & Nordin, 2023). This could explain the moderate effect of personal environmental norms.

This study has integrated three theoretical frameworks in explaining EV purchase intentions among young people. TPB is used to illustrate that psychological and social influences can influence purchasing decisions. TPB explains that if a person has an intention, they have the ability and freedom to carry out that behaviour. This approach ignores the need to consider human values . Not all intentions are considered valid or good; on the contrary, intentions can also be wrong if they conflict with values. Therefore, this theory assumes that humans are absolute free agents, as if without the limitations of moral or religious values. Therefore, this study has used the Norm Activation Model to explain how personal environmental norms strengthen the impact of independent variables on EV purchase intentions. In addition, this study improves the model by using the Value Perception Model to explain socio-economic factors, namely EV price and perceived goodness. This combination explains that EV purchase intentions among young people result from an interaction among psychological, social, moral, and socio-economic factors. All these factors explain that they influence individual intentions and actions.

2.2 Perceived Cost Savings and Intention to Purchase EVs

EVs have gained significant popularity in recent years due to their many cost-saving benefits. Not only do they offer a more environmentally friendly alternative to traditional petrol-powered vehicles, but they also provide significant savings in terms of fuel and maintenance costs (Purwanto & Irawan, 2024; Sobiech-Grabka et al., 2022). One of the main advantages of EVs is reduced fuel costs. Electricity is usually cheaper than gasoline, allowing drivers to save money on their daily commute or long-distance trips (Bhutto et al., 2022). With the increasing availability of public charging stations, it is becoming easier for EV owners to recharge their cars at a lower cost than constantly refueling with gasoline (Ji & Gan, 2022). In addition to lower fuel expenses, EVs also offer lower maintenance costs. Unlike internal combustion engines found in conventional vehicles, electric motors have fewer moving parts that can wear out or require regular maintenance. This means EV owners can say goodbye to oil changes, transmission repairs, and other costly maintenance procedures associated with traditional cars (Xie et al., 2022).

In addition, by switching from gasoline-powered vehicles to EVs, individuals contribute significantly towards reducing greenhouse gas emissions and combating climate change (Purwanto & Irawan, 2024). Overall, EVs provide an attractive cost-saving solution for car enthusiasts, environmentally conscious individuals, and potential EV buyers (Noordin & Zailani, 2025). However, despite its cost savings, the price of an EV in Malaysia is more than RM150,000, and luxury EV models can reach up to RM580,000. Price represents the monetary value agreed upon in return for a product or service (Malaysian Investment Development Authority, 2024). For example, the Tesla Model S is RM600,000+ (premium), and the Mercedes E-Class is around RM300,000 to RM400,000 (premium petrol). Setting the right price can influence purchasing decisions, and prices have a significant impact on consumer adoption of green products (Zhang & Zou, 2018). Thus, the following hypothesis is posited:

H1: Perceived cost savings significantly influence the intention to purchase EVs among Malaysian Gen Z in the Southern region.

2.3 Car Attributes and Intention to Purchase EVs

EVs typically have a lower failure rate than fuel-powered vehicles (Zamil et al., 2023). This is because the drive system of an EV is relatively simple, consisting mainly of an electric motor, a battery, and a few electronic control systems. In contrast, a traditional fuel vehicle has an internal combustion engine, a gearbox, and a complex fuel system (Ramachandaran et al., 2023). The EV has almost no engine noise when driving, which is very good. This is because the electric motor operates almost silently, significantly reducing the noise level inside and outside the car (Xie et al., 2022). The electric motor can produce maximum torque immediately, enabling the EV to accelerate quickly at startup and reach high speed quickly (Komnos et al., 2022). This linear, smooth acceleration experience is one of the significant advantages of EVs, especially in city driving, where EVs' acceleration performance is more flexible (Purwanto & Irawan, 2024). The durability of fuel vehicles is relatively stronger. Gasoline cars with a full tank can usually travel hundreds of kilometers, and refueling takes only a few minutes (Kottala et al., 2025). In nutshell, some attributes of EVs include 100 percent driven by electricity, can be recharged using a home socket, the charger uses a three-pin plug, a full charge can go up to 100 kilometers, duration of use 30 minutes up to eight hours, 69 percent savings in gasoline purchase costs, 64 percent savings in maintenance costs, and no longer facing the situation of petrol price increases of 6 percent every year (Noordin & Zailani, 2025), however, while filling up with gas takes only 5 minutes, charging an EV takes longer. A full charge at home can take several hours, while a fast charge takes 20-40 minutes (Carvalhosa et al., 2025). EV battery packs degrade over time, resulting in a slight reduction in range. Battery pack replacement can also be very expensive, but it is rare during the vehicle's life and is often covered by the warranty. The availability of specialist technicians and EV-specific spare parts may still be limited compared to ICE, especially outside major cities (Morin et al., 2025). Therefore, the following hypothesis is posited:

H2: Car attributes significantly influence the intention to purchase EVs among Malaysian Gen Z in the Southern region.

2.4 Subjective Norms and Intention to Purchase EVs

Subjective norms have been tested across various cases and disciplines, including economics and public policy. However, the interaction of subjective norms in the environment can also affect a person's behaviour. Therefore, this research aims to test the influence of subjective norms on individual involvement in environmentally caring behaviour. Both Klabi and Binzafrah (2023) and Van Tuan et al. (2022) found that individual confidence in social norms is a fundamental factor that underlies purchasing decisions for EVs. Subjective norms can also lead to conformity, prompting others to follow the desired actions, thereby triggering a domino effect (Handarujati et al., 2024). Families can instill environmental preservation values in their family members (Van Tonder et al., 2023). This is done by setting an example and involving family members in environmental conservation activities, such as supporting EV adoption, reducing plastic use, or planting trees in the yard (Kottala et al., 2025). Moreover, influencers have a strong role in shaping consumer attitudes and perceptions towards brands. Additionally, influencer followers are more likely to engage with brands and consider recommendations from influencers (Karuppiah & Ramayah, 2023). Cattapan et al. (2023) found that when consumers see influencer-celebrity brand posts, they perceive the source as more trustworthy and show a more positive attitude towards the supported EVs. However, Al Mamun et al. (2025) found that the social norm factor is not the primary driver of the community's tendency towards green consumption. Determining the factors that influence consumer choice behaviour regarding environmentally friendly products includes functional value, social value, emotional value, conditional value, and epistemic value (Çam et al., 2025). The purchase intention for EVs may result from the positive value they provide to themselves and the environment. Consequently, the following hypothesis is posited:

H3: Subjective norms significantly influence the intention to purchase EVs among Malaysian Gen Z in the Southern region.

2.5 The Moderating Influence of Personal Environmental Norms

Norms are rules that guide and direct us toward achieving desired values (Noor et al., 2023; Sukma et al., 2023). Norm has a good purpose for each of its members. The purpose of norms is to be guidelines, instructions, policies, and order to create an orderly and peaceful society (Alganad et al., 2023). As well as regulating people's behaviour and distinguishing between right and wrong (Mohd Noor & Nordin, 2023). Examples of norms applied include banning the throwing of garbage into the river and separating organic waste using the 4R approach (reduce, recycle, reuse, and replace). Violating these rules can result in flooding because the river's flow is blocked by garbage; separating organic waste can help prevent it. According to Klabi and Binzafrah (2023), personal environmental norms refer to a person's sense of responsibility towards caring for and protecting the environment. When an individual has high moral responsibility, he or she sees the use of EVs as a necessity rather than a desire (Karuppiah & Ramayah, 2023; Kottala et al., 2025).

Needs are basic elements in life that are needed for human survival. These needs consist of goods and services that are important aspects for us to live comfortably and healthily. They will see EVs not just as vehicles of the future but also as solutions to environmental problems and as a means of consumer savings today (Rehman, 2025). Lee et al. (2023) found that individuals with high moral environmental identity have strong knowledge, perceptions, and practices regarding environmental conservation and are expected to integrate environmental policy into everyday life. Harmonious interaction between people and the environment can minimize environmental destruction and foster a positive, blessed habitation (Hamzah et al., 2022; Vafaei-Zadeh et al., 2022). However, according to Abdullah and Hassan (2025), personal environmental norms may be diverse and difficult to measure accurately, as the culture and social environment in which we grow up influence our morals and attitudes. The culture and social environment people experience shape how they view life, interpersonal relationships, and prevailing norms. Moreover, religion and belief also play an important role in shaping human morals and attitudes (Abdullah & Hassan, 2025). This is often a source of inspiration and motivation to do good and to avoid actions that harm oneself or others. Accordingly, the following hypothesis is posited:

H4: Personal environmental norms significantly moderate the relationship between (a) perceived cost savings, (b) car attributes, (c) subjective norms, and the intention to purchase EVs among Malaysian Gen Z in the Southern region.

Figure 2 shows the research model of the study.

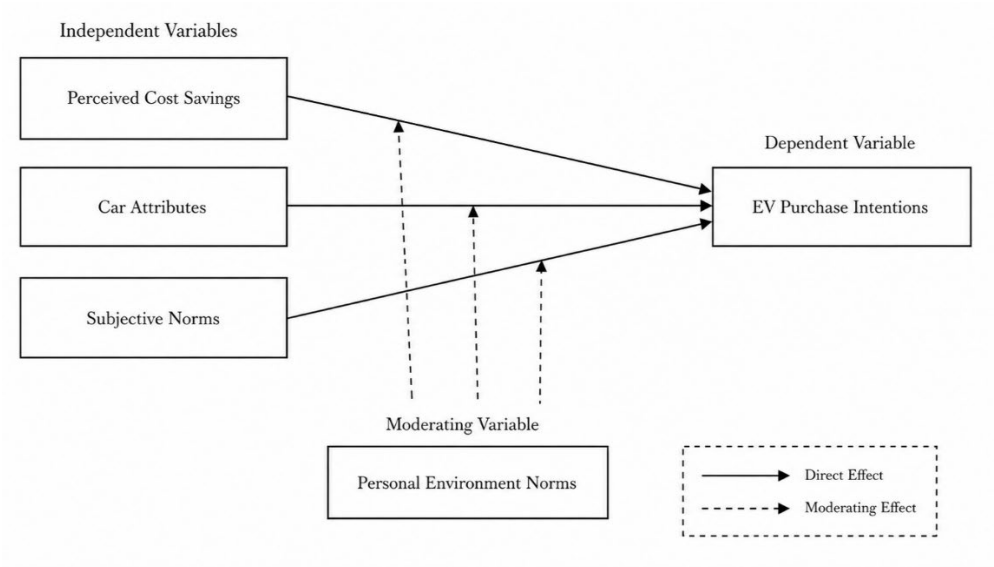

Fig. 2 *Research model*

3. Methodology

This study uses a quantitative survey method, which involves testing a structural equation model (SEM). It involves a survey study using a questionnaire distributed to respondents to obtain the required data. The study's population is Malaysian Gen Z living in Negeri Sembilan, Melaka, and Johor. Gen Z is a demographic group born between 1996 and 2012 (Dolot, 2018). These states are chosen as study sites because no studies have been conducted in these areas, even though EV distribution has expanded throughout the Klang Valley. Melaka has made history in the country's automotive industry, as the MG S5 EV became the first locally assembled EV model in the state. The Johor state government is targeting to establish 1,245 electric vehicle (EV) charging stations across the state by 2030. The increase in the number of EV charging stations will also attract more EV users from Singapore, following the island nation's decision to switch to clean-energy vehicles by 2030.

Apart from Tanjong Malim in Perak and Hulu Selangor in Selangor, Malaysia will have another modern automotive hub in the southern part of the Peninsula, namely Negeri Sembilan, through the Auto City development project in the Nilai Smart City. According to a Bernama report, the project is being developed with a gross development value (GDV) of RM1 billion. Kline (2016) asserted that the minimum sample size for SEM analysis is 200. Thus, the sample size for this study is 300 respondents, which exceeds the requirements for SEM analysis. The study used cluster and convenience sampling techniques. Cluster sampling is a sampling technique in which a population is divided into pre-existing groups (clusters), and the sample is selected from these clusters (Noor & Fuzi, 2024). Then, employing convenience, samples are selected from the most appropriate part of the population. This technique selects a sample based on ease of access. Although convenience sampling can be a useful method for data collection, applying it effectively requires careful consideration to minimize bias and increase the validity of findings. Before selecting a convenience sample, it is important to define the target population clearly. To increase the representativeness of the sample, the study used multiple recruitment sources (Bornstein et al., 2013). For example, combining data collected from diverse locations and populations can help diversify the sample and reduce potential bias. This can help weigh responses to better reflect the target population. Moreover, when analyzing data from a convenience sample, the study used Harman's One Factor Test, a statistical technique that assesses potential bias (Podsakoff et al., 2003).

Of the 300 survey questions distributed, 258 were answered within the given time (86% response rate). The study's 86% response rate is considered sufficient. All measurement items are revised from a study accompanied by Dodds et al. (1991) (perceived cost savings), Ismail et al. (2020) (car attributes), Ajzen (1991) (subjective norms), Stern et al. (1995) (personal environmental norms), and Zeithaml et al. (1996) (intention to purchase EV). Among the measurement items for measuring perceived cost savings are "EVs are affordable for people like me" and "I perceive the price of EVs as good value for money." Examples of items to measure car attributes are "EVs deliver reliable performance under different driving conditions" and "The acceleration and handling of EVs meet my expectations." To measure subjective norms, among the measurement items are "My friends believe purchasing an EV is a good idea" and "Most people who are important to me expect me to consider an EV." Among the measurement items assessing personal environmental norms are "I prefer environmentally friendly products" and "Reducing air pollution is a personal priority for me." Examples of measurement items for measurement intention to purchase EV include "I intend to purchase an EV within the next 12 months" and "I am likely to choose an EV for my next car." A five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used

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to measure each item. In this research, the data analysis tool used is Structural Equation Modeling (SEM), which is implemented in AMOS 29 to test the hypothesized model.

4. Findings

4.1 Demographic Profiles

Out of 258 respondents, the majority are male (n = 134, 51.9%), and the remainder are female (n = 124, 48.1%). In terms of age group, most respondents are 20-22 years old, with 71 respondents (27.5%). This followed with 22-24 (n=71, 27.5%), 18-20 (n=63, 24.4%), 25-30 (n=53, 20.5%), bachelor's degree (n=118, 45.7%), Diploma (n=71, 27.5%), Others (n=35, 13.6%), master's degree (n=23, 8.9%), and Secondary school (n=11, 4.3%). Regarding household income, most respondents are in the RM6,560–RM11,161 range (n=114, 44.2%). This followed up to RM5,351 (n=89, 34.5%) and above RM11,819 (n=55, 21.3%).

Table 1 *Demographic profiles*

Profile		Frequency (n)	Percentage (%)
Gender	Male	134	51.9
	Female	124	48.1
Age Group	18-20	63	24.4
	20-22	71	27.5
	22-24	71	27.5
	25-30	53	20.5
Highest Academic Qualifications	Secondary school	11	4.3
	Diploma	71	27.5
	Bachelor's degree	118	45.7
	Master's degree	23	8.9
	Others	35	13.6
Monthly Household Income	Up to RM5,351	89	34.5
	RM6,560 – RM11,161	114	44.2
	Above RM11,819	55	21.3

4.2 Harman's One Factor Test (CFA)

The questionnaire's biased responses were examined using Harman's Single Factor test, as recommended by Podsakoff et al. (2003). Harman's one-factor test is used to test the general method's variance,, with results indicating that one factor accounts for a large portion of the data's variation. The results of this test showed a variance of 36.56%, which is lower than the 50% threshold (Podsakoff et al., 2003). This means the biased element is not critical to the questionnaire data in this study.

4.3 Confirmatory Factor Analysis (CFA)

Model fit testing in AMOS is the process of evaluating how well the SEM model fits the available data. The SEM model consists of latent variables, indicators, and relationships between variables. Model fit is a measure of how well the model's assumptions hold. Students can use several types of fit indices, including: the ratio of the chi-square statistic to the degrees of freedom ($\chi 2/df$) to assess fitness, with a ratio of ≤ 3, Comparative Fit Index (CFI): Assesses the fit of the model relative to the independent model and a value >0.90 is considered good, Root Mean Square Error of Approximation (RMSEA): Measures the approximation error per degree of freedom of the model and a value <0.08 indicates an adequate fit, Goodness of Fit Index (GFI): Shows the proportion of variance explained by the model and a value close to 1 indicates a fit model (Hu & Bentler, 1999). The results of the CFA analysis showed $\chi 2/df = 2.524$, RMSEA = 0.056, GFI = 0.930, and CFI = 0.940. All measures used indicated that the data in this study provided a reasonable fit for the proposed model (Byrne, 2010).

4.4 Normality, Validity, and Reliability Assessments

The normality test shows that the critical ratio (c.r.) values are within ±2.58. This states that the data does have a multivariate normal distribution. In the SEM-Model analysis method, there are two validity tests and reliability tests that are important to perform to determine whether the indicators used in the construct are valid and

reliable in explaining the variable (Noor & Fuzi, 2025). The two tests are Composite Reliability (CR) and Average Variance Extracted (AVE). If the AVE is greater than or equal to 0.50, it indicates strong convergent validity. Then, Composite Reliability (CR) has a lower limit of 0.70 (Hair et al., 2014). As shown in Table 2, the variables used in this study meet the validity and reliability assumptions.

Table 2 *Normality, validity, and reliability assessments*

Variable	Items	Skewness	c.r.	Kurtosis	c.r.	Item Loadings	AVE	CR
Perceived Cost Savings	PCS1	-0.72	-2.00	2.30	1.82	0.740	0.551	0.786
	PCS2	0.84	1.90	3.00	2.10	0.752		
	PCS3	-0.58	-1.72	2.72	2.19	0.734		
Car Attributes	CA1	0.45	1.40	2.30	1.85	0.770	0.593	0.879
	CA2	-0.71	-2.10	3.73	2.34	0.763		
	CA3	0.53	1.75	4.11	2.40	0.765		
	CA4	-1.25	-2.30	5.34	2.12	0.780		
	CA5	0.90	2.15	3.40	2.27	0.773		
Subjective Norms	SN1	-0.82	-1.90	2.90	2.09	0.802	0.634	0.839
	SN2	0.46	1.80	3.11	2.15	0.811		
	SN3	-0.85	-2.10	4.00	2.25	0.776		
Personal Environmental Norms	PEN1	0.50	1.65	2.50	1.75	0.762	0.561	0.793
	PEN2	-0.72	-2.20	3.70	2.12	0.759		
	PEN3	0.70	1.75	4.12	2.20	0.726		
Intention to Purchase EVs	IT1	-0.92	-2.20	5.14	2.48	0.752	0.557	0.863
	IT2	0.63	1.77	3.55	2.45	0.764		
	IT3	-0.84	-2.10	4.20	2.38	0.750		
	IT4	0.77	2.05	3.95	2.30	0.747		
	IT5	-0.90	-2.25	4.75	2.45	0.717		

4.5 Discriminant Validity

Discriminant validity measures how far a construct is different from other constructs by comparing the value of the square root of the AVE with the correlation between constructs (Fornell & Larcker, 1981). Based on the cross-loadings in Table 3, it can be concluded that each indicator within a construct shows higher loadings within that construct, indicating that each indicator differs from indicators in other constructs. The instruments used in this research have met the discriminant validity criteria.

Table 3 *Discriminant validity results*

No.	Variable	1	2	3	4	5
1	Perceived cost savings	**0.742**				
2	Car Attributes	0.503	**0.770**			
3	Subjective Norms	0.400	0.481	**0.796**		
4	Personal Environmental Norms	0.427	0.399	0.464	**0.749**	
5	Intention to Purchase EVs	0.390	0.411	0.480	0.510	**0.746**

Note: Values in the diagonal show the square root of AVE

4.6 Moderation Analyses

From Table 4, there are relationships between perceived cost savings (β = 0.410, t = 5.46, p<0.001), car attributes (β = 0.407, t = 5.75, p<0.001), subjective norms (β = 0.396, t = 5.38, p<0.001), and intention to purchase EV. Thus, hypotheses 1, 2, and 3 are accepted. From Table 4, personal environmental norms have a significant indirect influence on the relationship between car attributes and intention to purchase EV (β = 0.158, t = 2.43, p<0.01) and on the relationship between subjective norms and intention to purchase EV (β = 0.240, t = 3.29, p<0.01). Therefore, hypotheses 4(b) and 4(c) are accepted. However, the results indicate there is no relationship between perceived cost savings and intention to purchase EV (β = 0.017, t = 0.280, p>0.05). Therefore, hypothesis 4(a) is rejected. The direct effect of the relationship between car attributes, subjective norms, and intention to purchase EV,

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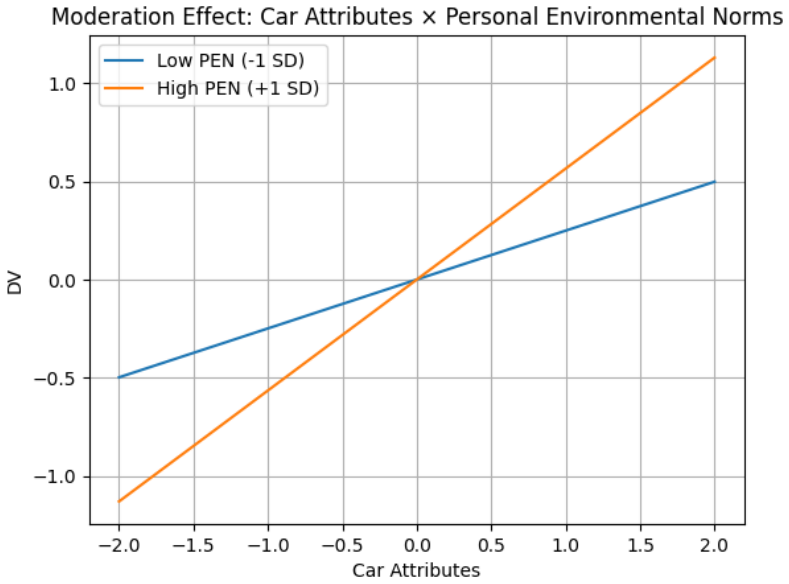
moderated by personal environmental norms, is supported by the lower limit confidence interval (LLCI) and the upper limit confidence interval (ULCI) values that do not exceed 0 and are both positive; thus, the indirect effects are significant.

Table 4 *Moderation analyses*

Direct Effect	***β***	**S.E**	***t***	***p*-value**	**LLCI**	**ULCI**
Perceived Saving Costs → DV	0.410***	0.070	5.46	0.000	0.263	0.537
Car Attributes → DV	0.407***	0.071	5.75	0.000	0.256	0.540
Subjective Norms → DV	0.396***	0.073	5.38	0.000	0.240	0.550
Interaction Effect	***β***	**S.E**	***t***	***p*-value**	**LLCI**	**ULCI**
Perceived Saving Costs*Personal Environmental Norms→ DV	0.017	0.060	0.28	0.750	-0.107	0.127
Car attributes*Personal Environmental Norms → DV	0.158**	0.064	2.43	0.012	0.021	0.275
Subjective Norms*Personal Environmental Norms→ DV	0.240**	0.072	3.29	0.001	0.087	0.343

Note: Significance level: ***p < 0.001; **p <0 .01.
DV = Intention to Purchase EVs

As shown in Figure 3, as personal environmental norms increase, the positive effect of car attributes on the intention to purchase becomes stronger, and the positive effect of subjective norms on the intention to purchase EV also increases substantially.



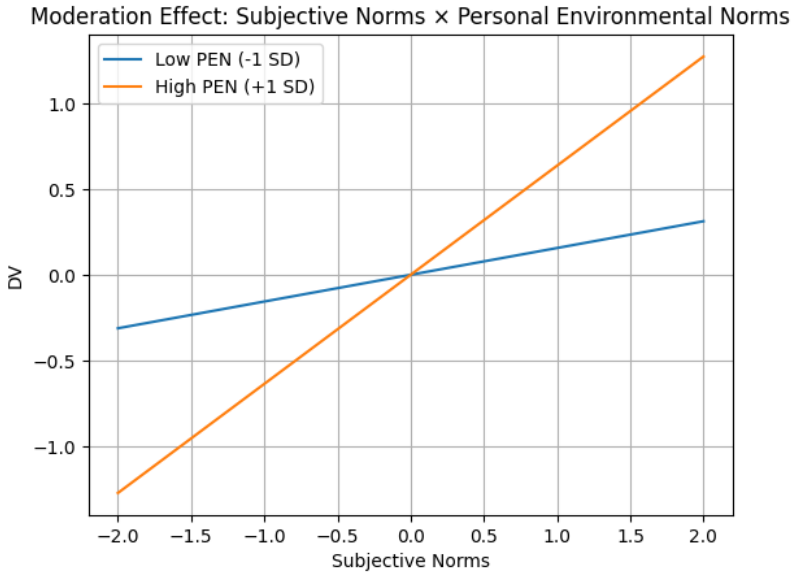


Fig. 3 *Moderation slope graph*

5. Discussion

Tensions in the Strait of Hormuz and global oil supply disruptions are forcing citizens to reassess their future vehicle choices. At the same time, Malaysia is witnessing a shift in vehicle choices as EVs are no longer just a hobby for the elite. These developments show that EVs are increasingly becoming a real alternative to petrol cars. This research aims to examine the factors influencing EV purchase intention among Malaysian Gen Z in the Southern region. Based on a sample of 258 respondents, perceived cost savings, car attributes, subjective norms, and personal environment norms positively influence purchase intention. EVs significantly reduce emissions, making them a greener alternative to traditional gas-powered vehicles (Vafaei-Zadeh et al., 2022). With advanced features such as autopilot capabilities and connected car systems, EVs put cutting-edge technology at the driver's fingertips (Rehman, 2025). Long-term savings on fuel and maintenance can offset the EV's higher initial purchase price (Ramachandaran et al., 2023; Wicki et al., 2022). Electricity is typically cheaper than gasoline, allowing EV owners to enjoy big savings at the pump (Bhutto et al., 2022). The cost per mile for electricity is typically lower than for gasoline, resulting in long-term financial benefits for drivers (Kottala et al., 2025). Moreover, EVs have higher energy efficiency than internal combustion engine (ICE) vehicles (Purwanto & Irawan, 2024). While conventional cars dissipate a large amount of energy through heat, electric motors convert a higher percentage of electrical energy into vehicle movement (Xie et al., 2022). Another advantage of EVs is lower maintenance costs. Unlike ICE vehicles with complex engines and many moving parts, EVs have simpler drivetrains that require less maintenance (Zamil et al., 2023). With fewer components exposed to wear and tear, EV owners can save money on repairs and replacements (Purwanto & Irawan, 2024; Sobiech-Grabka et al., 2022). Moreover, past studies have revealed that subjective norms drive behavioural changes related to the environment (Handarujati et al., 2024; Klabi & Binzafrah, 2023; Van Tuan et al., 2022).

Second, findings indicate that personal environment norms moderate the relationships among car attributes, subjective norms, and EV purchase intentions. Personal environmental norms do not depend on car attributes or subjective norms, and both moderators and independent variables affect the dependent variable, EV purchase intention. However, there is a distinction between the independent and moderating variables. In this study, personal environmental norms can affect the relationships between car attributes and purchase intention, as well as between subjective norms and purchase intention. Norms are deeply embedded beliefs held by individuals about the environment, guided by an informed understanding of it (Noor et al., 2023; Sukma et al., 2023). It serves as a guiding principle in a person's life that directs both thought processes (cognitive) and emotional reactions (affective) to environmental issues (Hamzah et al., 2022; Vafaei-Zadeh et al., 2022). The non-mediation effect of personal environmental norms on the relationship between perceived cost savings showed that young consumers who are forward-looking and financially aware can shape a stable financial future. They can see EVs offer lower maintenance costs and are more environmentally friendly (Bhutto et al., 2022; Ji & Gan, 2022).

As a result, the government has been urged to extend the existing tax incentives for EV batteries to accelerate the country's goal of reducing its reliance on fossil fuels and attracting long-term investment (Wang et al., 2022). The longer incentive period will stimulate and accelerate the construction of EV charging stations nationwide. Following China's example, consumers who switch from conventional cars to EVs will receive various incentives,

such as discounts on charging fees, special parking spaces, exemptions from road congestion tax, and the use of special registration numbers. To get tax breaks from the government, manufacturers must produce high-quality batteries by meeting requirements such as high energy content (energy density) per kilogram of battery. These requirements have led China's battery manufacturers to work hard to produce high-quality batteries (Zahoor et al., 2023).

Foreign companies that want to sell electric cars in China's domestic market must also buy Chinese-made batteries. In terms of finance, the government can subsidize charging station operators (Zahoor et al., 2023). At the same time, in terms of policy, the Malaysian government can streamline the permitting process for charging-station construction, reducing the time and workforce required and encouraging more companies and automotive manufacturers to get involved. The development of EV charging infrastructure is a critical factor in the growth of electric mobility (Wang et al., 2022). Currently, many charging stations are concentrated in major cities such as Kuala Lumpur, Johor Bahru, and Penang, reflecting the reality that EV buyers are mostly middle- and upper-income groups living in urban areas. However, rural areas interested in switching to EVs face major challenges, not only in access to charging stations but also in confidence in using EVs over long distances. Despite several challenges, concerted efforts from governments, enterprises, and consumer advocates can overcome these obstacles, provide strong support for the sustainable development of EVs, and achieve a win-win outcome in terms of environmental and economic benefits.

Next, formal education is seen as the best means and plays a significant role in shaping a generation with strong knowledge and a clear understanding of the environment (Bi et al., 2023). Environmental education has been introduced globally, including in Malaysia, as a long-term step to foster a positive attitude among future generations towards the environment. Educational institutions, especially higher education institutions, are suitable settings for educating and shaping positive environmental behavior among the younger generation (Wang et al., 2022). Mustafa et al. (2026) found that environmental education at schools or higher education institutions, to some extent, affects an individual's environmental sustainability practices. Car manufacturers and marketers are encouraged to adopt green marketing strategies and practices to enhance consumer perceptions of brands with a strong environmental impact (Bi et al., 2023).

6. Conclusion

The rise in oil prices is due to global supply disruptions, particularly conflicts in the Middle East and risks in the Strait of Hormuz. Malaysia, although an oil producer, remains dependent on certain oil imports. This increase affects energy, food, and regional economies. Amidst this pressure, EVs are no longer just a symbol of green technology, but are increasingly becoming a rational economic choice (Kottala et al., 2025; Purwanto & Irawan, 2024). As petrol and diesel prices continue to rise, owning an internal combustion engine (ICE) vehicle is increasingly seen as a long-term liability. Overall, EVs offer a promising solution for cost savings while benefiting the environment by reducing emissions (Bhutto et al., 2022; Ji & Gan, 2022). The study found that perceived cost savings, car attributes, subjective norms, and personal environment norms positively influence purchase intention. In contrast, personal environment norms moderate the relationships between car attributes, subjective norms, and EV purchase intentions. EVs are not the ultimate solution to the climate crisis, but they are an essential component in the transition to low-carbon mobility. Their effectiveness depends on the extent to which policies, infrastructure, and societal acceptance are developed sustainably and inclusively. As a country that wants to champion sustainability, Malaysia needs to ensure that the transition to EVs is not just an externality but contributes to long-term environmental conservation. This study contributes to a new understanding of the factors influencing Gen Z's intention to buy EVs in South Malaysia. It shows that more people are switching to EVs in Malaysia. Johor, Negeri Sembilan, and Melaka also saw a significant increase in EV usage. In this case, the federal and state governments must ensure that EV infrastructure is available nationwide. For example, PLUS plans to provide 100 Direct Current Fast Chargers (DCFC) and R&R Seremban (Arah Selatan) will also be equipped with 6 charge points in parking areas. Therefore, the development of EVs in South Malaysia is not limited to vehicles; it encompasses the entire ecosystem, including batteries, charging infrastructure, semiconductors, software systems, and grid systems. Malaysia needs to make a clear decision to not only be a passive user, but instead to be an active participant in the EV ecosystem and clean energy at the top level.

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Conflict of Interest

Authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design:*** *Ahmad Zafran Irfan Zainal Abidin, Nurul Hidayana Mohd Noor;* ***data collection:*** *Ahmad Zafran Irfan Zainal Abidin;* ***analysis and interpretation of results:*** *Ahmad Zafran Irfan Zainal Abidin;* ***draft manuscript preparation:*** *Nurul Hidayana Mohd Noor. All authors reviewed the results and approved the final version of the manuscript.*

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