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The Significant Role of Emotions in the Perspective of Malaysian Consumers Toward Converting from Conventional Vehicles to Electric Vehicles

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Abstract: Consumer interest in electric vehicles (EVs) among individuals in Malaysia has been significantly low despite the government's presentation of several promising options. Numerous obstacles hinder the extensive implementation of electric vehicles (EVs), encompassing insufficient charging infrastructure, absence of EV policies and local manufacturers, suboptimal vehicle design in terms of economic efficiency, restricted EV range, inadequate availability of EV service points, and elevated tariffs imposed on imported EVs. The primary aims of this study are to examine and emphasize the significance of addressing emotional obstacles that impact the propensity of Malaysian consumers to transition from internal combustion engine (ICE) vehicles to electric vehicles (EVs). The research is considered highly applicable for implementation due to its alignment with environmental protection, the government's objectives, and the nation's climate change agenda, specifically the implementation of the Low Carbon Mobility Actions Plan 2021-2030. The study revealed a correlation between market and performance in Malaysia, the perceived cost sacrifice of electric vehicles (EVs) in Malaysia, and external factors such as Malaysian government incentives. The interconnectivity of these elements plays a crucial role in shaping the emotional perspective of Malaysian consumers regarding the adoption of electric vehicles (EVs).

Keywords: Electric Vehicle Acceptance, Consumer Emotion Perspective, Driving Range, Charging Infrastructure

JEL Classification: D12, Q55, H23
Paper Type: Research

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1. INTRODUCTION

The primary means of transportation within Malaysia is roadways, significantly influenced by the country's geographical features. The transportation industry remains a significant consumer of global oil reserves and is a major contributor to greenhouse gas emissions. According to the United States Environmental Protection Agency (EPA), road transport is the predominant source of air pollution in urban areas, responsible for over 70% of Malaysia's total emissions. It also contributes to approximately 21% of Malaysia's carbon dioxide emissions as of 2016 (Kwan et al., 2023).

The transition to electric vehicles (EVs) is considered one of the most effective solutions to address the environmental impact of conventional vehicles. Unlike petrol or diesel-powered vehicles, EVs produce significantly fewer air pollutants and greenhouse gas emissions (EDF, n.d.). Despite their existence for nearly a century (Vepachedu, 2017), EVs are still in the development phase, and their acceptance remains low, particularly in developing countries like Malaysia (Situ, 2009).

Malaysia has not kept pace with its neighboring countries regarding EV adoption, even though the country ranks high in energy consumption. This is largely due to challenges related to energy efficiency and carbon emission reduction (Adnan et al., 2017). Public acceptance and the diffusion of EVs remain under-researched topics, especially in Malaysia, where the successful adoption of EVs has yet to be achieved (Adnan & Vasant, 2016; Hamzah et al., 2022). The present research aims to examine the emotional perspective of Malaysian consumers regarding the transition from conventional internal combustion engine (ICE) vehicles to EVs. It will focus on the factors that influence consumer intention, barriers to purchase, and usage of EVs.

1.1 Electric Vehicle Trends in Malaysia

Malaysia has been slow to adopt EVs despite starting initiatives as early as 1996 (WapCar, n.d.). As of September 2020, only a few new battery electric vehicles (BEVs) were available in the Malaysian market, including the Nissan LEAF, Mini Cooper Electric, BMW i3s, and Porsche Taycan. The market is predominantly composed of hybrid EVs (HEVs) and plug-in hybrid EVs (PHEVs) (Veza et al., 2022).

Despite advancements in battery technology and the reduction of associated expenses, Malaysia's EV adoption rate remains low. Sales increased from 274 units in 2021 to 2,631 units in 2022, marking an 860% increase, but this number is still considerably low compared to other countries (Paultan, n.d.).

1.2 Electric Vehicle Trends in Malaysia's Neighbouring Countries

Indonesia, a neighboring country, has made substantial progress toward EV adoption through initiatives such as the Program Kendaraan Bermotor Listrik Berbasis Baterai (KBLBB) or BEV program, aiming to procure 132,000 EVs and 2.45 million electric motorcycles by 2030 (Veza et al., 2022). Additionally, the Indonesian government has allowed EV conversion services, while Malaysia currently prohibits such services (The Malaysian Reserve, n.d.)

Countries like the United States, France, and India have adopted EV conversion services, which are seen as an alternative to promoting sustainability and reducing greenhouse gas

emissions. The availability of fast-charging stations and improved infrastructure has significantly accelerated EV adoption in these countries (Rauh et al., 2015).

1.3 Malaysia Low Carbon Mobility 2021 - 2030

The Malaysian government has established the Low Carbon Mobility Blueprint 2021–2030 to achieve a total industry volume (TIV) of at least 15% through incorporating EVs and hybrid vehicles. This initiative demonstrates the government's commitment to promoting sustainable transportation practices (BERNAMA, n.d.). However, to reach its target of 100,000 EVs by 2030, alternative strategies beyond incentives and tax exemptions are needed (MIDA, n.d.).

1.4 Research Purpose and Contribution

The increasing global emphasis on EV adoption highlights the importance of promoting sustainable economic growth. However, Malaysian consumers' familiarity with EVs remains low (Adnan et al., 2017). Therefore, this study aims to examine the emotional factors influencing Malaysian consumers' willingness to switch from ICE vehicles to EVs. This research is aligned with the principles of nature conservation and Malaysia's Low Carbon Mobility Actions Plan 2021–2030.

2. LITERATURE REVIEW

This section explores the emotional factors affecting Malaysian consumers' choices between ICE vehicles and EVs. The literature review focuses on perceived value, perceived quality, perceived sacrifice, and external factors to establish a conceptual framework.

2.1 Perceived Value (Ecological Concern)

Personal consumption has significant ecological implications. The transportation sector contributes approximately 25% to 30% of Malaysia's total greenhouse gas emissions, with ICE vehicles being the dominant source (LCMB, 2021). Gen Y consumers in Malaysia have shown interest in EVs due to quality concerns and environmental awareness (Yeoh, 2023). Studies also indicate that social influence, facilitation conditions, and perceived enjoyment significantly impact the intention to use EVs (Khazaei & Tareq, 2021).

H1: The emotional perspective of Malaysian consumers regarding EV adoption is influenced by ecological considerations.

2.2 Perceived Quality (Current Electric Vehicles Market and Performance in Malaysia)

Despite the increasing environmental awareness among consumers, performance-related concerns significantly influence their adoption of electric vehicles (EVs). Aspects such as vehicle design, power, comfort, and driving experience are crucial factors impacting consumers' purchasing decisions (Ioncica et al., 2012; Bengler, 2017). The limited availability of public charging infrastructure is a significant barrier to the widespread adoption of EVs in Malaysia, with potential users expressing concerns about "range anxiety" (Eco-Business, n.d.).

The Malaysian Automotive Association reported that 2,093 EVs were registered by the end of the previous year, and projections indicate a 45.6% increase in passenger EV sales in 2023, amounting to 4,449 units (The Star, n.d.). However, the prolonged charging time and insufficient charging infrastructure hinder the appeal of EVs. This situation is worsened during festive seasons when traffic congestion exacerbates the problem (MalaysiaNow, n.d.).

Furthermore, the complexity and unreliability of charging applications contribute to consumer dissatisfaction. Poor usability and technical failures further diminish the appeal of EVs to Malaysian consumers (SoyaCincau, n.d.). In contrast, countries like South Korea view vehicles as symbols of social status, influencing their preference for large sedans over compact EVs, which are more popular in Malaysia due to their affordability and fuel efficiency (Kim & Heo, 2019; NST, n.d.).

H2: The emotional perception of Malaysian consumers toward EV adoption is influenced by the current state of the EV market and its performance in Malaysia.

2.3 Perceived Sacrifice (Electric Vehicle Cost in Malaysia)

The high cost of EVs is widely regarded as a primary obstacle to their acceptance in Malaysia. Hybrid models in the country are priced significantly higher than similar models sold elsewhere, creating a financial barrier for potential consumers (Hamzah et al., 2022). The minimum market value of EVs in Malaysia is approximately RM150,000, making them inaccessible to the majority of the population, particularly the B40 demographic (MIDA, n.d.).

Even the most affordable fully electric car in Malaysia, the Neta V by Hozon Auto, is priced at RM98,800, which is still beyond the reach of most consumers (SoyaCincau, n.d.). The secondary market for pre-owned EVs faces significant depreciation due to consumer concerns about battery replacement costs. Batteries account for approximately 40% of the overall vehicle cost, making replacement a substantial financial burden (Hamzah et al., 2022).

Furthermore, maintenance costs and concerns about reliability also contribute to the low adoption rate of EVs in Malaysia. This contrasts with neighboring Thailand, where infrastructure and financial performance have little impact on EV purchasing intentions (Thananusak et al., 2017).

H3: The adoption of EVs among Malaysian consumers is influenced by perceived sacrifice, particularly the cost of EVs in Malaysia.

2.4 External Factor (Malaysian Government Incentive)

The Malaysian government has made efforts to promote EV adoption through various incentives, including tax exemptions and subsidies for charging infrastructure (Asadi et al., 2022). Despite these initiatives, the adoption rate remains low, with high prices and inadequate charging infrastructure being major deterrents (BERNAMA, n.d.).

Additionally, Malaysia’s road infrastructure presents limitations for optimal EV utilization. For instance, underdeveloped regions like Sabah lack adequate infrastructure to support EVs, further discouraging adoption (Songkin & Hj Jaafar, 2023). In contrast, Singapore, a

neighboring developing country, has already established 3,600 charging stations within a much smaller geographical area (Eco-Business, n.d.).

The Malaysian government has set ambitious goals to implement the Low Carbon Mobility Action Plan 2021–2030, aiming to provide up to 4,000 EV charging points by 2023 and increase this number to approximately 10,000 by 2025 (MIDA, n.d.). However, a lack of qualified personnel and spare parts continues to hinder the effectiveness of these incentives.

H4: The emotional response of Malaysian consumers toward EV adoption is influenced by government incentives and external factors.

2.5 Conceptual Framework of The Study

The conceptual framework of this research is based on the interaction between Perceived Value (Ecological Concern), Perceived Quality (Market and Performance), Perceived Sacrifice (Cost), and External Factors (Government Incentives). These variables influence the emotional factors affecting Malaysian consumers' decisions to switch from internal combustion engine vehicles to electric vehicles.

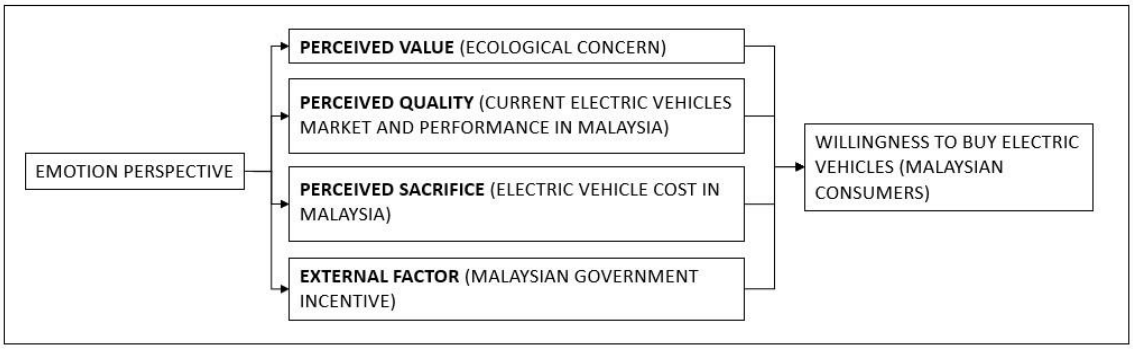

Fig. 1. Conceptual Framework of Study. Source: Modified model from Phuah et al. (2022).

3. METHODOLOGY

This study employed a systematic approach to data processing involving three primary stages: literature search and screening, data extraction and analysis, and generating a comprehensive literature review. The methodology aimed to ensure a structured review of the existing literature on emotional factors influencing Malaysian consumers' adoption of electric vehicles (EVs).

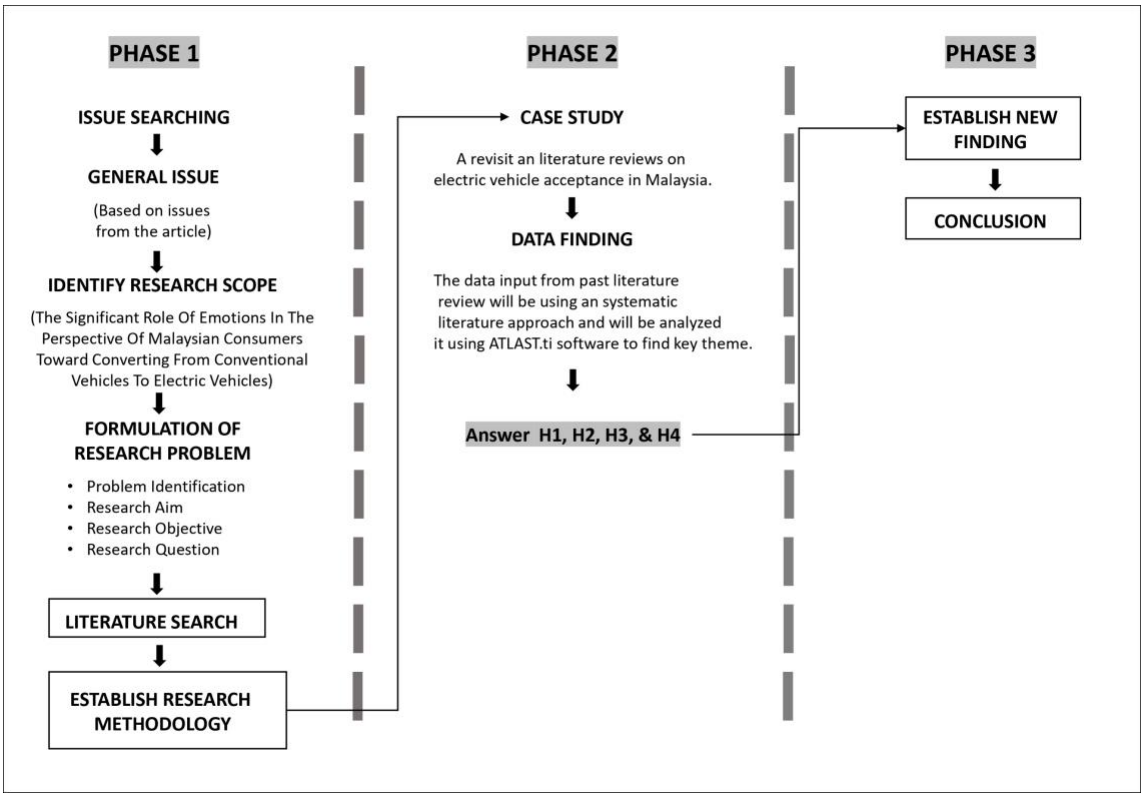

Fig. 2. Research Methodology Process.

3.1 Literature Search and Screening

The literature search involved collecting relevant articles, journals, conference papers, and credible online sources focusing on EV adoption, consumer behavior, ecological concerns, government incentives, and economic factors. Keywords such as “Electric Vehicle Adoption in Malaysia,” “Consumer Perception of EVs,” “Government Incentives for EVs,” and “Ecological Concerns and EVs” were used to retrieve scholarly articles and reports.

3.2 Data Extraction and Analysis

The data extraction process involved filtering relevant information to address the research objectives. The extracted data was analyzed using ATLAS.ti 9, a qualitative data analysis tool designed for thematic analysis. The software helped identify recurrent themes and patterns related to perceived value, quality, sacrifice, and external factors.

3.3 Study Data Analysis and Framework Development

Thematic analysis was conducted to identify significant themes associated with emotional factors affecting Malaysian consumers’ acceptance of EVs. The four primary themes derived from the literature review include:

(i) Perceived Value (Ecological Concern): How environmental awareness influences EV adoption.

(ii) Perceived Quality (Market and Performance): Concerns about design, comfort, power, and availability of charging infrastructure.
(iii) Perceived Sacrifice (Cost): Financial burden and depreciation concerns.
(iv) External Factors (Government Incentives): Effectiveness of government policies in promoting EV adoption.

3.4 Conceptual Framework Development

Based on the literature review, a conceptual framework was developed to illustrate the relationships between the emotional factors and their influence on EV adoption. The framework is adapted from the model proposed by Phuah et al. (2022) with modifications to suit the Malaysian context.

4. DATA ANALYSIS AND DISCUSSION

The thematic analysis identified four critical themes that significantly impact Malaysian consumers' emotional perspectives toward EV adoption.

4.1 Perceived Value (Ecological Concern) - Hypothesis Explanation (H1)

The present study posits a research hypothesis, referred to as H1, which suggests that the perceived value of ecological concerns may significantly influence the emotional factors that drive consumers' willingness to adopt electric vehicles (EVs) in the country under investigation. The exacerbation of petrol emissions in this nation, attributable to automobiles, is a discernible phenomenon. The populace of this nation has become cognizant of the necessity to modify their vehicular usage patterns owing to the issue above. The adoption of electric vehicles (EVs) is considered a viable solution. However, the unpredictability of weather patterns and unsuitable terrain significantly impede this transition. Such a problem can alter the user's perspective and emotional reaction regarding the vehicle's reliability.

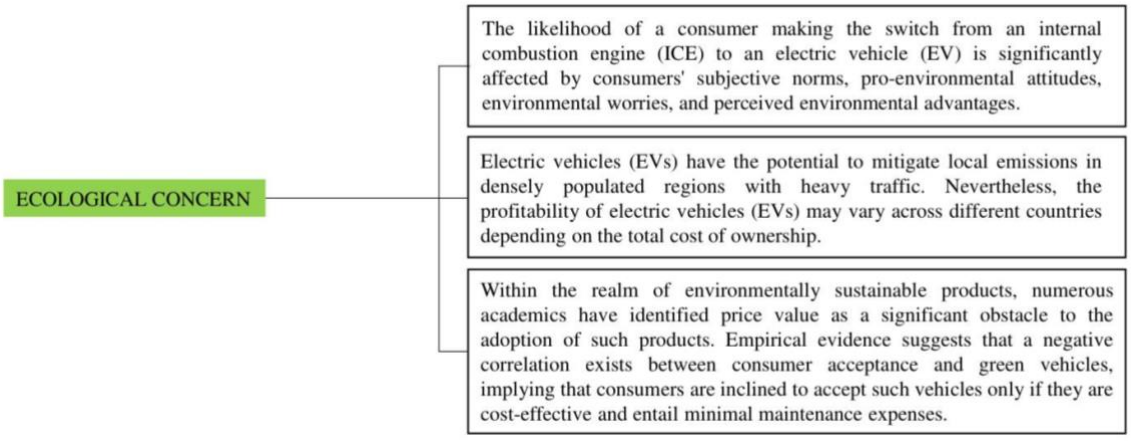

Fig. 3. Perceived Value (Ecological Concern) – (ATLAST.ti Extract)

4.2 Perceived Quality (Current Electric Vehicles Market and Performance in Malaysia) - Hypothesis Explanation (H2)

The role of a driver's experience and emotions has consistently been a significant factor in the unique selling proposition of vehicles, serving as a crucial foundation for product development. However, hypothesis H2 suggests a negative correlation exists between the emotional perspective of consumers and the perception of quality concerning the present market and the performance of electric vehicles (EVs) in Malaysia. The study results suggest a significant inadequacy of publicly available charging infrastructure nationwide. The matter under consideration is a matter of considerable apprehension for existing and potential electric vehicle (EVs) proprietors, as it relates to the difficulty of obtaining charging facilities while away from their domicile.

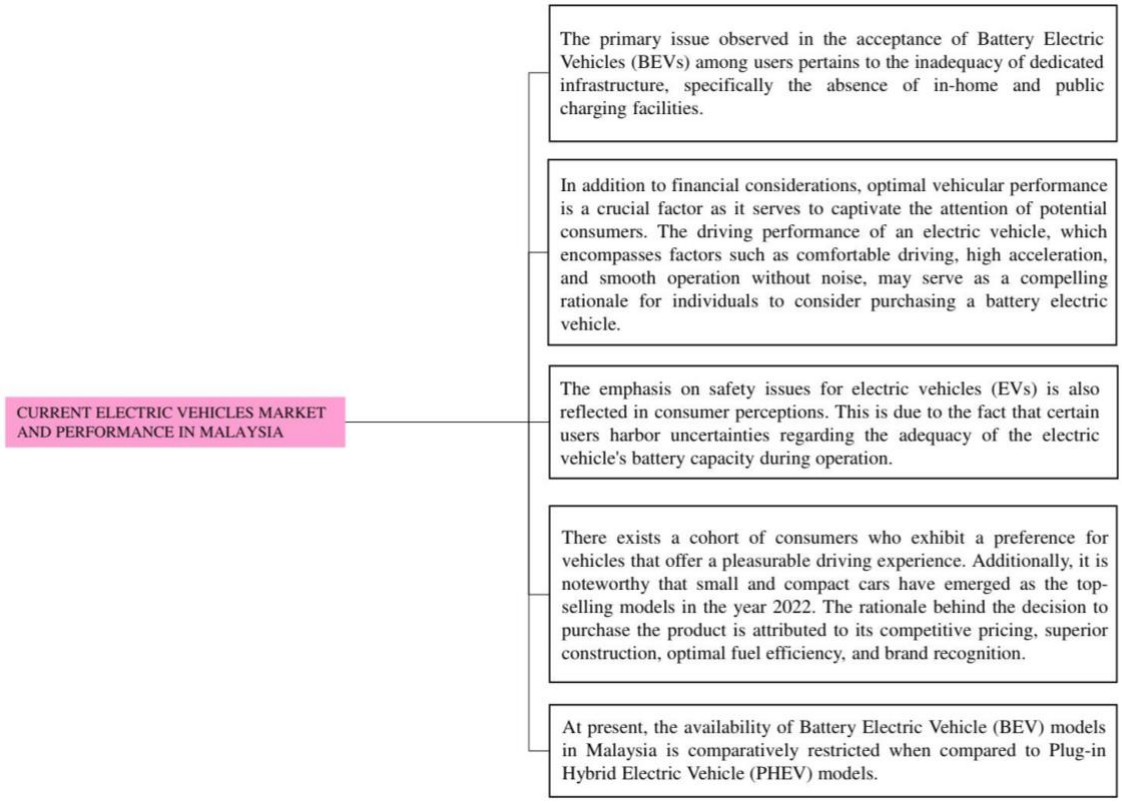

Fig. 4. Perceived Quality (Current Electric Vehicles Market and Performance in Malaysia) – (ATLAST.ti Extract).

The prolonged period required for charging electric vehicles (EVs), which may surpass 30 minutes, can potentially disturb users' travel schedules and psychological well-being. During the festive period, traffic congestion is common, which can be exacerbated by the deployment of electric vehicle (EV) charging stations. In the event of a significant depletion of the electric automobile's battery level, it will subsequently transition into a reduced speed mode, commonly known as 'turtle mode'. This has the potential to lead to further travel delays and create disruptions for other users. The most unfavorable situation pertains to the possibility of being stranded due to insufficient battery capacity to sustain their journey in the event of any deviation from their customary departure schedule and route. The problem encountered while using the charging application can affect the

emotional well-being of the user. The research results suggest that users face challenges in locating charging stations via the app, particularly in cases where server failures occur. Furthermore, users perceive the usability of the application to be challenging.

4.3 Perceived Sacrifice (Electric Vehicle Cost in Malaysia) - Hypothesis Explanation (H3)

Furthermore, concerning hypothesis H3, it is observed that the perceived sacrifice, which refers to the cost of electric vehicles (EVs) in Malaysia, exerts a significantly adverse impact on the emotional acceptance of consumers toward the adoption of electric vehicles (EVs). The cost factor may serve as a hindrance as it can impact the psychological disposition of the present-day purchaser while making a purchase decision. The study's findings indicate that the cost of electric vehicles (EVs) in this nation is not below one hundred thousand. The vehicle's cost renders it unaffordable and unsuitable for the B40 demographic, which constitutes the majority of the population in this nation.

Subsequently, within the secondary market, the devaluation of previously owned electric vehicles (EVs) is notably more substantial than their non-electric counterparts. This phenomenon can be attributed to the apprehensions among prospective purchasers regarding the costs involved in replacing the battery. The issue of depreciation and trade-in value of automobiles over an extended duration is a significant concern among Malaysians, as it is widely recognized. In addition to the costs related to a battery replacement, the platform's users have underscored the significance of general maintenance expenses and dependability as crucial factors that prospective purchasers should consider.

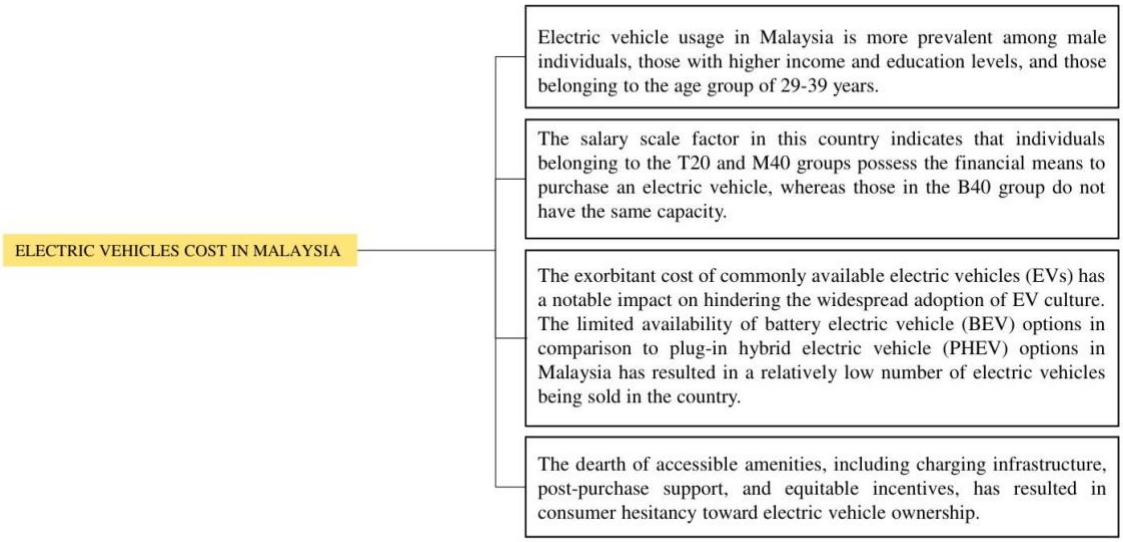

Fig. 5. Perceived Sacrifice (Electric Vehicles Cost in Malaysia) – (ATLAST.ti Extract).

4.4 External Factor (Malaysian Government Incentive) - Hypothesis Explanation (H4)

Finally, the H4 hypothesis posits that the positive impact of Malaysian government incentives on consumer emotions is evident in external factors. The research findings indicate that the government has implemented various incentives to encourage the

procurement and upkeep of automobiles. These incentives comprise monetary and non-monetary benefits, such as tax exemptions, purchase subsidies, and the establishment of charging infrastructure for electric vehicles (EVs). Nevertheless, it has not been successful in garnering a significant user base. The issue of high prices, despite the government's numerous incentives, indicates the problem factors at play. In addition to the issue of inadequate charging infrastructure, a dearth of qualified personnel and spare parts for electric vehicles (EVs) exists within the nation.

This nation's current topography and road infrastructure present limitations for the optimal utilization of electric vehicles (EVs), as evidenced by the underdeveloped state of Sabah's infrastructure. The study's results indicate that the government is trying to bolster the nation's adoption of electric vehicles (EVs). The Malaysian government has established a goal to implement the Low Carbon Mobility Action Plan from 2021 to 2030, indicating a commitment to reducing carbon emissions. Malaysia is projected to provide up to 4,000 electric vehicle (EV) charging points by 2023, with a target of approximately 10,000 charging stations by 2025 (Phuah et al., 2022).

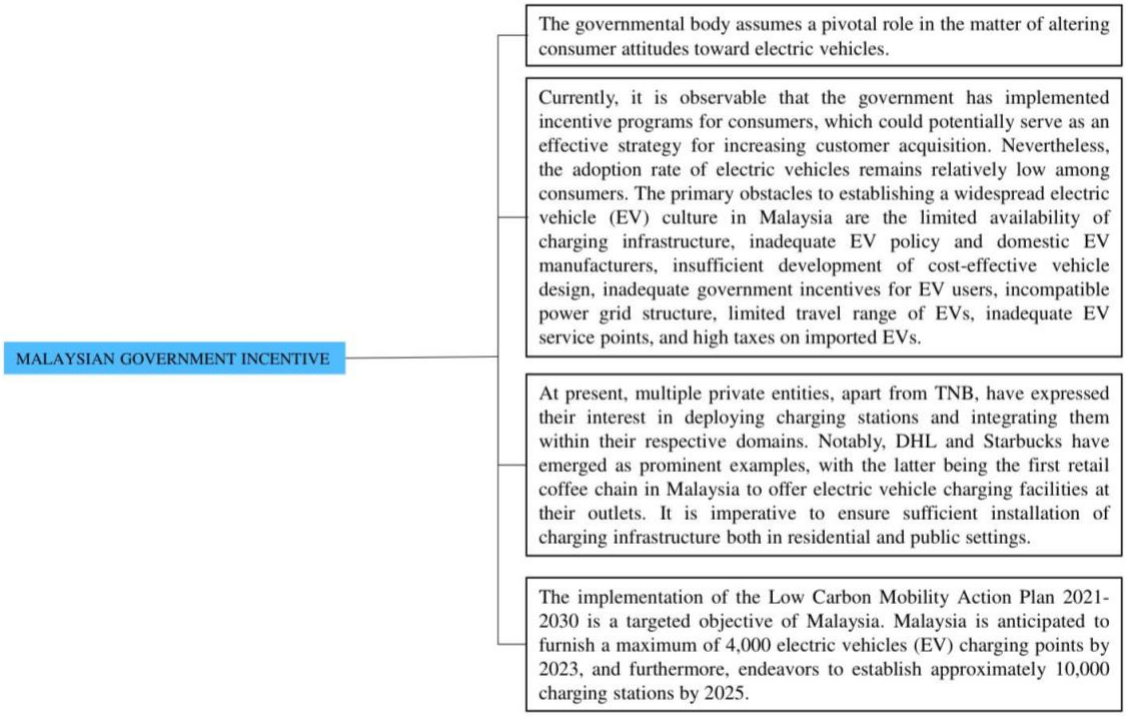

Fig. 6. External Factor (Malaysian Government Incentive) – (ATLAST.ti Extract).

5. CONCLUSION

As for the conclusion, this research emphasizes overcoming emotional hurdles that impede Malaysian consumers from converting from internal combustion engines (ICE) to electric vehicles (EVs). The research found that various factors, including perceived value related to ecological concern, perceived quality based on the current electric vehicle (EV) market and performance in Malaysia, perceived sacrifice in terms of electric vehicle (EV) cost in Malaysia, and external factors like Malaysian government incentives, are interconnected and significantly affect Malaysian users' emotional satisfaction perspective

on electric vehicle (EV) adoption. The research fits the government's climate change aims and ecological protection, Malaysia's Low Carbon Mobility Actions Plan 2021–2030.

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