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Factors Towards EV Adoption Among Malaysian M40 and T20 Income Groups

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Abstract: According to Global EV Outlook 2020 report by the International Energy Agency (IEA), the transportation sector accounts for around one-fourth of total global greenhouse gas emissions and are expected to rise from 23 percent to 50 percent by 2030. This significant contribution of transportation sector towards environmental pollution, accelerate the speed of initiatives in reducing carbon emissions and mitigating the dependency on fossil fuels in the sector. Inevitably, energy-efficient transportation innovations such as EVs are seen as one of the most effective ways to counter the problems. EVs were launched in Malaysia as one of the solutions to minimize fossil fuel dependency and carbon emissions caused by the transportation sectors, motivated by energy efficiency and emission concerns. Based on EV current prices, only Malaysian middle-and-high income consumers can afford to buy an EV. Therefore, the aim of this study to know the intention of M40 and T20 income groups to use EVs and to determine the relationship between studied factors and intention to use EVs. This research was using quantitative method and online Google Form survey questionnaire was used to collect the data from respondents. A total of 154 questionnaires had been returned and analyzed using SPSS. Descriptive analysis, reliability test, normality test, and Spearman correlation test were run on the data to answer research objectives. This study found that Malaysian middle-and-high income groups have high intention to adopt EV and they will possibly be buying EV in the future. This study also showed that variables such as demographic, financial benefits, infrastructure readiness, government intervention, performance attributes have significant positive relationship with the intention to adopt EVs among respondents. The findings of this study can provide some insights to EV stakeholders on formulating strategies towards promoting EV adoption in Malaysia.

Keywords: EV adoption, Intention to use EVs, EVs in Malaysia

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1. Introduction

EV is acronym for electric vehicle. EVs are vehicles that are fully or partially powered by electric power. They are basically three types of EVs: hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and battery electric vehicles (BEVs). Currently, most vehicles are internal combustion engine (ICE) type. ICE uses fuel to generate power. The fuel combusts in a combustion chamber with the help of oxygen typically from the air. The fuels used are commonly derived from fossil fuels such as petrol and diesel. The problems with ICE are the fossil fuel used is not a renewable source of energy. Furthermore, the combustion of fossil fuels producing carbon emission that will pollute the air around us. Due to ICE type vehicles causes many environmental challenges, transition to EV is becoming inevitable.

According to Global EV Outlook 2020 report by International Energy Agency (IEA), the transportation sector accounts for around one-fourth of total global greenhouse gas emissions and are expected to rise from 23 percent to 50 percent by 2030. This significant contribution of transportation sector towards environmental pollution, accelerate the speed of initiatives in reducing carbon emissions and mitigating the dependency on fossil fuels in the sector (Sang & Bekhet, 2015). Inevitably, energy-efficient transportation innovations such as EV are seen as one of the most effective ways to counter the problems (Sierzchula, 2014).

History of EV started back more than 100 years ago. But the present phenomenon of EV took place around more than a decade ago, in which Tesla Motors really make EV into a trend. By 2020, there were 10 million of electric cars globally after more than a decade of fast development. According to Global EV outlook 2021 by IEA, global car sales to drop 16% in 2020 due to Covid-19 pandemic, oppositely, the sales of EVs grew by 41% in the year. While Europe and China are the largest market for EVs.

EVs were launched in Malaysia as one of the solutions to minimize fossil fuel dependency and carbon emissions caused by the transportation sectors. Between 1990 to 2012, energy demands from the transportation sector was expanded dramatically. The energy demands accounted for 36.8% of total demand in 2012, which was the highest among all sectors in the country (Energy Commission, 2012). While government policies and programs encourage the use of greener and cleaner vehicles, such as EVs, the social perspective about the public acceptance need to be consider. During the 2022 Budget speech, Finance Minister Tengku Zafrul Aziz announced that the government intends to erase all taxes on EVs in Malaysia, including import and excise duties, as well as road tax. This announcement could be an incentive for Malaysian to adopt EVs. Among the early EVs introduced into Malaysia are Nissan Leaf, BMW iX3, and MINI Cooper SE. All these EVs are anticipated to cost more than RM 100,000, with the Nissan Leaf being the cheapest after taxes are deducted at RM 145,000. Based on the prices of the cheapest EVs in Malaysia, not all Malaysian consumers can afford to buy an EV.

Malaysian income groups have been classified into three categories which are B40, M40, and T20. Referring to Rebecca Hani (2021), B40 represents the bottom 40% of Malaysian household income and earns less than RM 4,850 per month, M40 represents the middle 40% of Malaysian household income and earns between RM 4,851 and RM 10,970, and T20 represents the top 20% of Malaysian household income and earns more than RM 10,971 per month. Based on the definition, T20 and M40 are the income categories to have the potential to adopt EVs in Malaysia. With such incomes and considering the prices of EVs, they can afford to adopt EVs. Hence, this paper study the factors that influence the intention of Malaysian M40 and T20 income groups to adopt EVs.

The deployment of electric cars has been the focus of attention around the world, with targets and policies in place to enable EVs to become a significant component of future automobiles (Buekers *et al.*, 2014). EVs have a substantially greater purchase cost, less charging infrastructure availability, and a longer charging time compared to ICE vehicles, causing public reluctant to adopt EVs (Carley *et al.*,

2013). Based on research by Sang & Bekhet (2015), factors such as social influences, performance attributes, financial benefits, environmental concerns, demographics, infrastructure readiness, and government intervention, play a considerable role in EV acceptance in Malaysia. EVs are considerably new in Malaysia market, there is not much study about EVs adoption among Malaysians. Factors towards public acceptance of any new technologies is important to study to make the implementation of the technologies a successful initiative.

2. Literature Review

The objectives of this research are to know the intention of Malaysian M40 and T20 income groups to adopt EVs and what factors that spark their intention to adopt the EVs. Davis *et al.* (1989) characterized the intention to use a technology as when a person has developed a thoughtful strategy to conduct or not perform specific behaviors in the future. This identifies whether consumers have negative or positive views about trying new products. The key interests of this specific research are the intention of prospective consumers toward the use of EVs technology, as well as the associations with independent variables of the research. By studying some amount of literature on this subject matter, researcher found that below variables are among popular variables contributed to the adoption of EVs.

2.1 Demographics

Many studies have proposed that demographics factor has the influence towards someone's intention to use a particular product. According to Hidrue *et al.* (2011), consumers' educational level, income, and environmental protection awareness are factors that favorably associated to EVs purchase intention. Study in Sweden observed that women value the environmental benefits of EVs more than men (Vassileva & Campillo, 2017). Research done among German consumers discovered that younger generation prefer EVs more than older generation (Achtnicht, 2012). Plötz *et al.* (2014) research in Germany has come to conclusion that EVs buyers are mostly among middle-aged men with the technical job and who live in rural or suburban multi-person households. Carley *et al.* (2013) found that the American drivers adopt EVs on their own motivation and consumers that interested in EVs are from well-educated background. Survey conducted in the Nordic countries found that more than half of EVs early adopters earn €60,000 or more each year (Vassileva & Campillo, 2017). Therefore, demographic factor is important variable towards the adoption of EVs.

2.2 Environment Concern

Environmental concern is referred as the degree to which people are aware of environmental problems and support efforts to solve them or indicate a readiness to contribute directly to the solution. Kang & Park (2011) study suggested that environmental concern strongly related to consumer behaviors such as purchasing environmentally safe products, recycling newspapers, contributing to environmental groups, communicating with public authorities, and attending public hearings. Another study showed that environmental concern influences the consumers to buy environmentally friendly products (Mohamed *et al.*, 2016). Peters & Dütschke (2014) and Bockarjova & Steg (2014) studies suggested that having environmental benefits is a driver for consumers to adopt EVs. Hence, environment concern is important driver towards decision of EV adoption.

2.3 Infrastructure Readiness

Infrastructure readiness is referring to the availability of public charging stations for users to recharge their electric vehicles (Sang & Bekhet, 2015). Lack of retail infrastructure, which delay the implementation of the new vehicle fuels. This is especially crucial when deciding whether to purchase a vehicle that runs on a new fuel type. Infrastructure readiness, also known as facilitation condition, is defined as an individual's understanding of infrastructures or the availability of technical support for

adopting technology or system (Venkatesh *et al.*, 2012). Access to the electric grid for charging, in addition to efficiency and emissions, is one of the major variables influencing the acceptance of plug-in hybrid electric vehicles (Skerlos & Winebrake, 2010). As a result, drivers may have 'range anxiety,' in which they feel ‘stranded' if charging facilities are not available (Browne *et al.*, 2012). Aside from that, a limited driving range and a lengthier charging time are two drawbacks to consumer acceptance of EVs (Ustaoğlu & Yıldız, 2012). Schroeder & Traber (2012) proposed that fast-charging infrastructure may promote and facilitate long-distance drives for EVs, which may be critical in pushing electric vehicle market adoption forward. Based on the previous studies, infrastructure readiness is an important factor towards EVs adoption.

2.4 Social Influence

Social influence is the degree to which the views of other persons within our social circles or social life will influence our decisions to adopt a specific technology (Venkatesh *et al.*, 2012). In general, family has a large influence on consumer intentions during the joint decision-making process (Li *et al.*, 2017). Daziano & Chiew (2012) stated that peer pressure, social influences, and social norms are examples of social externalities that might impact purchasing decisions. Eppstein *et al.* (2011) argued that social influence is an important factor influencing behavioral decision. According to Jansson *et al.* (2017), social pressure that customers experience from their surroundings particularly from friends, family, and co-workers influences the decision to adopt EVs. Studies by Jeon *et al.* (2012) comprehended that in both Korea and China the social influence was found to be crucial in enhancing customer purchase intention. Due to collectivist culture in which individual actions and social norms are valued by the group with which one identifies, who are important and those who believe themselves should conduct a specific behavior. As result, the researcher feels that social influence factor has a relationship with the intention to use EVs.

2.5 Financial Benefits

According to Zhang *et al.* (2013), consumers are concerned about the financial benefits and are willing to adopt greener vehicles that could lower the operational cost and improve fuel efficiency. When purchasing a vehicle, consumers examine not only the performance of the vehicle, but also the total cost of ownership. Whether the high purchase cost of EVs slows the growth of its promotion, EVs reduce the operation cost when compared to conventional vehicles (Caperello & Kurani, 2012). Studies in United States found that consumers pay more attention to the reduction of the energy consumption cost of electric vehicles, and respondents who pay attention to the low energy consumption cost of electric vehicles are more likely to buy electric vehicles (Krupa *et al.*, 2014). Knez & Obrecht (2017) discovered that purchasers are extremely concerned about the operational costs of EVs in Slovenia. As a result, financial benefits play a significant role in influencing Malaysians to buy EVs.

2.6 Government Interventions

As stated by Wang *et al.* (2017b), government subsidies are important in the commercial spreading of some innovative products and services. Government incentives, such as subsidies, tax deductions, and the expansion of charging infrastructure, have been found to encourage EV adoption (Bjerkan *et al.*, 2016; Noori & Tatari, 2016). Such subsidies are effective tools for increasing market demand and constructing infrastructure to prevent the market failure of technologies that provide a public good and have a high social value. Consumers' intentions to acquire new energy vehicles can be influenced by the government's policies on the new energy automotive industry (Du *et al.*, 2018). Pricing and taxation of vehicle ownership also have an impact on purchasing behavior, overall ownership, and even vehicle use (Brand *et al.*, 2013). According to a study done among Malaysian consumers, the involvement of the government is a key predictor of green purchasing behavior (Sinnappan & Rahman, 2011). The researcher believes that government intervention has a relationship with the intention to use EVs.

2.7 Performance Attributes

Study done by Kang & Park (2011) discovered that vehicle performance and economic concerns heavily influenced the purchasing decision-making process. According to Ozaki & Sevastyanova (2011) study on hybrid vehicles, found that performance factors such as ease of driving, comfort, quietness, and automatic transmission are among the most important features influencing consumers to buy EVs. While in another research conducted among Chinese consumers found that performance attributes like riding comfort, the convenience of use, safety, and operability have an impact on the acceptance of a new energy vehicle (Zhang *et al.*, 2013). Jensen *et al.* (2013) discovered that diversity of EV models, driving range, and security will influence consumers' desire to purchase EVs. So, researcher believes that the performances attribute has a relationship with the intention to use EVs.

2.8 Conceptual Framework and Hypothesis

The research conceptual framework for this study as illustrated in Figure 1.

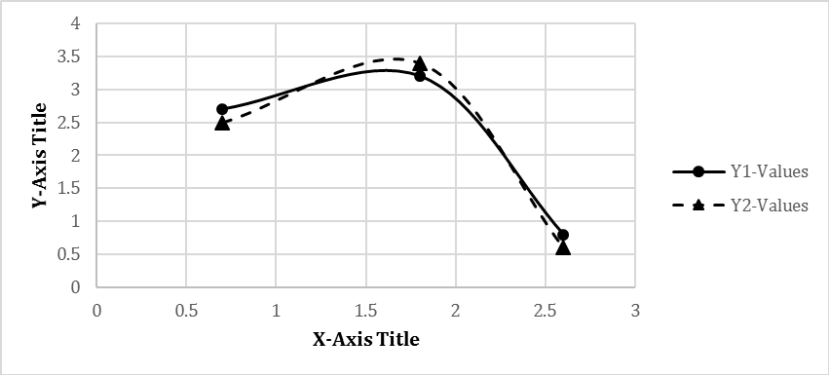

Figure 1: Conceptual framework

Based on the previous research findings, the following hypothesis have been developed:

H1: Demographics have significant relationship with intention to use EVs.

H2: Environmental concern has significant relationship with intention to use EVs**.**

H3: Infrastructure readiness has significant relationship with intention to use EVs.

H4: Social influences has significant relationship with intention to use EVs.

H5: Financial Benefits have significant relationship with intention to use EVs.

H6: Government interventions have significant relationship with intention to use EVs.

H7: Performances attributes have significant relationship with intention to use EVs.

3. Research Methodology

3.1 Research Design

Research design is a clear explanation of how a study will be carried out. A research design typically consists of how data are being collected, what instruments being used, how those instruments being used, and how the data gathered data being analyzed. This research is quantitative research and survey questionnaire is used to collect data. The feedback and response of the questionnaire survey that has been distributed to the consumer is a primary data. Thus, the sampling technique that use in this study

is non-probability sampling. The technique be used in this study call as judgmental sampling technique (Sang & Bekhet, 2015). The questionnaire was only distributed to consumers in the M40 and T20 income groups who have driven experience and a valid private vehicle driving license. Its purpose is to ensure that their view is based on familiarity and experience with driving automobiles.

3.2 Data Collection

(a) Survey Instrument

This study is cross-sectional study, i.e. it analyzes data from a sample of population at a specific point in time. Researcher used questionnaire as survey instrument. To approach the respondents from many different parts of Selangor and Kuala Lumpur in an easy and fast method, and without physically went to their places that bear high cost, online survey questionnaire was the best choice. So, researcher decided to use Google Form to reach the respondents. Questionnaire using Google Form was employed in this research due to several reasons, including the fact that the questionnaire is straightforward to construct with endless questions and without limits of respondents. Also, the targeted audience can be reached effortlessly using adverts on the most used social media platforms such as WhatsApp, Facebook, Instagram, and Twitter (Kemp, 2020). The selected population more readily accessible by giving an online survey link consisting of the questionnaire after pilot study was conducted to ensure that survey instrument is bias-free, reliable, and valid.

(b) Population and Sampling

The population of this study is Malaysians in the categories of M40 and T20 income groups. As mentioned before, the current price of EV is relatively high as compared to ICE cars. For example, Nissan leaf price is around RM175,000, Tesla model 3 is about RM300000. This price is only affordable to Malaysians with high income. The number of vehicles registered in Malaysia is concentrated in the state of Federal Territories (Kuala Lumpur and Putrajaya) and Selangor, and the number of EV charging stations are also concentrated in Selangor and Kuala Lumpur, so researcher decided to conduct research in these two states only. Respondents were chosen randomly in which online survey questionnaire was blasted through social media platform such as WhatsApp, Facebook, Instagram, and Twitter. The total number of populations in this study is around 2,107,400 individuals. The required sample size is 384 according to the table and calculation formula from Krejcie and Morgan 1970. According to Taherdoost (2017), the total sample size should have a return rate of 40% from the total sample size, which will be around 154 respondents were needed in this study.

(c) Construct Measurement

There were 3 sections in the questionnaire. Section A consisted of questions regarding respondents' background such as age, gender, educational level, household income, years of driving experience, and number of cars owned. Section B consisted of questions regarding dependent variable i.e. the intention of respondents to adopt EV. While in section C contained questions related to independent variables used in this research, i.e. the factors that contribute to the intention of M40 and T20 income groups to adopt EV. The factors are social influence, financial benefits, infrastructure readiness, government intervention, environmental concern, and performance attribute. There are total of 21 questions adapted from past researches. For Section B and C, the respondents needed to answer using five-point Likert scale to rate their agreement from "strongly disagree" to "strongly agree" to express their agreement with the statements.

3.3 Pilot Test

Pilot test was done in which 30 respondents were involved. Pilot test is conducted to examine the questionnaires' validity and reliability. It is important as it helps to improve the reliability of the survey questionnaires, ensure that the questions are clearly articulated and that the response options are

relevant, comprehensive, and mutually exclusive. Cronbach's Alpha of overall reliability statistics was 0.924, which was considered excellent, according to the results of the pre-test. By combining all the items of the factors which consist of intention to use, social influence, demographics, financial benefits, infrastructure readiness, government interventions, environmental concern and performance attributes, there were a total of 24 items tested in the reliability test.

3.4 Data Analysis

After the respondents filled up the questionnaire and submitted it in Google Form, researcher received the data. The data is analyzed using Statistically Package for the Social Science (SPSS) software. There were several types of analysis and test conducted to the data in order to evaluate the hypotheses and meet the study's goals, i.e. descriptive analysis, reliability test, normality test, and correlation test. First was descriptive analysis to analyze the number of descriptive and frequency statistics to observe the demographics of the respondents. Second was reliability test to calculate reliability statistic in which the Cronbach Alpha was measured to confirm whether the data is valid or not. Third was normality test to know whether the data were normally distributed or otherwise. Lastly, based on the normality test result, the correlation coefficient analysis was performed to analyze the relationship between the variables in this study.

4. Results and Discussion

4.1 Demographic Analysis

Researcher was able to collect 154 responses. Table 1 summarizes the demographics data of respondents.

Table 1: Demographic of respondents

		Frequency	Percentage (%)
Gender	Male	91	63.0
	Female	57	37.0
Age	20-30	21	13.6
	31-40	73	47.4
	41-50	33	21.4
	51-60	21	13.6
	60 and above	6	3.9
Educational level	SPM	4	2.6
	STPM	0	0
	Diploma	42	27.3
	Bachelor Degree	73	47.4
	Master	12	7.8
	PhD	23	14.9
Family income (monthly)	M40 (RM 4851 – RM 10970)	117	76.0
	T20 (RM 10971 – RM 15041)	37	24.0
Driving experience	Less than 2 years	1	0.6
	2-5 years	15	9.7
	6-10 years	81	52.6
	More than 10 years	57	37.0
Number of vehicles owned by the family	0	0	0
	1	112	72.7
	2	30	19.5
	More than 2	12	7.8

4.2 Reliability Test

The overall reliability test findings for each variable are given in Table 2, along with their interpretation.

Table 2: Reliability test

Variable	No. of items	Cronbach's Alpha	Reliability Interpretation
Intention to use	3	0.924	Excellent
Social influence	3	0.899	Good
Demographic	3	0.947	Excellent
Financial benefits	3	0.899	Good
Infrastructure readiness	2	0.855	Good
Government intervention	3	0.958	Excellent
Environmental concern	4	0.945	Excellent
Performance attributes	3	0.881	Good
Overall reliability of study	24	0.871	Good

4.3 Descriptive Analysis

A descriptive statistic is used to logically summarize and characterize the data. The mean is used to determine the central tendency, while the standard deviation is used to determine the value dispersion. The data revealed that the mean score or intention to use ranged from 4.27 to 4.49, indicating a high central tendency. Intention to use dimension standard deviation ranges from 0.514 to 0.619. Social influences have a mean range of 3.68 to 3.95, with a standard deviation of 0.554 to 0.591. The standard deviation for demographics is 0.559 to 0.684, and the mean range is 4.26 to 4.44. The financial benefit means ranges from 3.96 to 4.11, with a standard deviation of 0.543 to 0.614. Infrastructure readiness has a mean range of 4.32 to 4.47, with a standard deviation of 0.513 to 0.614. Next, mean range for government intervention is between 4.21 to 4.22 and the standard deviation is between 0.560 to 0.568. The mean range for the environmental concern is 4.39 to 4.60, with a standard deviation of 0.491 to 0.640. Finally, the mean range for the performance attributes is 4.01 to 4.24, with a standard deviation of 0.499 to 0.583. From all the mean results, majority of the respondents choose agree and strongly agree for each variable statement based on the Çelik & Oral (2016) level agreement table shown in the Table 3.

4.4 Normality Test

The normality test was used to see if the data set well-modelled by a normal distribution or not. Non-parametric techniques must be used for further testing if the sample is not normally distributed, and parametric techniques must be used for further testing if the sample is normally distributed. Because the questionnaire was not normally distributed, the researchers used non-parametric approaches in this study. The study used the Kolmogorov-Smirnov rather than Shapiro-Wilk because the sample size used in this study was more than 50 respondents in which the total dataset was 154 in numbers. A significance value of higher than 0.05 indicates that the data were normal, whereas a significance value of less than

0.05 indicates that the data were abnormal or not normally distributed. The data of this study shows that all significant value was below than 0.05 which indicates that the data were not normally distributed. The Kolmogorov-Smirnov test data used in this normality test may be seen in Table 4 below. The Kolmogorov-Smirnov testing is a test of non-parametric test that examines the agreement between two sets of data. The reason for using this result is that the number of respondents is greater than 50, and all of the variables are out of the ordinary because the value is less than 0.05.

Table 3: Descriptive analysis of the variables

No.	Item	Mean	Std. Deviation	Interpretation
1	Intention to use, ITU1	4.49	0.514	High
2	Intention to use, ITU2	4.27	0.619	High
3	Intention to use, ITU3	4.45	0.524	High
4	Demographics, DG1	4.26	0.684	High
5	Demographics, DG2	4.44	0.559	High
6	Demographics, DG3	4.44	0.560	High
7	Social Influence, SI1	3.82	0.554	High
8	Social Influence, SI2	3.95	0.564	High
9	Social Influence, SI3	3.68	0.591	High
10	Financial Benefit, FB1	4.11	0.543	High
11	Financial Benefit, FB2	4.10	0.574	High
12	Financial Benefit, FB3	3.96	0.614	High
13	Infrastructure Readiness, IR1	4.47	0.513	High
14	Infrastructure Readiness, IR2	4.32	0.614	High
15	Government Intervention, GI1	4.22	0.563	High
16	Government Intervention, GI2	4.21	0.568	High
17	Government Intervention, GI3	4.21	0.560	High
18	Environmental Concern, EC1	4.60	0.491	High
19	Environmental Concern, EC2	4.39	0.640	High
20	Environmental Concern, EC3	4.57	0.509	High
21	Environmental Concern, EC4	4.58	0.521	High
22	Performance Attributes, PA1	4.01	0.583	High
23	Performance Attributes, PA2	4.24	0.499	High
24	Performane Attributes, PA3	4.19	0.508	High

Table 4: Normality test

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ITU	0.295	154	0.000	0.796	154	0.000
DG	0.278	154	0.000	0.801	154	0.000
SI	0.260	154	0.000	0.856	154	0.000
FB	0.310	154	0.000	0.844	154	0.000
IR	0.305	154	0.000	0.774	154	0.000
GI	0.355	154	0.000	0.770	154	0.000
EC	0.283	154	0.000	0.753	154	0.000
PA	0.355	154	0.000	0.808	154	0.000

a. Lilliefors Significance Correction

4.5 Hypothesis Testing: Spearman Correlation Analysis

This analysis used to identify and test the strength of a relationship between two set of data. It is often as a statistical method to aid with either proving or disproving a hypothesis (Sedgwick, 2014). Table 5 shows the coefficient correlation value between all variables and Table 6 shows the interpretation table of Spearman Rank-Order correlation coefficients.

Table 5: Spearman correlation analysis

			ITU	DG	SI	FB	IR	GI	EC	PA
Spearman's rho	ITU	Correlation Coefficient	1.000	0.123	0.197*	0.342**	0.191*	0.258**	0.217**	0.255**
		Sig. (2-tailed)	.	0.012	0.014	0.000	0.018	.001	.007	0.001
		N	154	154	154	154	154	154	154	154
	DG	Correlation Coefficient	0.123	1.000	0.175*	0.056	-0.013	0.030	-0.001	0.013
		Sig. (2-tailed)	0.012	.	0.030	0.491	0.870	0.709	0.993	0.872
		N	154	154	154	154	154	154	154	154
	SI	Correlation Coefficient	0.197*	0.175*	1.000	0.374**	0.278**	0.108	0.007	0.256**
		Sig. (2-tailed)	0.014	0.030	.	0.000	0.000	0.182	0.928	0.001
		N	154	154	154	154	154	154	154	154
	FB	Correlation Coefficient	0.342**	0.056	0.374**	1.000	0.390**	0.218**	0.299**	0.366**
		Sig. (2-tailed)	0.000	0.491	0.000	.	0.000	0.007	0.000	.000
		N	154	154	154	154	154	154	154	154
	IR	Correlation Coefficient	0.191*	-0.013	0.278**	.390**	1.000	.254**	0.335**	0.177*
		Sig. (2-tailed)	0.018	0.870	0.000	0.000	.	0.001	0.000	0.028
		N	154	154	154	154	154	154	154	154
	GI	Correlation Coefficient	0.258**	0.030	0.108	0.218**	0.254**	1.000	0.397**	0.249**
		Sig. (2-tailed)	0.001	0.709	0.182	0.007	0.001	.	0.000	0.002
		N	154	154	154	154	154	154	154	154
	EC	Correlation Coefficient	0.217**	-0.001	0.007	0.299**	0.335**	0.397**	1.000	0.274**
		Sig. (2-tailed)	0.007	0.993	0.928	0.000	0.000	0.000	.	0.001
		N	154	154	154	154	154	154	154	154
	PA	Correlation Coefficient	0.255**	.013	0.256**	0.366**	0.177*	0.249**	.274**	1.000
		Sig. (2-tailed)	0.001	.0872	0.001	0.000	0.028	0.002	0.001	.
		N	154	154	154	154	154	154	154	154

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

4.6 Discussion

Three questions to measure the intention of M40 and T20 income groups at Selangor and Kuala has been asked and they scored 4.27, 4.49, 4.59 respectively out of 5. The scores showed that the respondents are having high intention to adopt EV and they will possibly be buying EV in the future.

For the factors towards the intention of Malaysian M40 and T20 income groups to adopt EV, the factor that get the highest score is environmental concern with an average mean of 4.54 out of 5. While the factor that get the lowest score is social influence with an average score of 3.82 out of 5. Other factors such as demographic, financial benefits, infrastructure readiness, government intervention, performance attributes get the mean score of 4.38, 4.06, 4.4, 4.21, and 4.15 respectively. Based on the scores, all these factors are fairly had equal importance.

Using Spearman correlation test, the strength of the relationship between the factors and intention to use EVs among Malaysian M40 and T20 income group is measured. From the result, it showed that all the studied factors, i.e., demographics, environmental concern, infrastructure readiness, social influence, financial benefits, government intervention, and performance attributes have significant relationship with intention to use EVs among Malaysian M40 and T20 income groups. Demographics factor has positive strong relationship with intention to adopt EVs is accorded with study by Hidrue et. al. (2011). The study found that respondents with high level of education and income are more likely to adopt EVs. Other studies also found that gender and age have correlation with the adoption of EVs (Vassileva & Campillo, 2017; Achtnicht, 2012; Plötz *et al.*, 2014).

Table 6: Example of presenting data using a table (Author, year)

	Hypothesis	Interpretation	Results
H1	Demographics have a significant relationship with intention to use EVs	Significance of relationship p-value = 0.012 which lower than 0.05 Correlation Coefficient r = 0.123, the outcomes indicates that demographics has a really weak and positive relationship with intention to use EVs. Null hypothesis was rejected.	Supported
H2	Environmental concern have a significant relationship with intention to use EVs	Significance of relationship p-value = 0.007 which lower than 0.05 Correlation Coefficient r = 0.217, the outcomes indicates that environmental concern has a weak and positive relationship with intention to use EVs. Null hypothesis was rejected.	Supported
H3	Infrastructure Readiness have a significant relationship with intention to use EVs	Significance of relationship p-value = 0.018 which lower than 0.05 Correlation Coefficient r = 0.191, the outcomes indicates that infrastructure readiness has a really weak and positive relationship with intention to use EVs. Null hypothesis was rejected.	Supported
H4	Social Influence have a significant relationship with intention to use EVs	Significance of relationship p-value = 0.014 which lower than 0.05 Correlation Coefficient r = 0.197, the outcomes indicates that social influence has a really weak and positive relationship with intention to use EVs. Null hypothesis was rejected.	Supported
H5	Financial Benefits have a significant relationship with intention to use EVs	Significance of relationship p-value = 0.000 which lower than 0.05 Correlation Coefficient r = 0.342, the outcomes indicates that environmental concern has a moderate and positive relationship with intention to use EVs. Null hypothesis was rejected.	Supported
H6	Government interventions have a significant relationship with intention to use EVs	Significance of relationship p-value = 0.001 which lower than 0.05 Correlation Coefficient r = 0.258, the outcomes indicates that environmental concern has a weak and positive relationship with intention to use EVs. Null hypothesis was rejected.	Supported
H7	Performances attributes have a significant relationship with intention to use EVs	Significance of relationship p-value = 0.001 which lower than 0.05 Correlation Coefficient r = 0.255, the outcomes indicates that environmental concern has a weak and positive relationship with intention to use EVs. Null hypothesis was rejected.	Supported

For the factor of environmental concern, Peters & Dütschke, (2014) and Bockarjova & Steg (2014) studies' finding are consistent with this research's finding. People with environmental consciousness will have high potential to consider electric mobility as this mode of transportation lower the carbon footprint towards our environment. From the macro level perspectives, infrastructure facilities contribute enormously to economic development. While from an EV perspective, infrastructure readiness is an indication to the availability of charging stations and technical supports for EV users. Without proper infrastructure particularly, charging stations, long distance travelers will face range anxiety. Studies by Browne *et al.* (2012) and Ustaoğlu & Yıldız (2012) found that charging facilities is crucial to keep away the range anxiety of the EV drivers leading to high the potential of EV adoptions. In Malaysia, where EVs adoption is still in its infant stage, charging stations are concentrated in Kuala Lumpur and urban area of Selangor. Therefore, the respondents that reside in this area found that infrastructure readiness is not a big issue leading to very weak positive relationship of this factor with intention to adopt EV. In this study, the social influence factor has positive but weak relationship with intention to adopt EVs. Previous studies such as Venkatesh *et al.* (2012); Li *et al.* (2017); Daziano &

Chiew (2012); Jansson *et al.* (2017); and Jeon *et al.* (2012) supported that social influences like family's support or friends' recommendation will have effect on someone's decision to adopt new technology.

While for financial benefits, correlation coefficient of this study is 0.342 showing that it has a moderate and positive relationship with intention to use EVs. This result is supported by many previous studies such as by Zhang *et al.* (2013); Caperello & Kurani (2012); Krupa *et al.* (2014); Knez & Obrecht (2017). These studies found that EVs adopters are concerned about the operational costs and the total cost of ownership. During 2022 Budget, government of Malaysia announced that EVs will be given 100% exemption of import duty, excise duty, and sales tax. Furthermore, EV users will also enjoy the road tax exemption of up to 100% and an income tax release of up to RM2,500 on the cost of purchasing and installing, renting or taking up hire purchase facilities, as well as subscription payments of EV charging facilities. This research has found that government incentives have positive relationship with intention to adopt EVs among Malaysian M40 and T20 income group. For the last studied variable, i.e. performance attribute, it is also found to has positive relationship with intention to adopt EVs. Kang & Park (2011); Ozaki & Sevastyanova (2011); Zhang *et al.* (2013); Jensen *et al.* (2013) are among the studies regarded performance attribute is important factor to influence customers to purchase EVs.

5. Conclusion

In this research, it is found Malaysian M40 and T20 income groups consumers are having high intention to adopt EV and they will possibly be buying EV in the future. This research also found that the studied independent variables have a positive significant relationship with the intention to adopt EVs among Malaysian M40 and T20 income groups. The value for all variables is $p<0.05$ but the strength of the relationship is in range of weak to moderate. All the factors i.e. demographic, financial benefits, infrastructure readiness, government intervention, performance attributes need to be considered for the campaign to encourage Malaysian to adopt EVs. The adoption of EVs among Malaysian are crucial to achieve the nation's target of zero carbon emissions by 2050.

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