

Customer Perceived Value and Purchasing Intention of Alternative Fuel Vehicles: An empirical Study in Sri Lanka.

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Abstract

Increasing greenhouse gases (GHG) are identified to be a major challenge for the global warming, climate change and air quality pollutions. In order to address the greenhouse gas emission based issues, the governments and the automobile manufacturers have been attempting to promote the adoption of the alternative fuel vehicles all over the world. The previous studies have attempted to show that the factors influencing the adoption of alternative fuel vehicles depend the economic, sociocultural and geographic features of the countries. Consequently, they have been unable to come to the generalized understanding of the key purchasing determinants of alternative fuel vehicles around the world. Accordingly, the present paper attempts to improve the present body of the knowledge about the factors affecting the adoption of alternative fuel vehicles.

The theoretical framework was constructed based on the theory of the perceived value-and the theory of reasoned action. Accordingly, the conceptual framework was developed by using the dimensions of PERVAL as the independent variables that influence on the customer's attitudes or customer's perceived value towards the alternative fuel vehicles. This model was empirically tested by using the CB-SEM analysis of the data collected online survey of 388 alternative fuel vehicle owners in Sri Lanka. The findings of the present study show how the dimensions based on the perceived value (PERVAL) are related to the CPV and then to PI. The results show that quality of vehicle, emotional driven values and social values don't have a significant impact on the CPV. Whereas, the price factor has a positive and significant impact on CPV, which in turn CPV has a positive significant impact on the PI. These results are in line with Higuera-Castillo, Molinillo, Coca-Stefaniak, & Liebana-Cabanillas (2019). They also tested the behavior of PERVAL dimensions against the CPV in Spain. Based on the findings of the present study, the importers, dealers and governments must concentrate their pricing strategies in order to promote the adoption of AFVs' in Sri Lanka.

Keywords: Alternative fuel vehicles (AFVs), Hedonic motivations (HM), utilitarian motives (UM), consumer innovativeness (CI), environmental concerns (EC), customer perceived value (CPV), purchasing intention (PI)

1. INTRODUCTION

The ever increasing greenhouse gases have been identified as one of the most challenge for the environmental contributing for global warming, climate change and air quality contamination (Degirmenci & Breitner, 2017). Further, according to them, transport contributes far more than 23% of the carbon dioxide (CO₂) emissions that are known to be an important ingredient of greenhouse gases and contaminate the environment. Further, four third of these are caused by the road based transport (International Energy Agency, 2016). Accordingly, in this context, the alternative fuel vehicles have been identified as the potential way of reducing the CO₂ subsequently. From an economic perspective, according to Busse, El Khatib, Brandt, & Kranz (2013), when compared with the fossil based fuel driven cars, the impeding factors of the diffusion of the alternative fuel vehicles are high acquisition costs, high repair costs and limited driving range due to insufficient battery technologies. Therefore, the replacement of internal

combustion vehicles with alternative fuel vehicles has never been a straightforward or easy task. Because the internal combustion engine coupled vehicles have proven technologies as well as range of widespread public acceptance for their convenient use, in addition to reliable infrastructures, worldwide supply chains, and established state policies and standards. Further, according to Yang, Long, Li, & Rehman (2016), changing process of existing drivers are inclusive of emerging concerns about the energy and air pollution as well as ever increasing new state policies caused by climate change, a new state of the art technologies, rising state favoritism for competitive key manufactures and growing levels of interest in alternative fuel technology in key markets developed markets such as China, Germany, Japan and the USA. Further, the adoption of AFVs is acceptably promoted by the governments through legislation that favors AFV technologies while penalizing greenhouse emissions. Further Wanninayake and Chovancova (2012) argued that perceived values of Sri

Lankan consumers is totally different than the perceived value of consumers in the western countries. In some circumstances consumer impulsiveness can be affected to make an planned decision of Sri lankan customers in terms of the consumers products as well as durable products such as vehicles (Karunaratne and Wanninayake, 2018). These global developments influenced reseachers to examine this area since the significant consumer behavior is involved. Accordingly, the present paper aims to fill the aforesaid gap through exploration of consumer buying behavior of the purchasing intention of Alternative fuel vehicles in Sri Lanka.

In the global context, many factors influencing the adoption of alternative fuel vehicles have been identified under different categories. These factors can be varied from the different economies, sociocultural aspects or sometimes according to geographical features. For example, the great driving experience, economy and environmental protection have been listed as the most affecting factors in the UK (Bennette, Kottasz, & Shaw, 2016). According to Neizari, Nikandish, & Samadi (2017), price sensitivity and green trust have been identified as the factors having significant impacts on purchasing intention of the alternative fuel vehicles. Further, according to Degirmenci & Breitner (2017); Lai, Liu, Sun, Zhang, & Xu, (2015); Khazaei and Khazaei (2016), the environmental based concerns play a vital role in the adoption of purchasing intention of AFVs. However Wanninayake and Shantha (2013) argue that willingness to pay of Sri Lankan customers for envirement friendly products is at very low level. As the introduction of alternative fuel vehicles is comparatively new and slow in Sri Lanka, this study is expected to compare and contrast the significance of the PERVAL dimensions that influence the adoption of alternative fuel vehicles. Based on the background of the study and the research problem, it may be important to examine how to attract customers for the alternative fuel vehicles and how they could be convinced to grab the new technology. The main objective of this paper is to investigate the impacts of the PERVAL dimensions on the customer perceived value towards the purchasing intention of the alternative fuel vehicles.

2.THEORETICAL BACKGROUND AND

The technology underlying the AFVs reportedly needs to address a number of challenges in order to be commercially viable all over the world. Accordingly, the consumer adoption has been a most critical factor affecting the viability of sustainable transport options. For companies involved in the marketing of these products, it is necessary to identify and reconcile these multi-directional challenges, particularly those influencing customer perceptions and attitudes (Higuera-Castillo et al. 2019). According to Ajzen (1991), the attitude within the framework of behavior has been defined as a person's evaluation or appraisal of the anticipated outcomes associated with a given behavior. According to the theory of reasoned action, the attitude is

generally influenced positively by the evaluation of behavioral outcomes as proposed by (Fishbein & Ajzen, 1975).

Furthermore, according to Zeithmal (1988), an ample of studies within the framework of perceived value theory has shown that perceived value has a direct impact on people's intention to use public transport (Lai & Chen, 2011) air transport, bicycle sharing schemes and EM vehicles (Jiang, 2016). The Perceived value (PERVAL) can be defined as a consumer's overall assessment of the usefulness of a product based on his or her perceptions (Zeithmal, 1988). In this sense, according to Sweeney & Soutarb (2001), the PERVAL can be generally interpreted using a range of dimensions. According to Higuera-Castillo et al. (2019). On this front, previous researchers have revealed that the PERVAL or a four-dimension conceptual approach can be used to interpret consumers' the perceived value. This PERVAL dimension includes the quality, emotional factors, price/value for money and social values. Firstly, the quality of the product or service is related to the practical or technical benefits that consumers gain when the product is used. Secondly, emotion based factors commonly comprise the mental or psychological based requirements of consumers associated with their feelings linked with a product. Thirdly, price based factor or value for money is generally considered to be the consumers' satisfaction with a purchase based either on monetary cost, or time invested in obtaining that product. Finally, the social dimension of a customer's evaluation process is more closely related to aspects of prestige associated with a product's purchase, according to Walsh, Shiu, & Hassan (2014).

According to (Higuera-Castillo et al. 2019). A number of consumer behavior studies pertaining to the adoption of new technologies have confirmed the role of perceived value as a key mediator variable between the consumer buying motives and purchasing intention of AFVs' (Collier, Sherrell, Babakus, & Horkey, 2014; Kim & Park, 2014; Molinillo, Muñoz-Leiva, Pérez-García, 2018; Truong, 2013; Yang & Jolly, 2009).

Based on the above empirical justifications, the following hypotheses were formulated in the present study:

Hypothesis 1: Vehicle quality has a significant positive impact on CBM towards AFVs'

Hypothesis 2: Emotional value has a significant positive impact on CPV towards AFVs'

Hypothesis 3: Vehicle price has a significant positive impact on CPV towards AFVs'

Hypothesis 4: Social value has a significant positive impact on CPV towards AFVs'

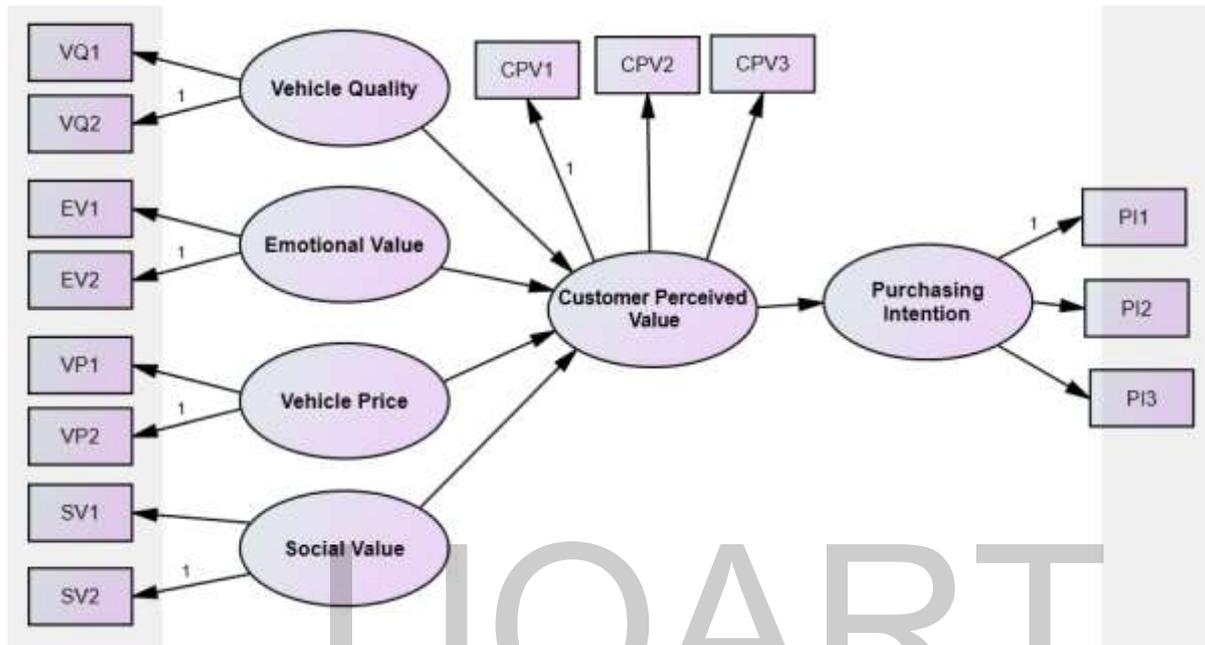
In addition to the above-mentioned hypothesized relationships, the theory of reasoned action suggests that customer's perceived value or customer's attitudes positively influences consumers' purchasing intentions

(Fishbein & Ajzen, 1975). Furthermore, according to Higuera-Castillo et al. (2019); Lai et al. (2015); Degirmenci & Breitner (2017) and other significant number of studies have shown that there is positive relationship between consumers' attitudes or customer's perceived value and their intentions to purchase new technologies embedded vehicles, especially AFVs'.Based on the above theoretical

and empirical justifications, it can be reasonably suggested that

Hypothesis 5. Customer's perceived value has a strong positive impact towards the PI of AFVs' Based on the above theoretical and empirical justifications, the following theoretical model is developed

Figure 1: Theoretical model of customer's perceived value to purchasing intention of AFVs'



Source: Author developed

3. RESEARCH METHOD

The problem the research was identified based on the broad problem area. So the research gap of the identified problem was then practically, empirically and theoretically justified. The theoretical model was constructed using the framework of the perceived value theory (means-end theory) to connect the PERVAL dimensions and customer's perceived value. According to the theory of reasoned action, the attitudes are the prime antecedents of the purchasing behavior. The ontological stance of the study is objective while the epistemological stance is positivism. As explained above, the conceptual model has been developed by deductive reasoning of two existing theories and literature. Accordingly, the deductive quantitative approach was adopted by considering the empirical nature of the study. Thus, the research strategy was chosen quantitative and thus the survey technique is chosen as the data collection method. The research instrument was selected as the online based self-administered questionnaire. There are six main constructs as depicted in the conceptual framework. These factors were identified through the intensive literature review as recommended by previous researchers in the same context. Accordingly, the well-known PERVAL dimensions were considered as the predictor variables.

The six constructs were measured using highly adopted scales mentioned in the table 1. In order to test and validate the research model, CB-SEM was adopted in this research as adopted by many researchers under different contexts. Even though PLS-SEM is more compatible in the behavioral studies of developing countries than CB-SEM (Kumari and Azam 2019), the data set of the present study has fulfilled the conditions to perform CB-SEM. A study in Spain by Higuera-Castillo et al. (2019), another study in Macau by Lai et al. (2015) and Khazaei & Khazaeu (2016) are some of the major studies recently conducted based on CB-SEM similar to the present research context.

The target population of the study is the number of registered alternative fuel vehicle owners in Sri Lanka. According to the official statistics of the Department of Motors Traffic, the number of registered car owners at 31/12/2019 is 170,130. The multilevel mixed sampling method was adapted for selecting the sample. Since, the population exceeds the 100,000, the sample size was considered as 388. Initially, the 25 administrative districts were selected as the clusters and number of registered AFV owners in the particular districts were obtained from the Department of Motor Traffic and sample size appropriate to each district was calculated as a fraction of the total sample

size (Number of Registered owners /entire population x 388).

The self-administered questionnaires were distributed online and 522 feedbacks were obtained. Since, only alternative fuel vehicle owners are the sample units, by Including a filter question to ask whether you have an AFV, the 392 respondents were qualified for the analysis. Univariate outliers were scientifically decoded and multivariate outliers were removed based Mahabalonis distance and setting 388 respondents for final analysis. In the initial phase, the construction of the model was justified theoretically and then empirically. Next after the data being collected and cleaned, in order to understand the nature of the measurements, exploratory factor analysis was carried out to ensure the reliability of indicators used and the confirmatory factor analysis (CFA) was performed to ensure the convergent and discriminant validity, composite reliability, model fit and their parameters within acceptable limits.

3.1 Measures

The measuring scales for all the variables included in the theoretical model were adopted from highly accepted earlier studies. The well-known PERVAL dimensions (E.g. Quality, emotional, price and social values) were assessed using a scale adopted from Walsh, Shiu, & Hassan (2014). The customer’s perceived value was assessed using three indicators. As adopted by Mohamed, Higgins, Ferguson, & Kanaroglu (2016). Intention to purchase or purchasing intention was measured using three items adopted from Zeithaml, Berry, & Parasuraman (1996). All these items were operationalised using a seven-point Likert scale ranging from 1 (completely disagree) to 7 (completely agree). Table 1 outlines the items used to measure the variables in the model. Additional information was collected through relevant socio-demographic to describe the profile of the respondents

Table 1: The adopted scales for measurements of the constructs

Construct	Selected items	Proposed scale (Adopted from general scales)
Vehicle Quality	1. AFV offers reliable levels of quality 2. AFVs’ are well-made	Walsh, Shiu, & Hassan (2014)
Emotional value	1. AFVs’ are something I would enjoy AFVs’ would make me feel good.	Walsh, Shiu, & Hassan (2014)
Vehicle price	1. AFVs’ offer value for money 2. AFVs are good products for the price	Walsh, Shiu, & Hassan (2014)
Social value	1. AFV would improve the way I am perceived by others 2. AFV would make a good impression on others	Walsh, Shiu, & Hassan (2014)
Customer Perception Value	1. In the long term, I think buying an EM vehicle is more cost effective than owning a conventional (internal combustion engine) vehicle. 2. Buying an EM vehicle will help to mitigate the effects of climate change. 3. I think buying an EM vehicle is a good decision.	Mohamed , Higgins, Ferguson, & Kanaroglu (2016)
Purchasing intention	1. I would recommend my friends to buy AFVs would speak favorably about AFVs’ to others 2. I would recommend my friends to buy AFVs 3. I would buy an AFV in the future (in 3 years’ time)	Zeithaml, Berry, & Parasuraman (1996)

Source: Higuera-Castillo et al. (2019)

3.2. Data collection and sample profile

As mentioned earlier, the data used for the empirical evaluation of this model were collected through an online survey of owners of AFVs' in all 25 administrative districts as multistate mixed mode. The data collection took place more than 30 days between May and June 2019. Importantly, the data were collected only from the AFV's owners who has the real experience of using the AFVs'. Table 2 outlines the main characteristics of the sample.

3.3. Data analysis

A covariance based structural equation modelling (CB-SEM) approach was adopted in assessing the measurement and

structural models. In the case of data collected by self-administrated questionnaires, CB-SEM approach has many advantages over the PLS SEM (Kumari, Azam & Khalida, 2020). Data analysis was carried out following a two-stage approach. First, the validity and reliability of the measures were assessed using SPSS v23 software ensuring the convergent and discriminant validities with the support of SPSS 23 Amos. Having successfully conducted Confirmatory factor analysis (CFA), then, the structural model was assessed to test the research hypotheses using SPSS AMOS 23 version.

Table 2. Sample profile (388 respondents)

Demographic factor	Description	Frequency	Percentage
Gender	Male	320	86.1
	Female	54	13.9
Age	24 - 34	94	24.2
	34 - 44	143	36.9
	44 - 54	123	31.7
	Above 54	28	7.2
Marital status	Married	330	85.1
	Unmarried	52	13.4
	Not willing to stay	6	6.5
Salary	Below 100,000	70	18.0
	100,000 – 150,000	42	10.8
	150,000 – 200,000	125	32.2
	Above 200,000	109	28.1
	Not willing to declare	42	10.9
Education	Primary	1	0.3
	Secondary	90	23.2
	Graduate	137	35.3
	Postgraduate	160	41.2

Source: Survey data, 2020.

4. RESULTS

4.1 Assessment of the Measurement Model

Initially, the adequacy of the measures was ensured by analyzing their reliability and validity through exploratory factor analysis (EFA). The reliability analysis was carried out involved two internal consistency indicators to ensure the Cronbach's alpha (CA). Then, the confirmatory factor analysis (CFA) was carried out to ensure the composite reliability (CR). The values of both tests were higher than the minimum threshold values of 0.6 and 0.7, respectively. The convergent validity was evaluated using the average

variance extracted (AVE). All AVE values were above the minimum recommended value of 0.50 ensuring the existence of the convergent validity. The computed AVE estimates for every combination of indicators were also greater than the correlation between the two relevant constructs, evidencing discriminant validity (Fornell & Larcker, 1981). Therefore, according to recommendations of Hair, Black, Babin, & Anderson (2018), the measures adopted had appropriate reliability, convergent validity and discriminant validity.

A summary is given in the table 3 and table 4.

Table 3: Reliability and convergent validity of the measures

Variables	Item	Factor Loading	Cronbatch Alpha	Composite reliability	AVE
Vehicle Quality	VQ1	0.814	0.847	0.849573	0.7390
	VQ2	0.903			
Emotional value	EV1	0.764	0.812	0.817292	0.8464
	EV2	0.895			
Vehicle Price	VP1	0.855	0.611	0.655006	0.9447
	VP2	0.534			
Social value	SV1	0.826	0.864	0.844536	0.7652
	SV2	0.921			
Customer perceived value	CPV1	0.676	0.634	0.480879	0.6789
	CPV2	0.210			
	CPV3	0.868			
Purchasing Intention	PI1	0.856	0.935	0.924195	0.8299
	PI2	0.922			
	PI3	0.953			

Source: Survey data, 2020.

Table 4. Discriminant Validity of the measures

Latent V	Quality	Emotional	Price	Social	CPV	P/Intention
Quality	0.859					
Emotional	0.643	0.920				
Price	0.688	0.852	0.972			
Social	0.595	0.832	0.865	0.874		
CPV	0.693	0.822	0.872	0.806	0.824	
P/Intention	0.650	0.706	0.864	0.662	0.723	0.911

Source: Survey data, 2020.

The values in bold are square root values of AVE.

The variance inflation factor (VIF) was analyzed to test for multicollinearity among the variables. The mean VIF value was 3.2678 and far below the maximum recommended value of 10 (Hair, Black, Babin, & Anderson, 2018).

4.2 Goodness of fit tests.

Table 5 displays the values of the goodness of fit of the proposed model. The normed Chi-square value (CMIN) was between 1 and 5 (3.388). The goodness of fit index (GFI) was

higher than the recommended value (>0.90) at 0.993. The comparative fit index (CFI) was greater than 0.9 (0.968). The Tucker–Lewis index (TLI) was greater than 0.9 (0.954). The Bollen’s incremental fit index (IFI) was also greater than 0.9 (0.978). The root mean square error of approximation (RMSEA) was suitable for the recommended value, <0.08 (0.080). Therefore, all the indices are well within the recommended values, indicating that the theoretical model fits approximately well with the collected sample data.

Table 5. Fit indices

Fit Indices	CMIN	GFI	AGFI	CFI	TLI	IFI	RMSEA
Reference value	1-5	>0.9	>0.9	>0.9	>0.9	>0.9	<0.080
Value for model	3.388	0.993	0.883	0.968	0.954	0.978	0.080

Source: Hair et al. (2018),

4.3. Assessment of the Structural Model

Having successfully evaluated the measurement model, in order to evaluate the structural model proposed here, the multiple correlation coefficient squared (R²) was first used. This coefficient indicates the amount of variance of the construct explained by the predictors included in the model. Falk & Miller (1992) reported that an appropriate value

should be greater than or equal to 0.1. The value of R² for attitude was 0.67, with a value of 0.70 obtained for purchasing intention thereby exceeding the recommended minimum value with the factors explaining a high proportion of the model variance. The table 6 portrays the causal relationships established in the research hypotheses

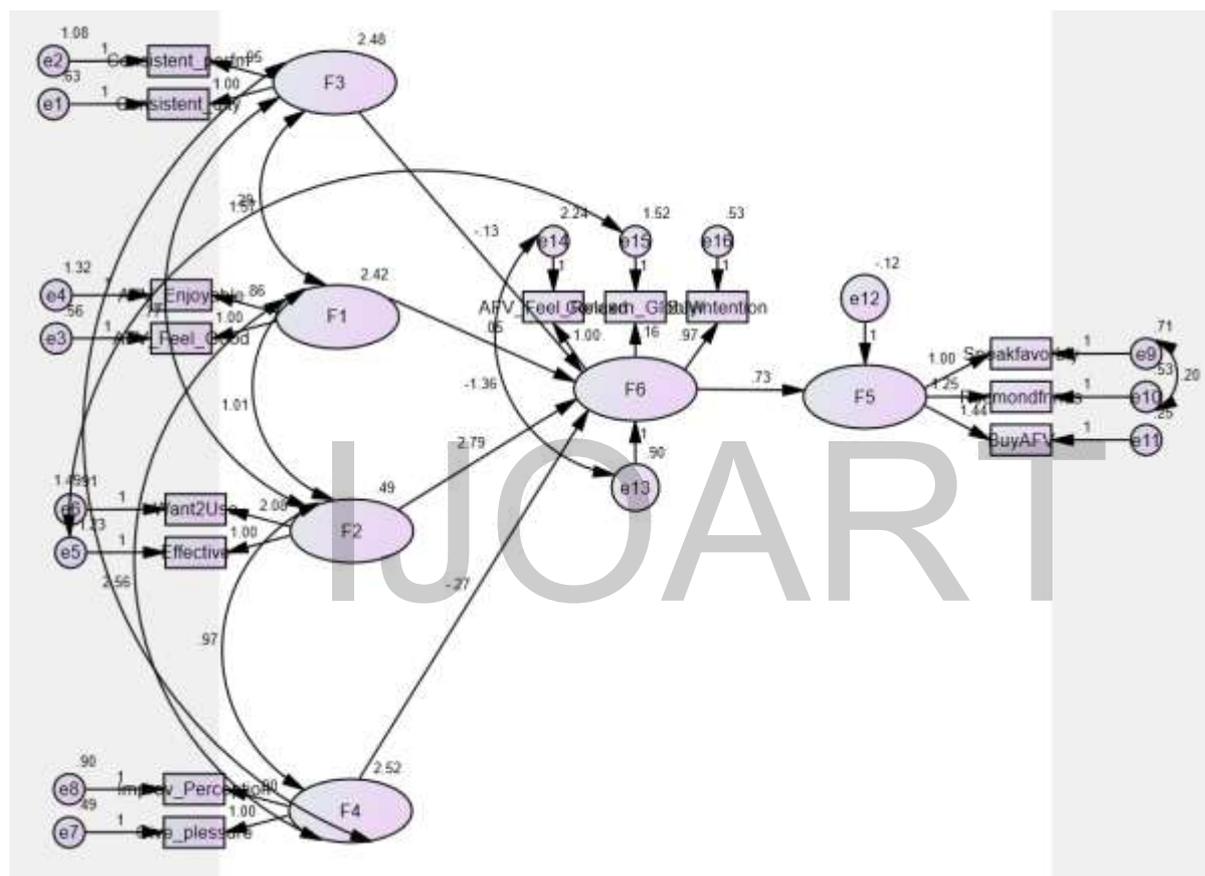
focusing on the value of the standardized coefficients. Two of the five hypotheses were supported by the data analysis.

Test 6. Research Hypotheses test

H/ Number	Research Hypotheses	Estimate	S.E	C.R	p value	Result
H1	Quality->Attitude	0.127	-1.013	-1.013	0.311	Not supporting
H2	Emotional->Attitude	0.054	0.270	0.201	0.841	Not supporting
H3	Price->Attitude	2.785	0.933	2.986	0.003	Supported
H4	Social->Attitude	-0.268	0.393	-0.680	0.496	Not supporting
H5	Attitude->P/Intention	0.732	0.048	15.298	0.000	Supported

Source: View text

Figure 2: Final structural mode



Source: SPSS Amos 23 output

5. DISCUSSION OF FINDINGS, CONCLUSIONS AND IMPLICATIONS

The findings of the present study suggested that out of PERVAL dimensions, namely quality, emotional, price and social of quality, only the price value has significant impact on the perceived value which in turn have a positive impact on purchasing intention of the alternative fuel vehicles. These findings partially in line with Higuera-Castillo et al. (2019). According to them, only emotional value and price have significant impact on the consumers' attitudes and then to intention to adopt. Further, as per the findings of Lai et al (2015), the reception of economic benefits has significant impact on the consumer's attitudes. Furthermore, according to findings of Karunanayake & Wanninayake (2015); Neizari, Nikandish, & Samadi (2017),

the price value has a significant impact on the purchasing intention of AFVs'. Accordingly, it can be reasonably argued that the price based concerns or values have a significant and positive impact on the customer's perceived value thus on the purchasing intention. Further, in contrast, Punchibandara (2017) found in his studies that the some of the individuals are more concerned than the luxury brand vehicles ignoring the price based concerns. Whereas Degrimency & Breitner (2017) in Germany argued that the environmental performance of AFVs' is a stronger predictor of attitude and thus purchasing intention than price and technical features. These inconsistencies may be due to the economic context of the countries. Further, the findings of the present research revealed that the customer's perceived value has a strongly positive impact on the purchasing

intention which is very much in line with the findings of Higuera-Castillo et al. (2019); Lai et al. (2015); Degrimency & Breitner 2017).

Though, there are a number of studies found about the factors affecting the adoption of AFV's, there was no any single study carried out taking as CPV as a mediator (Higuera-Castillo et al. 2019). Further, only very few studies were conducted to assess the impacts of the PERVAL dimensions on the purchasing intention of the alternative fuel vehicles. Consequently, it can be reasonably concluded that the current study contributed newness to the body of the existing knowledge filling the literature gap identified by the researcher based on the critical literature review on the relationship between the motivational factors affecting the CPV of the AFVs and the purchasing intention. However, this five factor model didn't emphasize the importance of the quality, emotional and social dimensions of the PERVAL. Accordingly, the academics are required to find out the reasons behind the inconsistency in order to generalize the scope of the model more widely.

The all the main stakeholder government, manufactures, dealers, activists and consumers (Byrne & Polonsky, 2001) need to understand the practical implications of the study in order to promote the alternative fuel vehicles mitigating the impediments they face. The government needs to promote the adoption of AFV's giving additional tax rebates on the imports of AFV's, spare parts. More importantly, the dealers or collaborators must be incentivized in order to develop the repairing facilities, improve the infrastructure. Further, the government could give special benefits for consumers of AFVs themselves providing special benefits such as free parking, free or subsidized expressway tickets, convenient charging centers at public places for subsidized rates. The dealers need to consider about the hybrid battery replacements at subsidized rates as the battery costs are very high and not freely available in Sri Lanka. The authorized dealers don't maintain enough stocks due to high cost and low frequency of use, thus importing batteries will take months and months. The pre-owned batteries and other related sophisticated accessories are sold by private vendors at very high rates and not at predetermined or controlled prices due to scarceness of the commodities yet without comprehensive guarantees. Unfortunately, the consumers are forced to purchase the AFVs batteries through private sources with high risks since the authorized dealers don't have stocks and too costly if available. Therefore, the government together with the dealers should implement some positive mechanisms to protect the consumers. The activists need to conduct awareness programs for the protection of the environment in regular intervals promoting people to shift into AFV's from fossil based fuel vehicles, in order to mitigate the greenhouse emissions to the environment. The activists are essentially required to make people aware through social media and, other ways and means about the importance of switching into AFV's.

The manufactures and competitors need to implement common standards for the accessories in order to reduce the costs and avail the spare parts freely. For example, the battery of the AFV's, the most expensive single part of the AFV can be designed in order to fit in many brands of the vehicles. Further, the collaborators or dealers must have strategies to lease the batteries instead of owning the batteries which then in turn reduce the battery costs and ease the recycling procedure. Importantly, the findings revealed that price value or economy based features are more significant than the improvement of other three dimensions of PERVAL. Accordingly, the manufactures must include and improve more and more utilitarianism based features in order to improve the utilitarianism of the customers which in turn improve the functional consequences and psychosocial consequences that lead to improve the customer perceived value towards the purchasing intention of the alternative fuel vehicles.

6. LIMITATIONS & RECOMMENDATIONS FOR FURTHER RESEARCH

Finally, although the findings of this study delivers a significant theoretical and practical contribution to existing knowledge, usual drawbacks do not exempt from its own limitations, including the fact that the research was carried out only in Sri Lanka. Therefore, the customer perceived values may be different from province to province, district to district, city to city. Further, even within the same city limits, the attitudes and perceptions of the AFV users may be different in the remote areas with different geographies and economic features. Consequently, the generalizability of the findings of the study to other consumer contexts would certainly depend on a widening the scope of this study to other world regions in order to achieve relevant cross-country comparisons. In addition, data collection was conducted through an online survey platform using a multi stage mixed mode sampling method. Therefore, the future studies could use random sampling instead of multi stage mixed mode sampling method to minimize the possible selection bias problems. Similarly, the consumer attitudes may vary after having experience on a product. Further, the present study was concerned only about the impact of the PERVAL dimensions on the CPV and the PI. Whereas a number of other important dimensions need to be investigated. The environment based concerns are one of the very important factors under the present context (Lai et al. 2015; Degrimency & Breitner, 2017; Khazaei & Khazaei, 2016). Further, according to Punchibandara (2017); Schuitema et al. (2012); Bennett, Kottasz and Shaw (2015), the hedonism based concerns have significant and very positive impacts on the customer's perceived value of the AFVs. Therefore, further studies are recommended to investigate the hedonism based features and environment based features under the changing context of the world. Accordingly, further studies are recommended to assess the other factors affecting the customers' perceived value.

Further, as this research examined only four positive psychological factors, the generalizability without considering other factors may be questionable when generalizing. Importantly, out of many different types of benefits, only some known long-term, personal, direct, and measurable economic benefits were tested. Therefore, it may be questionable generalizing only for some selected and measurable factors. Another important limitation is that this study mainly concerned only the passenger cars taking all AFV's into one common sample, this could be one of the major impediment in generalizing the findings into the wide range of AFV's as the EVs, HVs, semi HVs and semi EV's have one to one different characteristics inherent to them. Therefore, future studies must concern on their inherent characteristic and interpret results for improved much justified generalization. Additionally, there are different types of benefits. The only long-term, personal, direct, and measurable economic benefits are concentrated in this study that is basically known factors of alternative fuel vehicles. However, researchers can consider integrating other benefits such as social and environmental benefits in their research. Further, this study examined only with consumer adoption of alternative fuel vehicles. Therefore, it may not be reasonable to generalize for other environmental transportation technologies. Thus, the further studies are required to investigate whether this five factor model can be employed in order to install other environmental, transportation equipment Since this study mainly concerned only some selected long-term and measurable factors of the AFVs, the researchers are motivated to consider integrating other important but not direct benefits such as social and environmental benefits in their research. Since all the AFV's were taken under one common sample, future studies must concern on their inherent characteristics individually and interpret results for improved and much justified generalization.

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