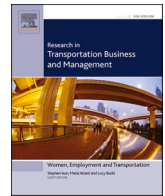


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A factor structure for adoption of hybrid vehicles: Differing impact on males, females and different age groups

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ABSTRACT

This study assessed the validity and reliability of the scales (latent factors) that can help measure consumers' actual adoption of hybrid cars. In so doing, it verified the factor structure of a set of measured variables. It then investigated the impact of each scales' measured variables on males, females and different age groups. The findings of prior studies, even the most recent ones, are inconclusive when it comes to the perceptions of consumers of different age group and gender towards purchase of such vehicles. This study adopted a quantitative approach of self-administered online survey, analyzing the data using SPSS and AMOS statistical tools. A conceptual framework was developed, incorporating the green self-image variable of the Self-image Congruence theory to the variables of price and cost savings, knowledge, hedonic and symbolic attributes, subjective norms, and time (as a risk factor). Confirmatory factor analysis results reported subjective norms as largely impacting males, females as well as all age groups while the rest had varied effects, with the impact of hedonic and symbolic attributes not as strong as the rest, except for on females. The empirical evidence confirms the suitability of most of the measured variables of the latent factors. Future researchers can use the same measured variables of these latent factors to further this research by investigating how these influence the actual adoption of hybrid vehicles, using a structural equation model. The six variables have not been tested together, in the same manner in any other prior study, to the best of the researchers' knowledge. In addition, this study presents a number of useful practical implications and recommendations based on the impacts of each measured variable.

1. Introduction

Driven by the realities of global warming, [Choi and Johnson \(2019\)](#), [Hamzah and Tanwir \(2021\)](#) and [Wang, Wang, Guo, Zhang, and Wang \(2018\)](#) found that buyers' awareness of vehicles' and pro-environmental attributes, do influence their buying habits. [Higueras-Castillo et al. \(2019\)](#) stated that consumers' knowledge of hybrid vehicles, coupled with their green self-image, are amongst the key reasons behind the booming hybrid car sales.

Whilst there is much research exploring consumer perceptions when adopting eco-friendly vehicles, there still exists a research void in

studying the same in the context of developing economies in terms of the specific gender-and-age categories. Studies that have been done thus far on these categories have been carried out in countries like China ([Lin & Wu, 2018](#); [Wang, Li, & Zhao, 2017](#) and [Yang et al., 2017](#)), Southern California, USA ([White and Sintov, 2017](#)), Malaysia – amongst the university students enrolled in Business Studies (aged between 18 and 30 years and above) ([Mohiuddin et al., 2018](#)) and cross cultural research in Australia, South Korea and Japan ([McLeay et al., 2018](#)). Some surveys were also conducted across Europe. For instance, [Simsekoglu and Nayum \(2019\)](#) examined the same in Norway; [Vassileva and Campillo \(2017\)](#) in Sweden; [Sovacool et al. \(2018\)](#) in Denmark, Finland, Iceland,

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Norway and Sweden and, [Higueras-Castillo et al. \(2019\)](#) in Spain. Nonetheless, “additional research that focuses on new countries would [still] be useful” ([McLeay, Yoganathan, Osburg, & Pandit, 2018](#): 527) since bigger and more advanced developing countries may differ when it comes to the perceptions of consumers of different age groups and gender in smaller, less advanced developing nations.

While prior studies have investigated age brackets, the age and gender categories have not been studied separately. Also, several papers define the younger middle-aged population (25–50 years) as early adopters ([Li, Long, Chen, & Geng, 2017](#); [Sovacool, Kester, Noel, & de Rubens, 2018](#); [Vassileva & Campillo, 2017](#); [White and Sintov, 2017](#) and; [Yang et al., 2017](#)). The other common age categories studied have been, below 25 years of age ([Sovacool et al., 2018](#)), younger middle age: 25–34 and 35–44 years of age ([Lin & Wu, 2018](#); [Sovacool et al., 2018](#)), middle age: 45–54 and 55–64 years of age ([Lou, Wang, & Yang, 2017](#); [Sovacool et al., 2018](#)) and the elderly, retirees and pensioners: over 65 years of age ([Lou et al., 2017](#); [Sovacool et al., 2018](#)).

Despite some research, there is no consensus on whether gender and/or age skews consumer perceptions on actual adoption of hybrid vehicles, however, scholars widely acknowledge the nuanced role that gender and age play in consumers’ decision-making. This study is an attempt in this direction, this being the major contribution of this study. This study first, assesses the validity and reliability of the scales (latent factors) that can measure consumers’ actual adoption of hybrid cars, verifying a factor structure of a set of measured variables. As [Huang, Yang, & Wang \(2014\)](#) argue, consumers’ actual adoption behavior may not always be the same as their adoption intention. Because it is the actual adoption behavior that can point out the factors pertaining to actual adoption ([Sajeewanie et al., 2019](#)), the sample of this study includes those who do own and/or use hybrid vehicles. The study then investigates the impact of each scales’ measured variables on males, females and different age groups.

A conceptual framework was developed accordingly, incorporating the green self-image variable of the Self-image Congruence theory to the variables of price and cost savings, knowledge, hedonic and symbolic attributes, subjective norms, and time (as a risk factor). Another contribution of the present study, is the addition of two latent factors – subjective norms and time which are understudied and have not been previously studied together with the rest of the factors as driving and risk factors in a consumer-centered hybrid vehicle research.

Findings of the present study suggest the suitability of most of the measured variables of the latent factors. Future researchers can use the same measured variables of these latent factors to further this research by investigating how these influence the actual adoption of hybrid vehicles, using a structural equation model. In addition, this study presents a number of useful practical implications and recommendations based on the impact of each measured variable on males, females and consumers of different age groups.

2. Literature review

Notwithstanding the scant literature, the following reviews various factors which influence the adoption of hybrid vehicles vis-à-vis gender and age variables.

Research highlights the prominence of subjective norms in influencing adoption of hybrid cars. For instance, a study conducted in Malaysia by [Hamzah and Tanwir \(2021\)](#) found that attitudes and acceptance by consumer social circles can predict consumer intentions of purchasing hybrid vehicles. Similarly, [Alzahrani, Hall-Phillips, and Zeng \(2017\)](#), [Lim et al. \(2019\)](#) and, [White and Sintov \(2017\)](#) share evidence of how social influences (of families, friends and celebrities) trigger consumers’ adoption of hybrid cars. However, [Ng, Law, and Zhang \(2018\)](#) stress that social pressures plausibly can also influence buyers to opt out of such purchases. In contrast, [Tanwir and Hamzah \(2020\)](#) argue that subjective norms are insignificant as determinants.

In emerging economies, consumers’ adoption of hybrid vehicles

seems most inclined towards their environmental knowledge and confidence in hybrid technology. Although cost concerns and affordability of hybrid vehicles play a role ([Bhutto et al., 2020](#); [Biresselioglu et al., 2018](#)), it is found that for some buyers’, their motivation to support eco-cars surpass price sensitivities ([Degirmenci & Breitter, 2017](#)).

Studies in China reported that females value the benefits of pro-environmental vehicles more than males ([Lin & Wu, 2018](#); [Wang et al., 2017](#)). These studies establish that females are more inclined to adopt hybrid vehicles early, as a result of being more environmentally aware. A study in Norway revealed that males have a lower intention to adopt hybrid cars ([Simsekoglu & Nayum, 2019](#)) while [Vassileva and Campillo’s \(2017\)](#) survey in Sweden, highlighted majority of early adopters being high-to-middle income earning males. There are other studies like that of [Sovacool et al. \(2018\)](#) that claim that both males and females are equally likely to purchase eco-friendly cars. Interestingly, their cross-country analysis in the Nordic region reported factors such as: females are less likely to own a car, are uninformed or have comparatively less or no driving experience within a household, which negatively impact their preferences towards eco-friendly cars (also see: [Kester, Noel, Zarazua de Rubens, & Sovacool, 2018](#)). All in all, it appears that the hybrid technology has gained much popularity amongst the younger buyers ([White & Sintov, 2017](#)). Overall, results do not concur ‘in profiling eco-friendly consumers based on socio-demographics’ ([McLeay et al., 2018](#): 526).

Another salient factor influencing the adoption of hybrid vehicles is, consumers’ perceived behavioral control. [Huang and Ge \(2019\)](#) and, [Simsekoglu and Nayum \(2019\)](#) highlight this as self-efficacy - the consumer’s perception of being in control of their purchase. Perceived behavioral control furthermore, subsumes a consumer’s financial capacity ([Adnan, Nordin, & Rahman, 2017](#)). This definition can also include the driver’s expectation and know-how ([Schmalfuss, Mühl, & Krems, 2017](#)); perceived risks ([Jing, Huang, Ran, Zhan, & Shi, 2019](#)); ease in accessibility and, availability of resources (e.g. tax exemptions, maintenance, etc.). In view of gender influences, when deciding to adopt hybrid vehicles, car ownership can also be linked to employment (i.e. earning capacity) as well as occupation (i.e. access to information/education). [Sovacool et al. \(2018\)](#) reveal that preferences for eco-friendly vehicles are mainly common amongst younger middle aged (25–44 years) individuals, particularly, skewed towards the higher income-earning females due to vehicles’ safety and cost saving features. The pensioners and retirees are another market segment that finds hybrid cars preferable for similar reasons.

In a nutshell, the premise at the crux of several studies is that a consumer’s adoption of a hybrid vehicle is motivated by, amongst other things, subjective norms, personal attributes, environmental knowledge, green self-image/altruism, perceived behavioral controls and, hedonic features. Although inconclusive, some studies have found that gender and age distributions do influence these preferences.

3. Theoretical underpinnings and hypotheses development

3.1. Green self-image

The self-image congruence theory posits that consumers inevitably draw parallels between their self-image and image of their purchased product. Studies confirm that consumers’ green self-identity actively shape adoption of hybrid cars ([Wang et al., 2018](#)). Scholars argue that consumers’ ecological purchase behavior is a result of their internal inclination, such that, a favorable attitude towards sustainability most likely leads to favorable intentions towards adoption of hybrid cars ([Cerri, Testa, & Rizzi, 2018](#); [Han, Wang, Zhao, & Li, 2017](#); [Higueras-Castillo, Liébana-Cabanillas, Muñoz-Leiva, & García-Maroto, 2019](#)). [Hamzah and Tanwir \(2021\)](#), p. 4) highlight, ‘altruistic obligation and self-interest’ as the two most effective predictors of purchase intentions, however, they were not able to empirically establish a statistically significant relationship between green self-identity and the intention to

purchase hybrid vehicles. According to [Lin and Wu \(2018\)](#), green consumerism is most pronounced amongst the younger individuals (below 45 years old) since they have a stronger attitude and favorable image. In terms of gender, a study in Spain reported that males have a lower likelihood of purchasing hybrid cars, given their low green self-identity ([Higueras-Castillo et al., 2019](#)). We thus, hypothesize that:

H1a. Green self-image measured variables are positively related to the adoption of hybrid vehicles for both male and female consumers.

H1b. Green self-image measured variables are positively related to the adoption of hybrid vehicles for consumers of different age groups.

3.2. Price and cost savings

Economic factors are amid the most scrutinized barriers to adopting eco-friendly vehicles across literature, price and consumer incentive being key ([Biresellioglu, Demirbag, & Yilmaz, 2018](#); [Li et al., 2017](#); [Noel, Zarazua de Rubens, Kester, & Sovacool, 2020](#); [Sovacool et al., 2018](#)). [Noel et al. \(2020, p.8\)](#) claim that 'price tag would dominate the decision-making', explaining that owning such a car can bring about significant economic savings. In contrast, [Degirmenci and Breiter \(2017\)](#) argue that environmental affinity and values of consumers mediate buying intentions more strongly than price and costs of eco-friendly vehicles. As per [Bjerkkan et al. \(2016, p.10\)](#): "Income levels do matter, ..." but is largely a weak predictor. This latter study rejected the notion that hybrid vehicles are more common amongst the affluent drivers. Nevertheless, they provide evidence in support of Norwegian men, having a higher budget in comparison to women intending to purchase eco-friendly vehicles. Conversely, [Li et al. \(2017\)](#) note that since cost savings are not apparent in the short run and may only eventuate with longer driving-range, buyers may initially get discouraged from their purchase. In terms of consumers of different age group, [Sovacool et al. \(2018, p.7\)](#) found that the 25–44 year olds highly preferred owning a hybrid car given the safety and cost savings attributes of the vehicles. The premium pricing of hybrid cars however, needs to be carefully restructured if the targeted middle-income consumer base is to be maintained ([Lou et al., 2017](#)). Interestingly, even with low ownership rate as well as little to no interest/experience with hybrid technology, the elderly (over 65 years) and retirees are much willing to adopt hybrid vehicles based on reliability and cost saving features. Thus, the hypotheses:

H2a. Price and cost savings measured variables are positively related to the adopt of hybrid vehicles for both male and female consumers.

H2b. Price and cost savings measured variables are positively related to the adoption of hybrid vehicles for consumers of different age groups.

3.3. Environmental knowledge

Environmental knowledge or lack thereof has a contributing or deterring effect on the purchase of hybrid cars. [Wang et al. \(2018\)](#) reported that in China, buyers' awareness is positively significant to their attitude and intention. Absence of knowledge, on the other hand, can become a psychological barrier blocking the acceptance of hybrid technology ([Choi & Johnson, 2019](#)). [Mohiuddin et al. \(2018\)](#), highlight environmental knowledge as having the strongest impact on the buying intentions of student consumers in emerging economies. They explained that business students typically favor greener vehicles because of their environmental awareness. Moreover, in identifying market segments, many researchers found females preferring smaller and more energy-efficient vehicles ([Fan, 2017](#), [Lin & Wu, 2018](#) and [Wang et al., 2017](#)). According to [Sovacool et al. \(2018\)](#), a key reason behind women preferring hybrid technology more than men, is environmental values. They confirmed that because 25–34-year-olds place greater importance to protecting the environment, their purchase intentions are the highest, followed by the 45–64 age cohorts with moderate interest in hybrid cars.

Similarly, [Vassileva and Campillo's \(2017\)](#) study in Sweden reported that the transition to hybrid vehicles is primarily common amongst the early adopters. Also, in Norway, drivers of hybrid vehicles are mostly the highly educated early adopters who purchase decisions are in line with their environmental motivations. For this research, we hypothesize that:

H3a. Knowledge measured variables are positively related to the adoption of hybrid vehicles for both male and female consumers.

H3b. Knowledge measured variables are positively related to the adoption of hybrid vehicles for consumers of different age groups.

3.4. Subjective norms

Subjective norms include both positive and negative societal and peer pressure that can influence a consumer's intention as well as actual purchase behavior, yet there are no studies per se investigating into consumers' adoption of hybrid vehicles in terms of both age and gender demographics, in this regard. Generally, however, as articulated by [White and Sintov \(2017\)](#), consumers seem encouraged to purchase hybrids when they perceive societal acceptance or witness their social circles (such as families, friends, neighbors, celebrities, etc.) switching to eco-friendly cars. The likelihood of a purchase is greater as the consumer gets exposed to the increasing positive social pressure ([Lim et al., 2019](#)). In their study, [Ng et al. \(2018\)](#) found subjective norms ineffective and unpersuasive towards the adoption of hybrid vehicles. Similarly, [Hamzah and Tanwir \(2021, p.5\)](#) while arguing that 'subjective norm positively affects green purchase intention', found insufficient statistical evidence supporting the effects of this on purchase intentions of hybrid vehicles. [Jansson, Nordlund, and Westin \(2017\)](#) and [Mohiuddin, Al Mamun, Syed, Mehedi Masud, and Su \(2018\)](#) also stated that consumers' decision to purchase a vehicle depends more on what suits his or her needs than what their social circles perceive. In agreement, [Thananusak, Rakthin, Punnakitikashem, and Tavewatanaphan \(2017\)](#) highlighted that an unaffordable price of hybrid cars dilutes the positive social influence, leading to withdrawals from the purchase. As per [Lin and Wu \(2018\)](#), the early adopters view hybrid technology more favorably than the elderly because they seem to enjoy a more apparent socio-economic standing. Agreeing with [White and Sintov \(2017\)](#) and, ([Lim et al., 2019](#)), we hypothesize that:

H4a. Subjective norms measured variables are positively related to the adoption of hybrid vehicles for both male and female consumers.

H4b. Subjective norms measured variables are positively related to the adoption of hybrid vehicles for consumers of different age groups.

3.5. Hedonic and symbolic attributes

Consumers of technologically advanced eco-friendly vehicles associate symbolic attributes with their self-identity and social status ([White and Sintov, 2017](#)). [White and Sintov \(2017\)](#) consider this a symbol of responsible imagery and hedonic features as an expression of aesthetics. They argue that capitalizing on the symbolic attribute of eco-friendly vehicles as an environmentalist mediates the strongest intent of purchase amongst buyers. [Higueras-Castillo et al. \(2019\)](#) study of the Spanish market found that overall, male consumers were more likely to make a purchase while higher income earning young women reported a preference for hybrid and/or electric vehicles as they symbolize pro-environmentalism. Thus, the hypotheses:

H5a. Hedonic and Symbolic measured variables are positively related to the adoption of hybrid vehicles for both male and female consumers.

H5b. Hedonic and Symbolic measured variables are positively related to the adoption of hybrid vehicles for consumers of different age groups.

3.6. Time risk

Despite the perceived risks associated with the purchase of hybrid vehicles, there is no study examining this variable in age and gender based hybrid vehicle research. In general terms, according to Adnan et al. (2017), a few of these risks are: financial (e.g., battery/maintenance and technical costs), psychological (e.g., anxiety relating to the innovation post-purchase); and time related (e.g., time involvement in learning/repair/getting used to the hybrid car). Knowledge and experience have shown positive influence on the adoption of hybrid cars, however, the development of such skills requires considerable time commitment. McLeay et al. (2018) explained that of the many risks involved, their studied sample was the most concerned about perceived time risks, in terms of understanding the product features and utilization. They also found that the intentions of university degree holders in developed countries were more favorable towards adopting hybrid vehicles by tackling the time risk (and other) constraints given sufficient information. Therefore, the hypotheses:

H6a. Time risk measured variables are negatively related to the adoption of hybrid vehicles for both male and female consumers.

H6b. Time risk measured variables are negatively related to the adoption of hybrid vehicles for consumers of different age groups.

As per the research aim and, in keeping consistency with the literature reviewed, the following conceptual model was developed as in Fig. 1 below, illustrating the relationship between the six latent factors and the adoption of hybrid vehicles.

4. Materials and methods

4.1. Participants and procedure

The perusal of hybrid vehicle literature shows that scholars have employed both quantitative as well as qualitative narrative approaches.

In particular, survey/questionnaires/Likert scales have been used by scholars like Kester et al. (2018); Lin and Wu (2018); Mohiuddin et al. (2018); Sovacool et al. (2018); Vassileva and Campillo (2017); Wang et al. (2017) and; White and Sintov (2017).

A quantitative method was thus adopted for the present study as well, using self-administered 'lime survey' created questionnaires. In line with the research aim of the present study, the target participants, including the pilot study participants were the actual users and/or owners of hybrid vehicles. The first question in the questionnaire asked them to indicate whether or not they owned a hybrid car and they could only proceed to other questions if they answered yes. See Appendix 1 for questionnaire.

Prior to the full survey, a pilot test was conducted with 25 University of the South Pacific (USP) students to check whether the questions were clear and easy to understand. Pilot study proved successful as all participants expressed no confusion and were able to fill out the questionnaire correctly. The questionnaire was deemed appropriate and a full survey was then carried out using Facebook, including several hybrid car groups with frequently interacting members between 1000 and 10,000. Approval was sought from the group administrators who, after checking the questions, posted it for interested members to participate. Participation was voluntary. Participants were allowed to refuse to participate if felt uncomfortable with any question. Data was gathered between October–December 2020. 264 responses were collected. While there were no invalid responses, a few invited participants declined, opting out of the survey.

4.2. Measures

Based on extant literature, scales were derived from the extended self-image congruency theory. Six scale items were then modified for this research and were rated in the questionnaire, using a five-point Likert scale with responses ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). These scales represented green self-image (GSI), price and cost savings (PCS), knowledge (K), subjective norms (SN), hedonic and symbolic (HS), and time risk (TR).

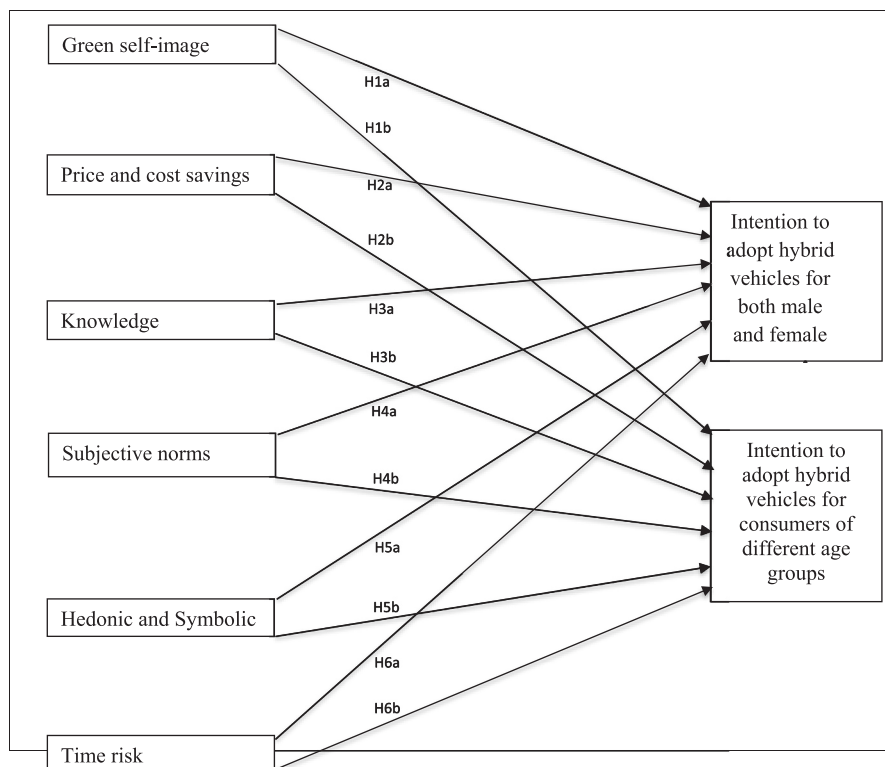


Fig. 1. Conceptual framework.

hedonic and symbolic (HnS) attributes and time (T). The scale for GSI was sourced from the work of and [McLeay et al. \(2018\)](#), PCS scale from [Wang, Fan, Zhao, Yang, and Fu \(2016\)](#), K scale from [Karunanyake and Wanninayake \(2015\)](#), SN scale from [Wang et al. \(2016\)](#) and, the scales for HnS and time were sourced from [McLeay et al. \(2018\)](#). A set of thirty-five questions helped achieve the results suitable to the study’s context. The list of questions are more than other similar studies (e.g. [Karunanyake & Wanninayake, 2015](#); [Wang et al., 2016](#)), thus assisting in better understanding of the subject matter.

5. Results and discussion

5.1. Respondent profile

Of the 264 respondents, 71.2% were from a developing country (Fiji) and 28.8% from a developed country (Australia). Respondents mostly resided in the heavily populated areas of the two countries e.g. Suva, Nasinu, Nausori, Lami and Navua in Fiji and, Sydney, Melbourne and Brisbane in Australia. The Australian market helped increase the sample size for better analysis and generalizations.

Since 2014, the Fijian Government implemented tax incentives for the importation of environmentally friendly vehicles. The tax incentives provide concessions on excise duties and value-added tax for importers and buyers of electric cars, hybrid cars, gas-operated cars (LPG and CNG) and solar-powered vehicles, not older than 8 years ([Fiji Government, 2020](#)). According to [CarHubJapan \(2018\)](#) and [The Globe and Mail \(2016\)](#), as a result of tax incentives, used hybrid cars appear to be the most popular cars in Fiji. Vast majority of these cars are second-hand hybrid-powered vehicles sourced from Japan, one of the largest hybrid-powered car markets in the Asia-Pacific region ([Japanese Times, 2019](#)). However, adverse policy implications and subsequent consequences were not considered. The mass importation of second-hand hybrid vehicles with limited warranty and aging engines and batteries create one of these unintended consequences, leading to an immensely negative environmental impact if not addressed ([Kaufmann & Kaufmann, 2020](#)). Hence, in its 2019–2020 National Budget, the government announced changes to the tax incentives on hybrid vehicles. While, lower fiscal import duties on hybrid cars and new non-hybrid cars led to a significant increase in vehicle ownership in Fiji over the years, new challenges such as serious traffic congestions and high risk of accidents also emanated. Given these challenges, the government then imposed a higher fiscal import duty along with environmental levies (ECAL) on hybrid cars ([Ministry of Economy, 2019](#)).

In Australia, electric vehicle accounts for only 0.6% of new vehicle sales while the purchase of these around the globe, accounts for almost 2.5% to 5% of sales ([Electric Vehicle Council, 2020](#)). A report compiled by the [Electric Vehicle Council \(2020\)](#) shows an encouraging increase in sales of electric vehicles in 2019 at 6718, compared to 2216 in 2018. It also highlighted that despite the Covid-19 pandemic, 3226 electric vehicles were sold in the first half of 2020 even though there was a 20% decrease in overall car sales. Across the states, it was noted that Victoria and NSW have the largest number of purchased electric vehicles with 2540 and 2532, respectively. The report also noted that according to the consumers, the main benefits of electric vehicles was the environmental benefits, fuel security and health benefits. A study ([Chua, Lee, & Sadeque, 2010](#)) reported similarly, comparing consumers’ intentions on purchasing a hybrid electric vehicle against conventional cars in Australia. The results suggest that consumers give more significance to purchasing a hybrid electric car because of green self-image and significant social influence rather than quality and appeal of the hybrid electric car. According to the [Electric Vehicle Council \(2020\)](#), the priority policies since 2018 focused more on providing subsidies to reduce: the cost of electric vehicles, the cost of installing home charging and the provision of public charging infrastructure.

While the development status and average income levels differ, the literacy rate of the above two countries are similar and literature suggest

that, largely, drivers of hybrid vehicles are mostly the highly educated early adopters who base their purchase decision on environmental motivations. Past hybrid car research reveals adopters as: younger consumers with higher qualifications ([Hackbarth & Medlener, 2013](#); [Sang & Bekhet, 2015](#)) between the young to middle age age-bracket ([Nayum, Klöckner, & Mehmetoglu, 2016](#)) who reside in small-to medium-sized municipalities ([Plötz, Schneider, Globisch, & Dütschke, 2014](#)). In addition, both countries share similar sentiments towards encouraging the general population towards environment friendly cars. Their policies regarding hybrid or eco cars are also similar, and the consumers in these countries have somewhat reacted similarly to hybrid cars ([Mazengarb, 2021](#)). In addition, Australia has provided assistance to Fiji in terms of channeling the hybrid car market in Fiji, in order to build the capacity to overcome the current gaps in policy and environmental challenges. For example, the Tesla Corporation developed an educational program and since 2018 offers partnerships to universities like the Fiji National University to take forward its technical know-how ([Kaufmann & Kaufmann, 2020](#)). Given the above, the comparison in this present study is only in terms of gender and age overall, but not in terms of the country comparison since the sample is skewed towards Fijians. The Australian dataset helped enhance sample size for better analysis and generalisation. [Table 1](#) shows the demographic profile of the sample.

5.2. Data analysis

SPSS v25 and AMOS v22 were used for descriptive analysis and Confirmatory Factor Analysis (CFA), respectively. Various reliability

Table 1
Demographic characteristics.

Age	N	Percentage
> 16	10	3.8
21–30	86	32.6
31–40	112	42.4
41–50	41	15.5
51 and above	15	5.7
Gender	N	Percentage
Male	170	64.4
Female	94	35.6
Income	N	Percentage
I do not earn an income	45	17.0
Under \$15,000	30	11.4
\$15,000–\$29,999	59	22.3
\$30,000–\$44,999	35	13.3
\$45,000–\$59,999	11	4.2
\$60,000–\$74,999	10	3.8
\$75,000–\$89,999	41	15.5
\$90,000+	23	8.7
Do not wish to indicate	10	3.8
Education	N	Percentage
Primary education	4	1.5
High school education	43	16.3
Diploma/certificate	68	25.8
Bachelors education	97	36.7
Postgraduate education	31	11.7
Others	15	5.7
Do not wish to indicate	6	2.3
Type of hybrid car owned	N	Percentage
Honda Fit	12	4.6
Honda Insight	21	8.0
Honda CR-Z	7	2.7
Toyota Camry Hybrid	16	6.1
Toyota Prius	99	37.8
Hyundai Ioniq	3	1.1
Toyota Sai	26	9.9
Toyota Hybrid Imports	9	3.4
Toyota Corolla SX Hybrid	23	8.8
Toyota RAV4 GXL Hybrid	21	8.0
Lexus ES300H Sports Luxury	7	2.7
Volvo CX90 T8 Twin Engine Hybrid	2	0.8
Others	16	6.1

and validity tests as well as model fit tests of measurement model were performed to test the appropriateness of the factor structure of the measured variables of the latent factors.

The KMO measure of sampling adequacy and the Bartlett's test of sphericity are the key assumptions of EFA. As required, KMO was 0.76 > 0.60 while Bartlett's test of sphericity was statistically significant with a *p* value of <0.05 (Pallant, 2013). Cronbach's alpha test confirmed reliability of scales since all were within the acceptable range of >0.6 (Wim, Katrien, Patrick, & Patrick, 2008), overall alpha being 0.855. For each latent variable, alpha was 0.672 for GSI, 0.696 for PCS, 0.771 for K, 0.707 for SN, 0.907 for HnS and 0.617 for T.

Furthermore, discriminant validity of all factors was also confirmed since all were within the acceptable range of <0.85 (Hair, Black, Babin, Anderson, & Tatham, 2010); being 0.688 for GSI, 0.817 for PCS, 0.768 for K, 0.707 for SN, 0.829 for HnS and 0.732 for T. Convergent validity was confirmed for most latent variables since these were > 0.5, being 0.668 for PCS, 0.589 for K, 0.686 for SN, 0.535 for HnS, except for GSI (0.473 < 0.5) and T (0.344 < 0.5). Because the convergent validity for T and GSI latent variables were lower than the threshold of >0.5, composite reliability was further computed which was 0.6 for Time, and for GSI, 0.7. Convergent validity was then deemed adequate given the 0.6 threshold for composite reliability (Fornell & Larcker, 1981). In addition, Harman's single factor score was calculated which was 26.38% and well below the 50% threshold, thus this study's findings are not affected by common method bias.

5.3. CFA model

Upon confirmation of reliability and validity, a measurement model was created for each latent factor for CFA. CFA was run for the six latent factors to examine the adequacy of the 25 measured variables. The measurement model was then modified by removing 9 measured variables (GSI_02, PCS_05,08, K_12, SN_16,17 and HnS_18,19,22) of poor loadings and by adding correlations between some error variables to improve the model fit. An acceptable model fit was then confirmed with CMIN/DF = 2.644 < 3.0, IFI = 0.927, CFI = 0.925: both >0.9; PNFI = 0.591, PCFI = 0.617: both greater 0.5; RMSEA = 0.079 < 0.8 (Schmitt, 2011). Fig. 2 presents the measurement model. Multigroup analysis was then performed for the male, female and age groups.

6. Results and discussion

Findings' reveal that the effect of the measured variables on the latent construct for the male group towards the adoption of a hybrid car, significantly differs from that of the females. Table 2 presents the comparative Standardized Loadings (SL), critical ratios and *p*-values of the male and female group.

For the male group, all measured variables showed significant positive impacts with *p* > 0.05. The measured variable: K_10: I understand the cost and environmental benefits of using a Hybrid vehicle, reported the strongest relationship (standardized coefficient of 0.947; C.R. = 12.716 > 1.96; *p* = 0.000 < 0.05), followed by SN_14: If I purchased a Hybrid vehicle, most people who are important to me would find it desirable (standardized coefficient of 0.906; C.R. = 13.962 > 1.96; *p* =

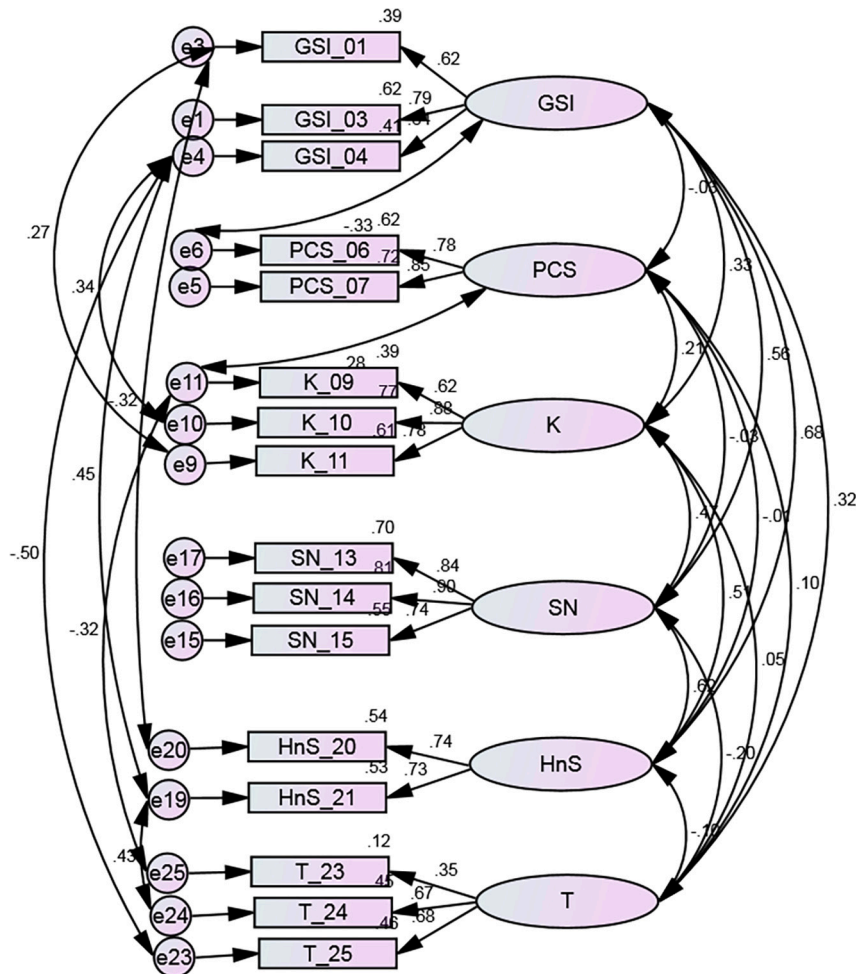


Fig. 2. Structure equation model.

Table 2
Confirmatory factor analysis results for refined measurement items (gender comparison).

Factor and item description			Male			Female		
			SL	C.R.	P	SL	C.R.	P
GSI_01: Using a hybrid vehicle is consistent with how I see myself	<--	GSI	0.592			0.742		
GSI_03: Using a Hybrid vehicle expresses my social position of being "environment friendly"	<--	GSI	0.867	7.793	***	0.582	5.223	***
GSI_04: Using Hybrid cars contributes to sustainable road transport.	<--	GSI	0.529	6.027	***	0.749	6.952	***
PCS_06: The Hybrid car price should be cheaper than the price of a normal car	<--	PCS	0.815	5.727	***	0.652	5.210	***
PCS_07: Having lower duty/tax on Hybrid vehicle imports influences my decision to purchase: because it's cheaper	<--	PCS	0.956			0.706		
K_09: I am very knowledgeable about environmental issues	<--	K	0.659	9.785	***	0.548	4.532	***
K_10: I understand the cost and environmental benefits of using a Hybrid vehicle	<--	K	0.947	12.716	***	0.711	5.442	***
K_11: I understand the need to move to a more eco-friendly vehicle and how to maintain the vehicle	<--	K	0.814			0.741		
SN_13: If I purchased a Hybrid vehicle most people who are important to me would agree with my decision	<--	SN	0.840			0.841		
SN_14: If I purchased a Hybrid vehicle most people who are important to me would find it desirable	<--	SN	0.906	13.962	***	0.907	9.368	***
SN_15: If I purchased a Hybrid vehicle most people who are important to me would appreciate it: they would be happy for me	<--	SN	0.786	11.783	***	0.600	6.044	***
HnS_20: Driving a Hybrid vehicle is pleasurable	<--	HnS	0.726	7.048	***	0.869	8.751	***
HnS_21: Buying a Hybrid vehicle will give me a feeling of being a better person	<--	HnS	0.643			0.808		
T_23: The time it took to learn to drive a hybrid vehicle is faster compared to other vehicles	<--	T	0.266	3.392	***	1.117	1.645	0.100
T_24: Adopting a new vehicle can be a time risk, as it takes a fair amount of time to get use to the vehicle	<--	T	0.746	6.320	***	0.504	1.775	0.076
T_25: Having a Hybrid vehicle means having high involvement into the repair and running of the vehicle	<--	T	0.628			0.161		

0.000 < 0.05), then GSI_03: Using a Hybrid vehicle expresses my social position of being "environment friendly" (standardized coefficient of 0.867; C.R. = 7.793 > 1.96; p = 0.000 < 0.05) while T_23: The time it took to learn to drive a hybrid vehicle is faster compared to other vehicles, had the least impact (standardized coefficient of 0.266; C.R. = 3.392 > 1.96; p = 0.000 < 0.05).

For the female group, all measured variables except for the time construct, showed significant positive impacts, with the measured variable: SN_14 reporting the strongest relationship (standardized coefficient of 0.907; C.R. = 9.368 > 1.96; p = 0.000 < 0.05), followed by HnS_20: Driving a Hybrid vehicle is pleasurable (standardized coefficient of 0.869; C.R. = 8.751 > 1.96; p = 0.000 < 0.05). K_09: I am very knowledgeable about environmental issues, reported the least impact (standardized coefficient of 0.548; C.R. = 4.532 > 1.96; p = 0.000 < 0.05).

This paper argues that driving a car is easier and comes more naturally to males than females, as such T_23, while positive for both, was only significant for males. SN_14 was found important for both the male and female groups, with strong positive significant impact. The opinions of significant others or loved ones are important and has a strong effect on purchase, especially for a product that is used by the entire household. Mostly, purchase of such products is made in the presence of the entire household/family. Our study partly agrees with Hamzah and Tanwir (2021) who, while agreeing that 'subjective norm positively affects green purchase intention', did not find this statistically significant. Our study also does not agree with Jansson et al. (2017) and Mohiuddin et al. (2018) who mention that the purchase of such vehicles depends more on what suits consumer needs than what their social circles perceive.

Aside SN_14, the difference in measured variables that have significant positive impacts, differ. This maybe because of the differing gender characteristics and perceptions towards eco-cars. Males may be more aware of hybrid car cost and environmental benefits, more concerned about their eco-friendly social status but less concerned about pleasurable driving than women. Findings of this study reveal that knowledge about environmental issues matters more to males than females. This finding is unlike the studies of Lin and Wu (2018) and Wang et al. (2017) who found that females value the benefits of pro-environmental vehicles more than males and, Sovacool et al. (2018) who claimed that women prefer hybrid technology more than men because of environmental values. To a little extent, our study agrees with studies like that of Kester et al. (2018) who state that females may not own a car, are uninformed or have comparatively less or no driving experience within a household, negatively impacting on their preference of eco-friendly cars.

In addition, the empirical results depict that the perception of different age groups towards the adoption of a hybrid car, also significantly differs. Table 3 presents the comparative standardized loadings, critical ratios and p-values of the three major age groups.

For the 21–30 year olds, all measured variables except the time construct showed significant positive impacts, with the measured variable PCS_06: The Hybrid car price should be cheaper than the price of a normal car, reporting the strongest relationship (standardized coefficient of 0.966; C.R. = 2.679 > 1.96; p = 0.007 < 0.05), followed by SN_14 (standardized coefficient of 0.931; C.R. = 5.971 > 1.96; p = 0.000 < 0.05), then K_10 with positive significant impact (standardized coefficient of 0.799; C.R. = 5.858 > 1.96; p = 0.000 < 0.05). K_09: I am very knowledgeable about environmental issues, reported the lowest impact (standardized coefficient of 0.576; C.R. = 4.739 > 1.96; p = 0.000 < 0.05).

For the 31–40 year olds, all factors reported significant positive impact. Unlike the 21–30 year olds, the measured variable T_24 reported the strongest relationship (standardized coefficient of 1.235; C.R. = 2.521 > 1.96; p = 0.012 < 0.05), followed by SN_14 (standardized coefficient of 0.891; C.R. = 15.249 > 1.96; p = 0.000 < 0.05), K_10 (standardized coefficient of 0.841; C.R. = 12.843 > 1.96; p = 0.000 < 0.05) and PCS_06 (standardized coefficient of 0.806; C.R. = 12.903 > 1.96; p = 0.000 < 0.05) while T_23, unlike 21–30 year olds, had the least impact (standardized coefficient of 0.362; C.R. = 3.329 > 1.96; p = 0.000 < 0.05).

For the oldest of the three groups, 41–50 year olds, unusually all except the measured variables GSI_04 (Using Hybrid cars contributes to sustainable road transport), K_10 (I understand the cost and environmental benefits of using a Hybrid vehicle) and HnS_20 (Driving a Hybrid vehicle is pleasurable) reported significant positive impacts. Like the other groups, the measured variable SN_14 reported the strongest relationship (standardized coefficient of 1.161; C.R. = 6.096 > 1.96; p = 0.000 < 0.05), followed by PCS_06: The Hybrid car price should be cheaper than the price of a normal car with strong significant impact (standardized coefficient of 0.976; C.R. = 7.36 > 1.96; p = 0.000 < 0.05) while K_09: I am very knowledgeable about environmental issues, had the least impact (standardized coefficient of 0.147; C.R. = 2.427 > 1.96; p = 0.015 < 0.05).

Overall, like the male and female groups, SN_14 reported a significant positive effect on all age groups, more so, the oldest of the three age groups. The opinions of significant others or loved ones appear to be important to all but more so for the older groups. For them, happiness and opinions of all family members matter the most. This study agrees with scholars like White and Sintov (2017) and Lim, Perumal, and

Table 3
Confirmatory factor analysis results for refined measurement items (age comparisons).

Factor and item description			21–30 years			31–40			41–50		
			SL	C.R.	P	SL	C.R.	P	SL	C.R.	P
GSI_01: Using a hybrid vehicle is consistent with how I see myself	<--	GSI	0.757			0.593			0.747		
GSI_03: Using a Hybrid vehicle expresses my social position of being "environment friendly"	<--	GSI	0.61	5.839	***	0.805	6.825	***	0.95	7.671	***
GSI_04: Using Hybrid cars contributes to sustainable road transport	<--	GSI	0.708	5.943	***	0.803	6.917	***	-0.227	-1.456	0.145
PCS_06: The Hybrid car price should be cheaper than the price of a normal car	<--	PCS	0.966	2.679	0.007	0.806	12.903	***	0.976	7.36	***
PCS_07: Having lower duty/tax on Hybrid vehicle imports influences my decision to purchase: because it's cheaper	<--	PCS	0.485			1.043			0.794		
K_09: I am very knowledgeable about environmental issues	<--	K	0.576	4.739	***	0.634	8.637	***	0.147	2.427	0.015
K_10: I understand the cost and environmental benefits of using a Hybrid vehicle	<--	K	0.799	5.858	***	0.841	12.843	***	1.626	1.899	0.058
K_11: I understand the need to move to a more eco-friendly vehicle and how to maintain the vehicle	<--	K	0.691			0.966			0.386		
SN_13: If I purchased a Hybrid vehicle most people who are important to me would agree with my decision	<--	SN	0.597			0.949			0.68		
SN_14: If I purchased a Hybrid vehicle most people who are important to me would find it desirable	<--	SN	0.931	5.971	***	0.891	15.249	***	1.161	6.096	***
SN_15: If I purchased a Hybrid vehicle most people who are important to me would appreciate it: they would be happy for me	<--	SN	0.667	5.004	***	0.747	10.414	***	0.76	5.478	***
HnS_20: Driving a Hybrid vehicle is pleasurable	<--	HnS	0.748	5.855	***	0.639	7.647	***	0.316	1.038	0.299
HnS_21: Buying a Hybrid vehicle will give me a feeling of being a better person	<--	HnS	0.644			0.88			1.418		
T_23: The time it took to learn to drive a hybrid vehicle is faster compared to other vehicles	<--	T	0.22	1.154	0.248	0.362	3.329	***	0.52	4.539	***
T_24: Adopting a new vehicle can be a time risk, as it takes a fair amount of time to get use to the vehicle	<--	T	0.19	1.157	0.247	1.235	2.521	0.012	0.496	4.001	***
T_25: Having a Hybrid vehicle means having high involvement into the repair and running of the vehicle	<--	T	1.627			<u>0.272</u>			1.115		

Ahmad (2019) who argue that consumers seem encouraged to purchase hybrids given increasing positive social pressure, societal acceptance or when they witness their social circles shifting towards eco-friendly cars. Our study however, does not agree with Lin and Wu (2018) who suggest that early adopters view hybrid technology more favorably than the elderly because they seem to enjoy a more apparent socio-economic standing. We partly agree with Hamzah and Tanwir (2021) who reported subjective norms' positive effect on green purchase intention but did not find this statistically significant, unlike our study. We disagree with Ng et al. (2018), Jansson et al. (2017) and Mohiuddin et al. (2018) who reason that subjective norms are ineffective and unpersuasive towards the adoption rate of hybrid vehicles and that the purchase of a vehicle depends more on what suits consumer needs than what their social circles perceive.

Overall, K_09 had the least impact on the youngest and the oldest of the three groups, more so the oldest of the three groups. This can be explained as, comparatively, the 31–40 year olds have more knowledge on how the environment is affected by products and this in turn affects their purchase. K_10 was reported positive and significant for the age groups 21–30 and 31–40 year olds only. For 41–50 year olds, this was not statistically significant. Apparently, the younger groups are more aware and better understand the hybrid cars' environmental cost and benefits. This finding is parallel to studies by White and Sintov (2017) and, Vassileva and Campillo (2017) who noted that hybrid technology is more preferred and popular amongst the younger buyers. Our study also concurs with Sovacool et al. (2018) who confirmed that 25–34-year-old individuals give more importance to environmental protection.

PCS_06: The Hybrid car price should be cheaper than the price of a normal car, was positive and significant for all age groups, more so for the oldest of the three. This maybe because the older groups are more encouraged by the lower price of hybrid and at that age, more careful spenders, comparatively. This finding is somewhat similar to that of Sovacool et al. (2018) who found that the 25–44 year olds highly prefer owning a hybrid car for the 'safety and cost savings' attributes of such vehicles.

6.1. Theoretical contributions

This study makes numerous contributions to literature on consumers' actual adoption of hybrid vehicles. Prior studies on such vehicles focused more on Plug in Electrical Vehicles (PEV) than hybrid vehicles, examining consumers of the developed countries, in particular. In addition, most prior studies merely focused on driving factors while others looked at risk factors. Little attention has been paid to risk factors overall and both sets of such factors have not been investigated in a single research (McLeay et al., 2018). The present study addresses the aforementioned gaps in literature by empirically investigating both the driving and risk factors.

Secondly, unlike McLeay et al. (2018), the present study treated subjective norms as a driving factor. One of its measured variables reported the strongest positive impact on all groups, confirming the usefulness of this factor in eco-car studies.

Thirdly, this study is one of the first few studies to compare multi-groups of males and females and, three major age groups, reporting differing levels of influence of measured variables on these groups. The developing nation selected in this study has not been previously studied in this manner for this subject.

6.2. Implications for practice

This research presents various implications for an economy's government, eco-car sellers, marketers and eco-product and marketing scholars. Through policies and regulations, a government can promote and encourage the purchase of eco-cars, for instance, by providing tax concessions to encourage imports and purchase of such cars. The empirical results confirm the importance of price and cost savings. Price and cost savings (in particular, PCS_06: The Hybrid car price should be cheaper than the price of a normal car) was positive and significant for all age groups.

Findings also reveal significant and positive impact of subjective norms, in some cases the strongest impact (in particular, SN_14: If I

purchased a Hybrid vehicle, most people who are important to me would find it desirable) on males, females and all age groups on the intention to adopt a hybrid vehicle. Marketers can thus use testimonials (TV advertisements as well as videos on social media) of not only the consumer who purchases but their close family members/loved ones in advertisements, depicting how each family member perceives and feels about hybrid car ownership to encourage others to purchase such vehicles.

Second, the study also reports a strong positive impact of knowledge (in particular, K_10: I understand the cost and environmental benefits of using a Hybrid vehicle) on males and the age groups 21–30 and 31–40. Automobile companies' marketers should hence take note of different segments in terms of gender and age groups and must ensure that their salespeople have complete product's cost and benefits related information/knowledge and, videos on their webpages and social media pages, displaying such evidence.

Third, green self-image (in particular, GSI_03: Using a Hybrid vehicle expresses my social position of being 'environment friendly') reported positive influence on the male consumers. For this segment, marketers can come up with promotional campaigns that show how the use of hybrid cars enhances consumers' social standing and how they use their eco-friendly status in their everyday life. Companies' can feature such loyal consumers (particularly those who define themselves as environment conservationists) on TV advertisements and webpage/social media/videos and also use them as influencers on social media including tik tok, promoting green living and status, showing how individuals can contribute towards a better environment.

Fourth, hedonic and symbolic factors (particularly, HnS_20: Driving a Hybrid vehicle is pleasurable) was found to have a strong impact on females. Companies can focus on this when promoting eco-cars to the female segment. For instance, TV advertisement could feature loyal female consumers enjoying while driving a hybrid car. These consumers can also be used as influencers for the female market in social media, including tik tok.

6.3. Research limitations and future directions

Like any other research, this study also has some limitations but such gaps offer useful hints for future research. Firstly, this study is limited to the assessment of the validity and reliability of the scales or latent factors that can help measure consumers' actual adoption of hybrid cars. It verified the factor structure of a set of measured variables. Future researchers can use the same suitable measured variables of these latent factors to further this research by investigating and analyzing how these influence the actual adoption of hybrid vehicles, using a structural equation model. Second, the sample is skewed towards the developing country, males and the 31–40 age group which may influence the results, affecting results and generalizations. The survey was also conducted during the COVID-19 pandemic, which may have influenced the results. Notwithstanding, its findings offer a good base study for future better distributed studies on other countries and during non covid situations. Third, the data collection medium was Facebook but not all hybrid car owners are on Facebook. Other social media platforms as well as methods of data collection can be used by scholars, including engaging the eco-friendly automobile companies. Fourth, this study employed quantitative data collection and analysis methods. Future studies can look into mixed methods for deeper insights. Fifth, the demographic factors of gender and age were investigated in this study. Future studies can investigate into other factors such as cultural dimensions of consumers as well as the age groups that were not covered in this study e.g. consumers below the age of 21 and above 50. Sixth, the present study investigated measured variables of six latent factors; future studies can combine variables of related theories to improve the model. Despite above limitations, car companies, marketers, relevant government agencies, hybrid/eco-car scholars can benefit from the findings, suggestions and future research ideas.

7. Conclusion

The empirical evidence confirmed the suitability of most of the measured items of the scales or latent factors. Findings of this research further confirm that the extent to which the measured variables influence consumers' actual adoption of hybrid cars, can vary in terms of their gender and age. Empirical results reported that largely, subjective norms strongly influenced males, and all age groups' adoption of a hybrid vehicle. Knowledge, time and green self-image reported varied effects on all groups while hedonic and symbolic factors' impact did not appear as strong as the above factors except for on the female group.

Specifically, the empirical findings of this study revealed that the effect of the measured variables on the latent construct for the male group towards the adoption of a hybrid car, significantly differs from that of the females and amongst the different age groups. Policy makers and practitioners thus must understand that 'one-size-fit-all' hybrid products and the way such products are marketed, may not appeal to all consumers the same way. This study puts on the spotlight the factors that matter the most to consumers of different age groups and gender. Hence, there is a need to segment consumers by way of age as well as gender and devise separate marketing strategies in a way that appeals to these separate segments. The factors that matter the most to each segment must be given a lot of attention especially when selling to them, one on one basis or as separate segments. However, the same information should be provided on the governments and automobile companies' webpages, their print advertisements as well as social media platforms.

For instance, this study reported a strong positive impact of knowledge of cost and environmental benefits of using a hybrid vehicle on males and the age groups 21–30 and 31–40. Hence, when persuading and promoting to these segments, automobile companies' marketers, should ensure that their staff like customer service staff and salespeople have complete products' cost and benefits related information/knowledge. Consumers of these segments may have many questions and can be annoyed if staff are unable to answer their questions. Automobile companies can lose such consumers to their competitors who do better in this area and have staff with good product knowledge. In addition, automobile companies should also provide such details with evidence on how the use of hybrid cars lowers costs and benefit the environment. Such information should be on their webpages, print advertisements and social media pages, to ensure that these are readily available when these consumer segments search for extra information.

Green self-image also reported positive influence on the male consumers. For this male segment, in terms of actual promotional campaigns, companies can show how hybrid car usage and ownership enhances male consumers' social standing as well as use environment enthusiast consumers' testimonials on print, TV and webpage/social media and also use them as influencers on social media. In addition, marketers of automobile companies should pay a lot of attention to what hybrid car ownership means to male consumers, and also educate their customer service and sales staff on how to emphasize on green self-image when dealing with male consumers, overall and one on one basis.

Furthermore, hedonic and symbolic factors reported a strong impact on females. Companies can focus on this when promoting and selling hybrid cars to the female segment, overall and one on one basis. TV advertisements for instance, could feature loyal female consumers enjoying driving a hybrid car. Customer service staff and salespeople should also be educated on how they can emotionally stress on 'enjoying driving hybrid cars' when attending to this consumer segment, using personal examples of their female friends and family members. This consumer segment can also be used as influencers for the female market in promotions.

All in all, understanding what affects each segment the most, can help entice them into buying hybrid cars. Companies that ignore the difference between consumer segments and fail to tailor make their promotions, will be less successful than those who make an effort to understand the different consumer segments, know what factors affect

these segments the most and use these very factors in promotions and selling.

However, certain factors of the marketing strategies may remain the same across all segments such as the factors that are important across all segment types. For instance, this empirical study reported the element of price and cost savings as positive and significant for all age groups. To this end, policy makers can relook into the taxes imposed not only on the imported hybrid vehicles but also the related spare parts and lower it to reduce the final selling price to consumers when sold by car dealers. Governments themselves, can promote how the use of such eco-friendly cars can help towards better and cleaner environment by purchasing and using hybrid cars in their daily operations. Car dealers need to also negotiate with the overseas hybrid car manufacturers for better prices. In addition, findings also revealed significant and positive impact of subjective norms, in some cases, the strongest impact. Marketers can thus use hybrid car consumer testimonials in their promotions, using not only the consumers who purchase hybrid cars but also including their close family members/loved ones in advertisements, depicting how each family member perceives and feels about hybrid car ownership to encourage other families to purchase such vehicles.

Appendix 1

THE UNIVERSITY OF THE SOUTH PACIFIC.
SCHOOL OF MANAGEMENT AND PUBLIC ADMINISTRATION.
TOPIC: Consumers Perceived attitude towards Eco Cars: A Comparative Study.

7.1. Objective

The objective of this study is to identify the factors that influences customer's in purchasing an eco car. The information collected through this questionnaire is highly confidential and will only be used for academic purposes. It should take approximately 10 min to complete this questionnaire. Thank you for your participation. Please read and understand the following statements carefully.

Participation:

Your participation in this research is voluntary and you may exit the survey at any time or refuse to take part in the research without incurring any penalty. You are also free to decline answering any question that you do not wish to answer for any reason.

Benefit:

You will not receive any direct benefits from participating in this research. However, your responses may help us learn more about factors that influence consumers in purchasing an eco car.

Risk:

There are no foreseeable risks involved in participating in this research.

Contact Information:

If you have questions relating to this study, you may contact **Ms. Tuma Greig** via phone (679) 3232680, email greig_t@usp.ac.fj or **Ms. Samantha Naidu** via phone (679) 3232436, email naidu_sm@usp.ac.fj.

Section A: Personal Background Information.

In this section, use a tick "✓" or put as "X" to select the option for each of the questions below.

Do you give informed consent to this survey? Yes No

If yes, please proceed to answering the questions below. If not, we thank you for your response.

Do you or your family own a Hybrid vehicle? Yes No

If yes, please proceed to answering the questions below.

• Age

(Select only one.)

- 16
21–30
31–40
41–50
51 and above

• Gender

(Select only one.)

- Male
Female

Overall, as suggested by the findings of this study, the emphasis on price and cost savings and, subjective norms can be generalized across all segments in promotions. However, emphasis on other factors such as knowledge of cost and environmental benefits of using a Hybrid vehicle, green self-image, hedonic and symbolic factors should be given more emphasis when selling and promoting to different consumer segments separately, such as the age groups 21–30 and 31–40, male consumers and female consumers, respectively.

Declaration of Competing Interest

None.

Data availability

Data will be made available on request.

Acknowledgements

None.

• Country of origin

(Select only one.)

- Fiji
- Australia

• Personal Annual Income Level

(options below are for both FJD and AUD)

Please use a tick “✓” or put as “X” to select the option.

- I do not earn an income
- Under \$ 15,000
- \$15,000–\$29,999
- \$30,000–\$44,999
- \$45,000–\$59,999
- \$60,000–\$74,999
- \$75,000–\$89,999
- \$90,000 +
- Do not wish to indicate

• Highest level of qualification

Please use a tick “✓” or put as “X” to select the option

- Primary education
- High school education
- Diploma/Certificate
- Bachelors education
- Postgraduate education
- Others
- Do not wish to indicate

• Hybrid vehicle you drive

(you may select more than one.)

- Honda CIVIC
- Honda Fit
- Honda Insight
- Honda CR-Z
- Toyota Camry Hybrid
- Toyota Prius
- Toyota Estima
- Hyundai Ioniq
- Toyota Sai
- Toyota Hybrid Imports
- Toyota Corolla SX Hybrid
- Toyota RAV4 GXL Hybrid
- Mitsubishi Outlander PHEV
- Lexus ES300H Sports Luxury
- Volvo CX90 T8 Twin Engine Hybrid
- Mercedes-Benz C 300e PHEV
- BMW 330e iPerformance PHEV
- Others, please provide vehicle type

SECTION B:

1. Green Self- Image

In this section, use a tick “✓” or put as “X” to select the option that best reflects how you feel about each of the below statements. There are options provided: Strongly disagree (SD); Disagree (D); Neutral (N); Agree (A); Strongly agree (SA).

Statement:	Strongly disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly agree (SA)
1. Using a hybrid vehicle is consistent with how I see myself	(SD)	(D)	(N)	(A)	(SA)
2. People similar to me use my type of Hybrid vehicle.	(SD)	(D)	(N)	(A)	(SA)
3. Using a Hybrid vehicle expresses my social position of being “environment friendly”.	(SD)	(D)	(N)	(A)	(SA)
4. Using Hybrid cars contributes to sustainable road transport.	(SD)	(D)	(N)	(A)	(SA)

2. Price and Cost Savings

In this section, use a tick “✓” or put as “X” to select the option that best reflects how you feel about each of the below statement. There are options provided: Strongly disagree (SD); Disagree (D); Neutral (N); Agree (A); Strongly agree (SA).

Statement:	Strongly disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly agree (SA)
5. The price of a vehicle is important to me.	(SD)	(D)	(N)	(A)	(SA)
6. The Hybrid car price should be cheaper than the price of a normal car.	(SD)	(D)	(N)	(A)	(SA)
7. Having lower duty/tax on Hybrid vehicle imports influences my decision to purchase: because it's cheaper.	(SD)	(D)	(N)	(A)	(SA)
8. Fuel subsidies on Hybrid vehicle influences my decision to purchase: because it helps me save money.	(SD)	(D)	(N)	(A)	(SA)

3. Knowledge

In this section, use a tick “✓” or put as “X” to select the option that best reflects how you feel about each of the below statement. There are options provided: Strongly disagree (SD); Disagree (D); Neutral (N); Agree (A); Strongly agree (SA).

Statement:	Strongly disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly agree (SA)
9. I am very knowledgeable about environmental issues.	(SD)	(D)	(N)	(A)	(SA)
10. I understand the cost and environmental benefits of using a Hybrid vehicle.	(SD)	(D)	(N)	(A)	(SA)
11. I understand the need to move to a more eco-friendly vehicle and how to maintain the vehicle.	(SD)	(D)	(N)	(A)	(SA)
12. I have good knowledge about different Hybrid vehicles.	(SD)	(D)	(N)	(A)	(SA)

4. Subjective Norms

In this section, use a tick “✓” or put as “X” to select the option that best reflects how you feel about each of the below statement. There are options provided: Strongly disagree (SD); Disagree (D); Neutral (N); Agree (A); Strongly agree (SA).

Statement:	Strongly disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly agree (SA)
13. If I purchased a Hybrid vehicle most people who are important to me would agree with my decision.	(SD)	(D)	(N)	(A)	(SA)
14. If I purchased a Hybrid vehicle most people who are important to me would find it desirable.	(SD)	(D)	(N)	(A)	(SA)
15. If I purchased a Hybrid vehicle most people who are important to me would appreciate it: they would be happy for me.	(SD)	(D)	(N)	(A)	(SA)
16. I was recommended to purchase a Hybrid vehicle by my family.	(SD)	(D)	(N)	(A)	(SA)
17. I was recommended to purchase a Hybrid vehicle by my friends.	(SD)	(D)	(N)	(A)	(SA)

5. Hedonic and Symbolic

In this section, use a tick “✓” or put as “X” to select the option that best reflects how you feel about each of the below statement. There are options provided: Strongly disagree (SD); Disagree (D); Neutral (N); Agree (A); Strongly agree (SA).

Statement:	Strongly disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly agree (SA)
18. Driving a Hybrid vehicle is exciting.	(SD)	(D)	(N)	(A)	(SA)
19. Driving a Hybrid vehicle is enjoyable.	(SD)	(D)	(N)	(A)	(SA)
20. Driving a Hybrid vehicle is pleasurable.	(SD)	(D)	(N)	(A)	(SA)
21. Buying a Hybrid vehicle will give me a feeling of being a better person.	(SD)	(D)	(N)	(A)	(SA)
22. Buying a Hybrid vehicle would reflect my possession of a new technology.	(SD)	(D)	(N)	(A)	(SA)

6. Time

In this section, use a tick “✓” or put as “X” to select the option that best reflects how you feel about each of the below statement. There are options provided: Strongly disagree (SD); Disagree (D); Neutral (N); Agree (A); Strongly agree (SA).

Statement:	Strongly disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly agree (SA)
23. The time it took to learn to drive a hybrid vehicle is faster compared to other vehicles.	(SD)	(D)	(N)	(A)	(SA)
24. Adopting a new vehicle can be a time risk, as it takes a fair amount of time to get use to the vehicle.	(SD)	(D)	(N)	(A)	(SA)
25. Having a Hybrid vehicle means having high involvement into the repair and running of the vehicle.	(SD)	(D)	(N)	(A)	(SA)

Thank you for taking the time to complete this questionnaire. Your responses will enable us to better understand the area of research.

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