Research on Brand Equity of Intelligent Connected Vehicles in China

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Abstract

In the context of global climate change, the advancement of electric vehicles (EV) has emerged as a pivotal strategy for energy conservation and emission reduction within the transportation sector. Leveraging the progress in 5G and IoT technologies, intelligent connected vehicles (ICV) have emerged as a focal point within the realm of electric vehicles, with China spearheading significant developments in this domain. Concurrently, the proliferation of Chinese brand electric vehicles (CBEVs) has been notable in recent years. Nonetheless, academic research on the brand equity of CBEVs remains limited, particularly regarding the influencing factors from the consumer perspective and the functionalities of intelligent connectivity. This study aims to address these gaps by investigating the determinants of brand equity for CBEVs from the consumer standpoint. The findings reveal that consumer attitude, trust, and the intelligent connected feature exert a positive influence on brand equity. This underscores the importance for CBEVs manufacturers to focus on enhancing brand equity by fostering positive consumer attitudes, building trust, and offering comprehensive intelligent connected features.

Keywords: Electric Vehicle, Intelligent Connected Vehicle, Brand Equity, Intelligent Connected Feature，Chinese Brand Electric Vehicles

1. Introduction

China is taking corresponding carbon emission reduction actions in all industries, which is also to fulfil China's global commitment to achieve a carbon peak by 2030 and achieve carbon neutrality by 2060. Although reducing CO2 emissions is something that all industries need to work together, in the study of combating global climate change, the field of transportation is the focus of attention, because a large amount of fossil fuels are used in the traditional transportation field, and the use of automobiles Carbon emissions account for 80% of the original traffic, mainly dominated by diesel locomotives, because diesel locomotives use fossil fuels and generate a lot of carbon emissions during use, and these carbon emissions are the cause of climate change(Wang et al., 2022). In order to achieve environmental protection goals, new energy vehicles may be an effective solution in the transportation field.

Electric vehicles (EVs) are a key focus of China's development strategy, with significant efforts aimed at promoting their adoption and production. As the largest global market and manufacturer of EVs, China's New Energy vehicle market is primarily dominated by EVs that rely solely on battery power. This can be attributed to policy initiatives and technological advancements that incentivize and facilitate the use of EVs. Consequently, pure electric vehicles account for a majority of new energy vehicle sales in China each year (Lin & Wu, 2018).

The 5G wireless network will enable IoT devices to interact with the smart environment to a new level of connectivity through smart sensors. 5G wireless networks can also significantly expand the coverage of the Internet of Things and the fastest communication and capacity by providing (S. Li et al., 2018). Intelligent connected vehicles (ICV) are user-side applications implemented in the form of smart devices under the development trend of Internet of Things and 5G technology. Intelligent connected vehicles are one of the applications of the Internet of Things, usually based on electric vehicles, focusing on the interconnection functions of electric vehicles. The core feature of intelligent connected cars is intelligent connected functions (Ullah et al., 2021).

As a global frontrunner in the advancement of intelligent connected vehicles, China has witnessed the emergence and rapid growth of numerous domestically oriented brands in recent years. In the context of globalization, Chinese brand electric vehicles (CBEVs) also want to expand the market on a global scale, while also

accelerating the process of internationalization. However, there are many challenges in the development of CBEVs. In previous research, it was found that CBEVs are different in different grades of EVs. For example, in high-end EVs, CBEVs are less competitive than joint ventures or foreign brands, but in the mid-end EV market, CBEVs are competitive advantage (L. Li et al., 2021).

Previous research has also examined local consumer attitudes towards CBEVs in other markets. While Chinese automobile brands have weaker competitive advantages than foreign or joint venture brands in the traditional vehicle industry, some researchers believe that they could still make significant strides in the EV industry since the competition for electric vehicle brands is just beginning, and the race is still up in the air (Z. Li et al., 2021). Chinen et al. (2021) studied CBEVs purchasing behavior among U.S. consumers has pointed out that consumers outside of China are more focused on brand equity and product functional factors, but country of origin and other attitudes may also influence the development of CBEVs in other countries (Chinen et al., 2022). This also shows that in the EV purchase behavior of high-end customers, brand equity is one of the factors that consumers consider, and its role in purchase behavior needs to be studied. Although the development of CBEVs faces many challenges, companies should be deeply aware that brand equity is one of their considerations when consumers choose high-end EVs.

Previous research has focused on technology and neglected research on ICV consumers perspective (Larson et al., 2014). There is a limited study about the intelligent connected vehicle brand equity's impact. The previous scholars encourage to consider more factors in the research model that could impact intelligent connected vehicle's brand equity and its influence factor (Jiang et al., 2021). Therefore, this article will focus on studying ICV brand equity in the Chinese market and the factors that affect brand equity. Due to the intelligent connected vehicle technology development, the EV's feature had been developed (Ullah et al., 2021). This article focuses on the intelligent connected vehicle different features. This article considers the intelligent connected vehicle brand equity by considering the impact of the intelligent connected feature's perspective.

This article studies the role of brand equity in the field of ICV and analyses the factors that affect ICV brand equity from the perspective of consumers. On the one hand, it could decrease the limitations of related research on brand equity in the field of Chinese ICV, meanwhile, it will also explore the influencing factors of Chinese ICV brand equity, providing relevant reference for the accumulation and development of ICV brand equity from the perspective of consumers.

2. Literature

2.1 Brand Equity

The perceived quality is the majority of research on the quality concept (Tasci, 2021). The perceived quality is related to the service quality, product quality, attitude, conditions, security, performance, or the service providers' training of the brand. The consumer's perceived quality is important to the brand quality (Aaker, 1996). It is also a crucial influence on the purchase behaviour of vehicle (Jalilvand et al., 2011). As considered all the factors, this study applies the perceived quality as one of the dimension of the brand equity. Brand loyalty has some different definitions and measurement dimension (Tasci, 2021). Although brand loyalty is not clear, Aaker (1996) brand equity model was defined as the attachment that a consumer has to the brand. Jalilvand et al. (2011) consider brand loyalty as the consumer's preference for the exact brand instead of others, as well as the first choice of the brand from the consumer.

The previous study found that the EV charging facilities could impact the consumer choose EV. It showed that in the high-end EV market, there is significant impact the consumer choose of EV depends on the different charging facilities of each brand (L. Li et al., 2021). Since the brand-owned super charge station are provided by each brand. This is considered as a part of brand service quality, and this may give Chinese EV brand an opportunity to boost quickly. However, the other components including brand loyalty and perceived quality are remained. Although brand equity models have undergone different evolutions, brand loyalty and perceived quality are still retained in different brand equity-related models. This study focuses on considering the impact of brand loyalty and perceived quality on measuring brand equity, especially for automobile brands.

Brand awareness is defined as "the consumers could recognize the brand is belong to a certain product category and considered as a liability to a company field (Aaker, 1991). Brand awareness is considered the consumer's top mind of the brand, which could enable the consumers to recognize the brand between other brands (Aaker, 1996; Keller, 2001). The brand association was defined by Aaker (1996) as anything that could link to the consumer's memory of the brand. There is a similar definition of brand association in consumer-based brand equity. Keller, (1993)'s consumer-based brand equity defined as the benefits, attitudes, or uniqueness that the consumer could imagine related to the brand.

Since the intelligent connected vehicle has some new established technology-driven brands, the traditional brand still has their intelligent connected vehicle series. The traditional brand has a huge intangible value due to the long time's development in an era of the fuel vehicle compared to the new intelligent connected vehicle brand. This is necessary to use brand loyalty as the dimension of the brand equity. This study chooses brand awareness, brand association, perceived quality, and brand loyalty as the four demission to the brand equity.

2.2 Theory of Planned Behaviour

The theory of planned behaviour suggested that the behaviour could be influenced directly by behavioural intention (Ajzen, 1991). The intention could refer to the person's willingness to participate in one action, and it could directly predict the behaviours. The intention could be influenced by the attitude, subject's normal, and perceived behavioural control. According to the meta-analyse of the TPB, it indicated that 39% average amount of the variance in the behaviour and intention respectively (Emma L. Pelling, et al., 2009). The attitude is the thinking or feeling developed about the product and thing; it could be positive or negative (Lim & An, 2021). The attitude indicates the self-assessment of the degree that which the person likes or dislike (Nga & Tuan, 2019). Attitude reflects a person's positive or negative evaluation of the execution behaviour.

2.3 Attitude and Brand Equity of ICVs

Attitude can be defined as a psychological tendency expressed by a certain degree of preference or non-preference for a particular entity (Eagly & Chaiken, 1993). It is reasonable to use attitude to predict the intention of behaviour to use new technology, especially the correlated relationship between the prior acceptability and the attitude (Payre et al., 2014). The attitude in this study is defined as the consumer's feeling about the EV product, the general evaluation of this product includes negative and positive. The attitude used to study related to the brand equity, to test the relationship between the attitude to the brand equity. The attitude was found to have a significant antecedent of brand equity (Prados-Peña & Del Barrio-García, 2021), and the consumer's attitude is the main influence factor to the brand extension (Bottomley & Doyle, 1996). However, the research related to the consumer's attitude to the brand equity in ICV industry is limited. In this case, the hypotheses are proposed as below:

H1: There is a relationship between attitude and brand equity of ICVs.

2.4 Trust and Brand Equity of ICVs

Trust is related to consumers' belief to the EV safe and external mechanisms related to the intelligent connected vehicle. Trust used to be studied as the relationship to brand equity. However, the previous study focus on the stakeholder's trust and got the significant relationship between trust and brand equity (Winit & Kantabutra, 2022). The company should follow the geosocial development and focus on the consumer's benefits, which enable to enhance the brand equity field (Kantabutra & Ketprapakorn, 2020). However, this research is from the corporate perspective to discover brand equity and trust. The previous scholars also indicated that the future study could test the trust and brand equity in different industries and enhance the external validity (Winit & Kantabutra, 2022). In this case, the hypotheses are proposed as below:

H2: There is a relationship between trust and brand equity of ICVs.

2.5 Intelligent Connected Feature and Brand Equity of ICVs

The intelligent connected system is important to the brand, and that could improve the consumer engagement with the brand (Ullah et al., 2021). Although there is limited study on the intelligent connected vehicle performance expectancy, effort expectancy and intelligent connected feature's relationship to the brand equity. Although this is important to the product and brand to study the relationship between these constructs. Since intelligent connected vehicle is a new technology product, the relationship between its performance expectancy, effort expectancy and intelligent connected feature's relationship to the brand equity's research is needed. In this case, the hypotheses are proposed as below:

H3: There is a relationship between intelligent connected feature and brand equity of ICVs.

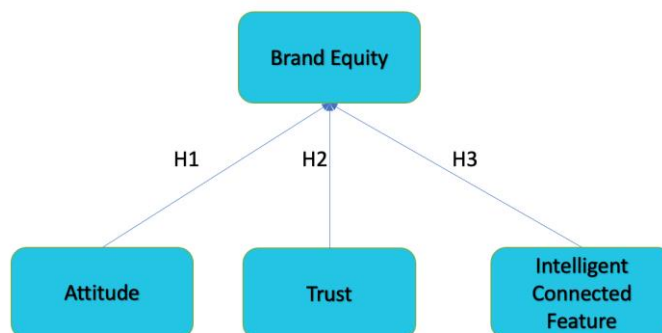*2.6 Theoretical Framework*

Figure 1. Theoretical Framework

3. Methodology

The deductive approach operationalised mainly quantitatively, attempting to estimate causation, repeated measures and associated assumptions (Zikmund, 2003). This research method is based on existing theories and models for further study, developed by researchers in the study of hypotheses. The inductive research method is a study in which theory is developed from the observation of empirical reality; thus general inferences are induced from particular instances (Collis & Hussey, 2019). This research method could build different perspectives depending to the research object. Then the different qualitatively collected data, the building and developing thory and models could be refered to these different perspective.

Qualitative research emphasises the development of hypotheses, while quantitative research focuses on testing hypotheses. Qualitative research is usually used when only limited knowledge about the research question and research area, and researchers form theories through the analysis of research data (Hair, 2015). This research will use quantitative research methods to explain the reality by analysing the data collected.

The survey strategy are likely to favor the use of descriptive and exploratory research, often associated with deductive methods. This strategy is common in the fields of business and management research area (Saunders et al., 2009). Questionnaire is related to a survey in which respondents are asked the same questions in a predefined way and a technique for collecting data to answer the research question (Creswell & Creswell, 2018). Questionnaire method are chosen in this research to collect the data.

The population includes the people or things related to the research topic or the researcher interested in investigating and the sample is the unit of the population (Saunders et al., 2009). The sampling frame is a comprehensive list of the elements from the sample. It provides the target population's work definition (Hair, 2015). The sampling frame in this study is the consumers who already purchased the intelligent connected vehicle who lives in the urban area of China. There is a higher concentration of valuable consumers in major cities across China, making it easier to collect consumer data. This study focuses on high-end intelligent connected vehicles, which are primarily targeted towards technologically-driven consumers with greater purchasing power residing in these urban areas. In this stuation, the convenience sampling is chosen due to the number of consumers groups is large and uncertain, and then sampling frame is difficult to gain exact list of the sample.

This study apply PLS-SEM, although the PLS-SEM could obtain whether the small samples are acceptable or not is determined by the population nature (Rigdon, 2016). This is important to decide the proper size of the sample to get a receivable analysis result. In some research, the populations are restricted in size. That means if assuming the same situation of other characteristics, the more heterogeneous the population, the more population size needed in order to get the receivable result (Cochran, 1977). The sample size obtained by this inverse square root method could be better to used for PLS-SEM analysis due to the sample size is objective. In this case, this study use the inverse square root mehod and then confirm the sample size is minimium 275. The data collection period lasted for nearly two months, spanning from October 17, 2023 to December 16, 2023. During this period, we sent the questionnaire to 1,192 respondents and received 501 responses, resulting in a response rate of 42% for this survey. After cleaning the collected results, 307 questionnaires were identified as samples that could be used for analysis.

3.1 Measurement of Each Construct

In order to avoid inaccurate descriptions and ensure the accuracy of each variables, all measurement items in this study were selected from previous studies or articles based on the differences of variables. Some are adopted directly, and some are modified for better use in this study, but the original meaning is not changed. Questionnaire items or variables were evaluated using a seven-point Likert scale, where 1 represents "strongly disagree" and 7 represents "strongly agree." The measurent item of trust, intelligent connected feature and brand equity are adapted from Khalid et al. (2021), Shahid et al. (2022), Ullah et al. (2021), Lavuri et al. (2022), Alamsyah et al. (2020), Paul (2019), and Jalilvand et al. (2011). The meassurement item of attitude is adapted and adopted from Curtale et al. (2021) and Walter & Abendroth (2020). The measurement table of each construct are shown in the Table 1.

Table 1. Measurement Table of Each Construct

Variables	Questionnaire items	Origin	Sources
Trust	I trust intelligent connected vehicles because they can provide an excellent travel or driving experience.	adapt	Khalid et al., (2021)
	I trust the intelligent connected vehicle more than other vehicles.	adapt	
	I am confident that I am not at risk when using the intelligent connected vehicle.	adapt	
	Overall, I think intelligent connected vehicle is a trustworthy product.	adapt	
	I am confident that utilizing the intelligent system of the connected vehicle is secure.	adapt	Shahid et al., (2022)
	I felt safe to provide my personal and private data to the intelligent connected vehicle's intelligent system.	adapt	
Attitude	I hold a favourable view of the intelligent connected vehicle compared to traditional vehicles.	adapt	
	I prefer to use the innovative technology product.	adapt	Curtale et al., (2021)
	I am confident that the public will accept this technology.	adopt	
	I think the intelligent connected vehicle could increase my driving or travelling experience.	adapt	Walter & Abendroth, (2020)
	I would like to integrate my intelligent connected vehicle well into my other smart devices.	adapt	
	I think the intelligent connected vehicle's intelligent system is a good solution to traffic accidents and traffic jams.	adapt	
	I think the vehicle's internet connectivity function is useful.	adapt	
Intelligent Connected Feature	I think a virtual assistant for intelligent connected vehicles is a useful feature.	adapt	
	I think it is a very convenient feature that my intelligent connected vehicle can interact with other smart devices.	adapt	Ullah et al., (2021)
	I frequently use the mobile phone App of my car.	adapt	
	I think the intelligent connected vehicle's entertainment system is a useful feature.	adapt	
	I think the autonomous driving feature is useful.	adapt	
Brand Equity	I like this brand because this brand have a good quality and service support.	adapt	Lavuri et al., (2022), Alamsyah et al., (2020). Paul, (2019). Jalilvand et
	I like this brand because I think it is technology and intelligent driven.	adapt	
	I consider myself to be loyal to this brand.	adapt	
	I like this brand because of brand knowledge.	adapt	

| I like this brand because it is a domestic brand and the benchmark of my country's innovation. | adapt | al., (2011) |
| I think choosing a top-of-mind brand in my country, state, or district is important. | adapt | |

4. Result and Discussion

4.1 Constructs' Reliability and Validity

As shown in the table 2, each outer loadings are exceed 0.70, which means all the indicators could be maintained (Hair et al., 2021). Meanwhile, all indicators' average variance extracted (AVE) are exceed 0.5, which means all these items could explain more than 50% of variance, and these items are loaded in the construct as well. Based on this analyze result, there is a conclusion for all the constructs' reliability is good and these constructs' AVE could meet the requirement in this framework.

Refer to the Table 2, all of the indicators composite reliability are more than 0.7, which means all the indicators could exhibits sufficient internal consistency or sufficient convergence (Gefen, 2000). The Cronbach's alpha should be more than 0.7, which the minimum acceptance is 0.7. As shown in Table 2, all constructs Cronbach's alpha is more than 0.8, which could be accepted.

Table 2. Indicators, reliability, and validity statistics

Constructs	Outer Loadings	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Attitude		0.845	0.848	0.89	0.617
AT1	0.81				
AT2	0.772				
AT3	0.784				
AT4	0.775				
AT5	0.787				
Intelligent Connected Feature		0.858	0.861	0.894	0.585
ICF1	0.772				
ICF2	0.806				
ICF3	0.79				
ICF4	0.772				
ICF5	0.714				
ICF6	0.734				
Trust		0.867	0.871	0.9	0.602
TR1	0.703				
TR2	0.782				
TR3	0.773				
TR4	0.824				
TR5	0.79				
TR6	0.776				

4.2 Assessment for Formative Indicators

Brand equity is the only formative construct in this framework. To obtain the values of the outer weights, a

bootstrapping technique can be employed, wherein t-values are assessed for each indicator weight towards the formative construct. These outer weights can then be utilized to determine the relative contribution or importance of each indicator to the construct (F. Hair Jr et al., 2014). This approach can be justified if prior research and theoretical foundations provide support for the relevance of these indicators in capturing the content validity of the construct (F. Hair Jr et al., 2014). According to the table 3, all indicators p-value is less than 0.05.

Table 3. Indicators reliability, and validity statistics

Indicator	Weight	T values	P values	VIF
BE1 -> BE	0.446	5.453	0	1.617
BE2 -> BE	0.176	2.125	0.034	1.658
BE4 -> BE	0.237	2.728	0.006	1.553
BE6 -> BE	0.417	4.582	0	1.383

4.3 Discriminant Validity

Refer to the Table 4, the AVE of all reflective construct is larger than all reflective items' correlation. This could be concluded that there observed sufficient discriminant validity of the reflective constructs.

Table 4. Discriminant validity Fornell-Lacker criteria

Constructs	Attitude	Intelligent Connected Feature	Trust
Attitude	0.786		
Intelligent Connected Feature	0.672	0.765	
Trust	0.606	0.538	0.776

4.4 Assessment of Path Coefficients

The path coefficients are assessed the structural model through the bootstrap t-values, which should be under 500 sub-samples by examining the significance of hypotheses paths and the regressions weights of the inner model (Efron & Gong, 1983). Validation of structure models is critical for researchers to assess whether hypotheses indicated by structure models are supported by empirical data. It provides a valuable means of confirming the relationships and effects proposed in the research framework (Urbach & Ahlemann, 2010). The summery of the hypotheses test result and the corresponding result could be observed in table 5. The hypotheses 1 t-value is 4.035 and P values is 0, which means hypotheses 1 is supported. The hypotheses 2 t-value is 3.828, and the p values is 0. This could be considered hypotheses 2 is supported. The hypotheses 3 t-value is 3.199, and p values is 0.001. This could be concluded that hypotheses 3 is supported in this research.

Table 5. Path coefficients bootstrapping results

Hypotheses	Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
H1	AT -> BE	0.278	0.281	0.069	4.035	0
H2	TR -> BE	0.275	0.277	0.072	3.828	0
H3	ICF -> BE	0.238	0.241	0.074	3.199	0.001

4.5 Assessment of the Level of R-Square

There is a rule of tube for R-square values include the R-square value in 0.26, 0.13 and 0.02. These values are indicated as substantial, moderate and weak (Cohen, 1988). Refer to the Table 6 and Figure 2, the brand equity's R-square is 0.462, which is more than 0.26. This is the substantial explanatory power and could explain more than 46.2% of other constructs.

Table 6. R-square of Brand Equity

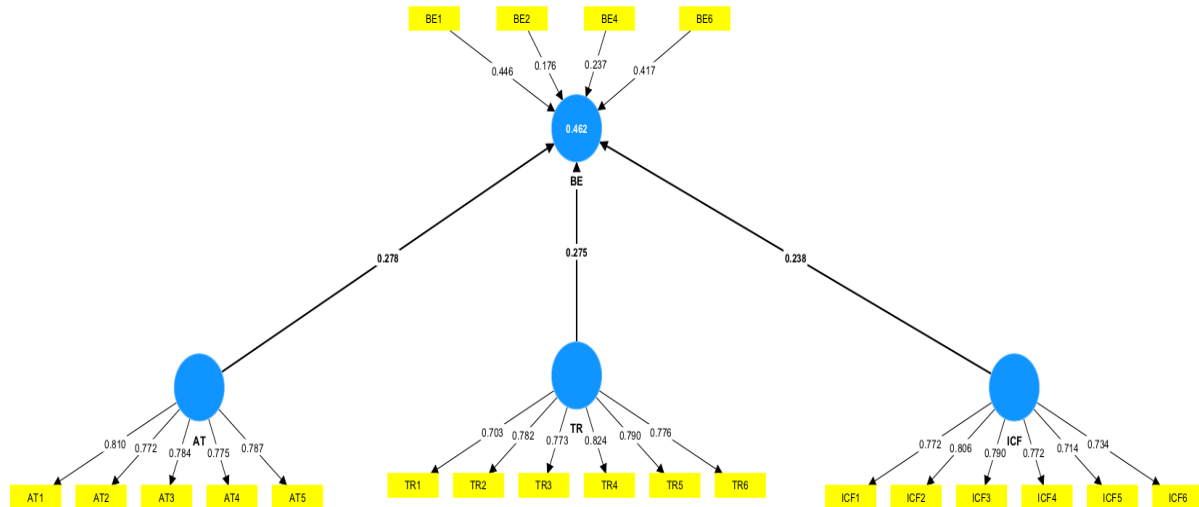| Constructs	R-square	Explanatory Power
BE	0.462	Substantial

Figure 2. PLS algorithm results of the model.

4.6 Assessment of the Effect Sizes f-Square

According to Cohen (1988), the effect size less than 0.02 could be considered as trivial. However, if the effect size of 0.02, 0.15 and 0.35 could be considered indicative of small, medium and large effect (Chin, 2010; Cohen, 1988; Hair et al., 2016). As shown in the Table 7, the effect size of all constructs is more than 0.02 but less than 0.15, which could be considered as small effect size.

Table 7. Effect Sizes f-square

Constructs	f-square	Effect Size
AT -> BE	0.067	S
ICF -> BE	0.055	S
TR -> BE	0.085	S

5. Practical and Theoretical Implications

5.1 Practical Implication

First of all, the ICV brand equity could be impact by some different factors, the most important of which are trust, attitude and intelligent connected features. ICV manufacturers should focus on improving the public's awareness of the reliability of ICV products and improve consumer trust in marketing, to make consumers have a positive attitude towards ICV products. Meanwhile, ICV manufacturers should strengthen their R&D capabilities and manufacturing capabilities, improve the intelligent connected features of ICV products and a safer use experience continuously. In relevant publicity and promotion activities for consumers, the intelligent connected feature should be focused on. More importantly, ICV manufacturers are advised to consider the consumer experience and practicality of product functions when designing and developing ICVs.

This article verifies the important impact of brand equity. It is recommended that ICV manufacturers insist on establishing and developing emerging brands of smart and connected cars in the long term and focus on the accumulation of brand assets. At the same time, smart and connected car manufacturers need to establish long-term development goals when establishing their own brands, and establish consumer brand awareness and brand awareness. associations, brand loyalty and perceived quality, thereby accumulating brand equity.

This article studies the brand equity of ICV from the perspective of consumers and provides reference for ICV manufacturers in the brand building process. It is also recommended that ICV manufacturers not neglect their understanding of consumers when accumulating brand equity.

5.2 Theoretical Implications

This study theoretically extends the brand equity theory to the field of ICV, especially the study of Chinese consumers. The impact of different factors on brand equity is studied, especially from the consumer perspective. This study expanded the TPB theory and combined it with the brand equity theory to finally discover the impact of attitude, trust and intelligent connected features on ICV brand equity.

Firstly, this article conclusion suggests that researchers pay more attention to the attributes of the ICV product itself. To study the intelligent connected feature to the ICV brand equity's impact which has not received extensive attention in previous studies. Secondly, consumers' attitude and trust towards ICV products are crucial to influencing brand equity as well. Although the functions of ICV have received little attention in previous studies, but the results of this study found that the intelligent connected feature of ICV could significantly affect brand equity.

6. Limitations and Recommendation for Further Study

This article adopts a structured questionnaire research method. This research method has some uncontrollable limitations. The structured nature of the survey will affect the ability to explore unanticipated findings in depth. The questionnaire of this study was developed based on relevant topics and has structured characteristics. The respondents answered according to the structure of the survey questionnaire, which may limit the unexpected performance of some respondents. On the other hand, it is easier to discover some in-depth information using preset survey questionnaires and possibly without on-site interviews, and unexpected information in the survey may be ignored.

The ICV field is developing rapidly, and the consumer situation in each country may be different. The research object of this article is ICV consumers in the Chinese market, and the research object is limited to China, which may have limitations. At the same time, ICV technology updates rapidly, and this article may not be able to update the latest technological information on ICV as soon as possible.

According to the limitations of this article, further study could examine consumer situations in different markets and conduct research in the market context of different countries. Meanwhile, further research could also consider more factors that affect ICV brand equity based on actual conditions and conduct empirical studies. ICV technology is developing rapidly, further research is recommended using the latest technology.

7. Conclusions

This article conducts a survey on Chinese consumers who have purchased ICV to study the influencing factors of ICV brand equity from the perspective of consumers. This article provides a reference for the rapidly developing ICV industry and Chinese ICV brands. ICV manufacturers should focus on the promotion of intelligent connected features when promoting ICVs because it can affect brand equity. At the same time, this article also found that consumers' attitude and trust will also significantly affect brand equity. ICV manufacturers should focus on improving consumers' trust in ICV when promoting ICV products, and help consumers establish a positive attitude towards ICV. These are of great significance to ICV's brand equity.

References

Aaker, D. A. (1991). *Managing brand equity: Capitalizing on the value of a brand name*. Free Press, New York, NY.

Aaker, D. A. (1996). Measuring Brand Equity across Products and Markets. *California Management Review*, *32*, 102-120.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Alamsyah, D. P., Othman, N. A., & Mohammed, H. A. A. (2020). The awareness of environmentally friendly products: The impact of green advertising and green brand image. *Management Science Letters*, 1961-1968. https://doi.org/10.5267/j.msl.2020.2.017

Bottomley, P. A., & Doyle, J. R. (1996). The formation of attitudes towards brand extensions: Testing and generalising Aaker and Keller's model. *International Journal of Research in Marketing*, *13*(4), 365-377. https://doi.org/10.1016/S0167-8116(96)00018-3

Chin, W. W. (2010). How to Write Up and Report PLS Analyses. In V. Esposito Vinzi, W. W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of Partial Least Squares* (pp. 655-690). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-32827-8_29

Chinen, K., Endo, H., & Matsumoto, M. (2021). The Chinese-Brand Electric Vehicles in the Eyes of the US Consumers. In *Sustainable Production, Life Cycle Engineering and Management* (pp. 3-16).

Chinen, K., Matsumoto, M., Liu, C., Tong, P., Han, Y. S., & Endo, H. (2022). *Expanding electric-vehicle adoption beyond the national border: Insights for developing marketing policies for global electric-vehicle manufacturers.*

Cochran, W. G. (1977). *Sampling Techniques* (3rd ed.). John Wiley & Sons, New York.

Cohen, S. (1988). Psychosocial models of the role of social support in the etiology of physical disease. *Health Psychology*, *7*(3), 269-297. https://doi.org/10.1037/0278-6133.7.3.269

Collis, J., & Hussey, R. (2019). *A Practical Guide for Undergraduate and Postgraduate Students.* 3.

Creswell, W. J., & Creswell, J. D. (2018). *Research design Qualitative, quantitative, and mixed methods approaches* (5th ed.).

Curtale, R., Liao, F., & van der Waerden, P. (2021). User acceptance of electric car-sharing services: The case of the Netherlands. *Transportation Research Part A: Policy and Practice*, *149*, 266-282. https://doi.org/10.1016/j.tra.2021.05.006

Eagly, A. H., & Chaiken, S. (1993). *The Psychology of Attitudes.* Orlando, FL: Harcourt Brace Jovanovich.

Efron, B., & Gong, G. (1983). A Leisurely Look at the Bootstrap, the Jackknife, and Cross-Validation. *The American Statistician*, *37*(1), 36-48. https://doi.org/10.1080/00031305.1983.10483087

F. Hair Jr, J., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, *26*(2), 106-121. https://doi.org/10.1108/EBR-10-2013-0128

Gefen, D. (2000). E-commerce: The role of familiarity and trust. *Omega*, *28*(6), 725-737. https://doi.org/10.1016/S0305-0483(00)00021-9

Hair, J. F. (2015). *Essentials of business research methods* (3rd ed.). Routledge.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2016). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* SAGE.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook*. Springer International Publishing. https://doi.org/10.1007/978-3-030-80519-7

Jalilvand, M. R., Samiei, N., & Mahdavinia, S. H. (2011). *The Effect of Brand Equity Components on Purchase Intention:* 10.

Jiang, Q., Wei, W., Guan, X., & Yang, D. (2021). What Increases Consumers' Purchase Intention of Battery Electric Vehicles from Chinese Electric Vehicle Start-Ups? Taking NIO as an Example. *World Electric Vehicle Journal*, *12*(2), 71. https://doi.org/10.3390/wevj12020071

Kantabutra, S., & Ketprapakorn, N. (2020). Toward a theory of corporate sustainability: A theoretical integration and exploration. *Journal of Cleaner Production*, *270*, 122292. https://doi.org/10.1016/j.jclepro.2020.122292

Keller, K. L. (1993). Conceptualizing, Measuring, and Managing Customer-Based Brand Equity. *Journal of Marketing*, *57*(1), 1. https://doi.org/10.2307/1252054

Keller, K. L. (2001). *Building Customer-Based Brand Equity: A Blueprint for Creating Strong Brands,* 1, 38.

Khalid, B., Urbański, M., Kowalska-Sudyka, M., Wysłocka, E., & Piontek, B. (2021). Evaluating Consumers' Adoption of Renewable Energy. *Energies*, *14*(21), 7138. https://doi.org/10.3390/en14217138

Larson, P. D., Viáfara, J., Parsons, R. V., & Elias, A. (2014). Consumer attitudes about electric cars: Pricing analysis and policy implications. *Transportation Research Part A: Policy and Practice*, *69*, 299-314. https://doi.org/10.1016/j.tra.2014.09.002

Lavuri, R., Chiappetta Jabbour, C. J., Grebinevych, O., & Roubaud, D. (2022). Green factors stimulating the purchase intention of innovative luxury organic beauty products: Implications for sustainable development. *Journal of Environmental Management*, *301*, 113899. https://doi.org/10.1016/j.jenvman.2021.113899

Li, L., Li, Y., Lei, K., Li, Y., & Luo, Y. (2021). Revolutionize China's Auto Market Setup by Chinese EV Brands? Answers from Consumers. *IOP Conference Series: Earth and Environmental Science*, *793*(1), 012022. https://doi.org/10.1088/1755-1315/793/1/012022

Li, S., Xu, L. D., & Zhao, S. (2018). 5G Internet of Things: A survey. *Journal of Industrial Information Integration*, *10*, 1-9. https://doi.org/10.1016/j.jii.2018.01.005

Li, Z., Liang, F., & Cheng, M. (2021). Research on the Impact of High-End Ev Sales Business Model on Brand Competitiveness. *Sustainability*, *13*(24), 14045. https://doi.org/10.3390/su132414045

Lim, H.-R., & An, S. (2021). Intention to purchase wellbeing food among Korean consumers: An application of the Theory of Planned Behavior. *Food Quality and Preference*, *88*, 104101. https://doi.org/10.1016/j.foodqual.2020.104101

Lin, B., & Wu, W. (2018). Why people want to buy electric vehicle: An empirical study in first-tier cities of China. *Energy Policy*, *112*, 233-241. https://doi.org/10.1016/j.enpol.2017.10.026

Nga, N. T. H., & Tuan, T. A. (2019). Consumers' Purchase Intention of Pork Traceability: The Moderator Role of Trust. In V. Kreinovich, N. N. Thach, N. D. Trung, & D. Van Thanh (Eds.), *Beyond Traditional Probabilistic Methods in Economics* (Vol. 809, pp. 886-897). Springer International Publishing. https://doi.org/10.1007/978-3-030-04200-4_64

Paul, J. (2019). Masstige model and measure for brand management. *European Management Journal*, *37*(3), 299-312. https://doi.org/10.1016/j.emj.2018.07.003

Payre, W., Cestac, J., & Delhomme, P. (2014). Intention to use a fully automated car: Attitudes and a priori acceptability. *Transportation Research Part F: Traffic Psychology and Behaviour*, *27*, 252-263. https://doi.org/10.1016/j.trf.2014.04.009

Prados-Peña, M. B., & Del Barrio-García, S. (2021). Key antecedents of brand equity in heritage brand extensions: The moderating role of tourist heritage experience. *European Research on Management and Business Economics*, *27*(3), 100153. https://doi.org/10.1016/j.iedeen.2021.100153

Rigdon, E. E. (2016). Choosing PLS path modeling as analytical method in European management research: A realist perspective. *European Management Journal*, *34*(6), 598-605. https://doi.org/10.1016/j.emj.2016.05.006

Saunders, M. N. K., Lewis, P., & Thornhill, A. (2009). *Research methods for business students* (5th ed). Prentice Hall.

Shahid, S., Islam, J. U., Malik, S., & Hasan, U. (2022). Examining consumer experience in using m-banking apps: A study of its antecedents and outcomes. *Journal of Retailing and Consumer Services*, *65*, 102870. https://doi.org/10.1016/j.jretconser.2021.102870

Tasci, A. D. A. (2021). A critical review and reconstruction of perceptual brand equity. *International Journal of Contemporary Hospitality Management*, *33*(1), 166-198. https://doi.org/10.1108/IJCHM-03-2020-0186

Ullah, A., Zhang, Q., & Ahmed, M. (2021). The impact of smart connectivity features on customer engagement in electric vehicles. *Sustainable Production and Consumption*, *26*, 203-212. https://doi.org/10.1016/j.spc.2020.10.004

Urbach, N., & Ahlemann, F. (2010). *Structural Equation Modeling in Information Systems Research Using Partial Least Squares, 11*(2).

Walter, J., & Abendroth, B. (2020). On the role of informational privacy in connected vehicles: A privacy-aware acceptance modelling approach for connected vehicular services. *Telematics and Informatics*, *49*, 101361. https://doi.org/10.1016/j.tele.2020.101361

Wang, R., Song, Y., Xu, H., Li, Y., & Liu, J. (2022). Life Cycle Assessment of Energy Consumption and CO2 Emission from HEV, PHEV and BEV for China in the Past, Present and Future. *Energies*, *15*(18), 6853. https://doi.org/10.3390/en15186853

Winit, W., & Kantabutra, S. (2022). Enhancing the Prospect of Corporate Sustainability via Brand Equity: A Stakeholder Model. *Sustainability*, *14*(9), 4998. https://doi.org/10.3390/su14094998

Zikmund, W. G. (2003). *Business research methods* (7th, illustrated ed.). Thomson/South-Western, 2003.