



A Study of Purchase Intention of Electric Vehicles in Hong Kong

A Dissertation submitted to The University of Wales for the
Master of Business Administration (MBA)

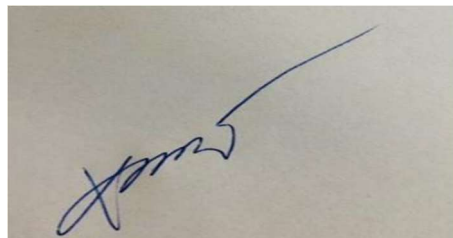
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Declaration/Statements page

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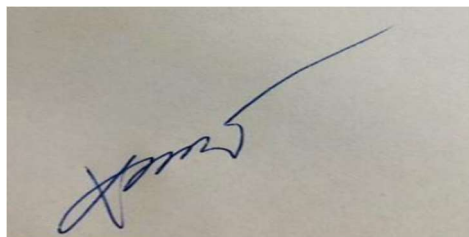
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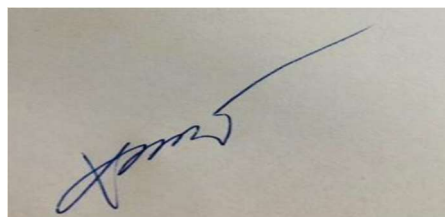


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Abstract

The environmental impact of petroleum vehicles and the hike in fuel prices create the market for electric vehicles. It is a new era for the engagement of electric vehicles in the automotive industry. The purpose of this study is to discuss the consumers' purchase intention of electric vehicles and aim to provide market insight and recommendations for the development of automotive companies.

A proposed research model that incorporated perceived value, brand image, environmental concern and environmental attitude on purchase intention was examined. This study relied on both theoretical and methodological directions to investigate their relationship. Due to epidemic, the questionnaire was conducted with non-probability sampling. 385 questionnaires were completed with quantitative and qualitative methods to test the proposed hypothesis.

The result of the sample questionnaires was analyzed with SPSS for descriptive statistic analysis, reliability analysis, correlation analysis, and regression analysis. It evidenced there was a direct positive relationship between perceived value, brand image, environmental concern and environmental attitude on the purchase intention of electric vehicles. The managerial recommendation was provided to the automotive company for their strategic business planning. Limitation of generalization due to non-probability sampling and lack of analysis of demographic factors have been highlighted. Recommendation provided for future study.

Keywords: Electric vehicles; purchase intention; perceived value; brand image; environmental concern; environmental attitude.

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1. Introduction

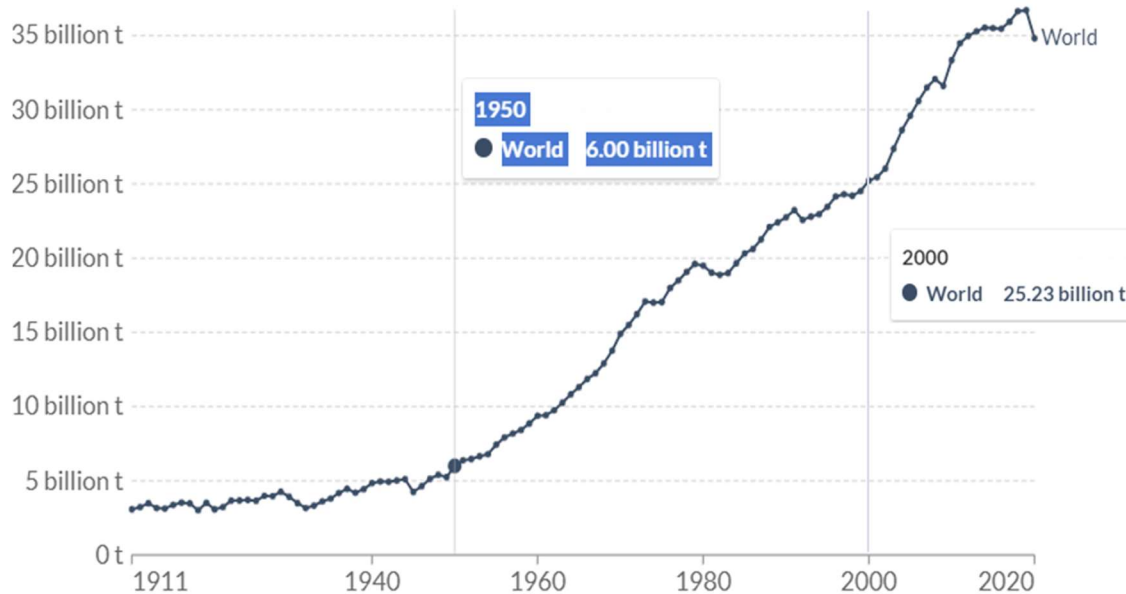
In recent years there is a dramatic change in the automotive market. The sales volumes of electric vehicles keep on rising since it is introduced into the market. The global electric vehicle market size was USD 246.7 billion in 2020 (Fortune Business Insights, 2020). The environmental impact of petroleum vehicles and the hike in fuel prices create the market for electric vehicles. The market's growth and demand are attributed to the rise of the electric vehicle market. Based on this change in the automotive market, we aimed to study the purchase intention of electric vehicles. The research background, research statement, research aim, research object and its flow will be described and illustrated in the following section.

1.1 Research background

Climate change has already had a recognized effect and raised the awareness of the world. The intergovernmental body, Intergovernmental Panel on Climate Change (IPCC), was formed to provide governments with scientific information and recommendation on human-induced climate change (IPCC, 2021). Global warming and the greenhouse effect are one of kind of consequences associated with climate change. Carbon dioxide emission is the main cause of global warming (Loshof and Ahuja, 1990; Sun and Wang, 1996; Lindsey, 2021) and it is the primary greenhouse gas produced by human activities (United States Environmental Protection Agency, 2021). Figure 1 shows annual carbon dioxide emission risen since 1950. The world emitted 6 billion tonnes of carbon dioxide in 1950 and it became 25.23 billion tonnes

in 2000 (Ritchie and Roser, 2020).

Figure 1. Annual carbon dioxide emissions

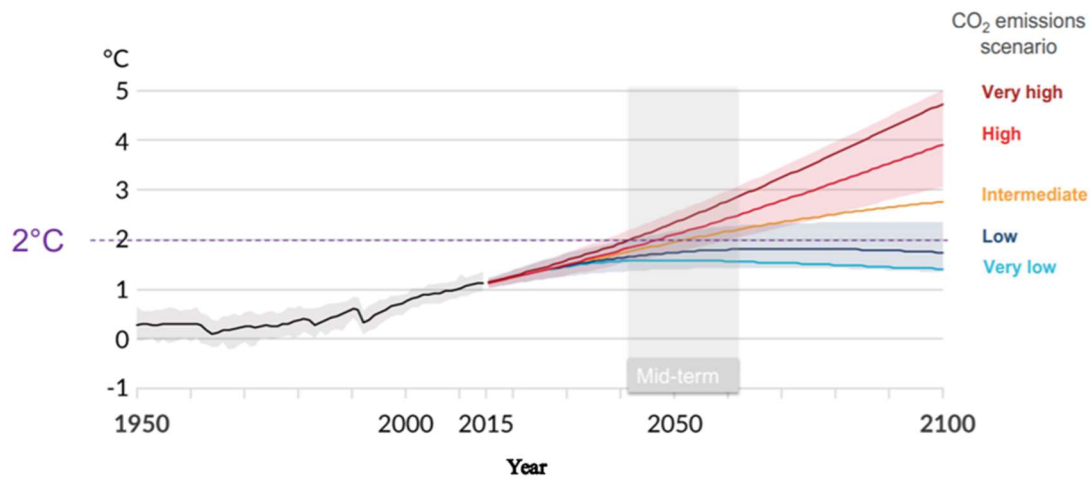


Sources: OurWorldInData (2020)

It is important to maintain carbon dioxide emissions at a low level. IPCC (2021) announced 1.5 degrees is the general indicator for limiting global warming. The organization forecasted the level of global warming can only be limited when the carbon dioxide emission is very low (IPCC, 2021).

Global warming accelerated due to the increase in carbon dioxide emissions. The global warming of 2 degrees will be exceeded in the coming future as a result of the increment in carbon dioxide emission as illustrated in Figure 2. Peters et al (2013) even claimed that it is unlikely global warming will keep below 2 degrees. They highlighted immediate significant and sustained global mitigation should be taken to aim at net negative emissions in the long term (Peters et al, 2013).

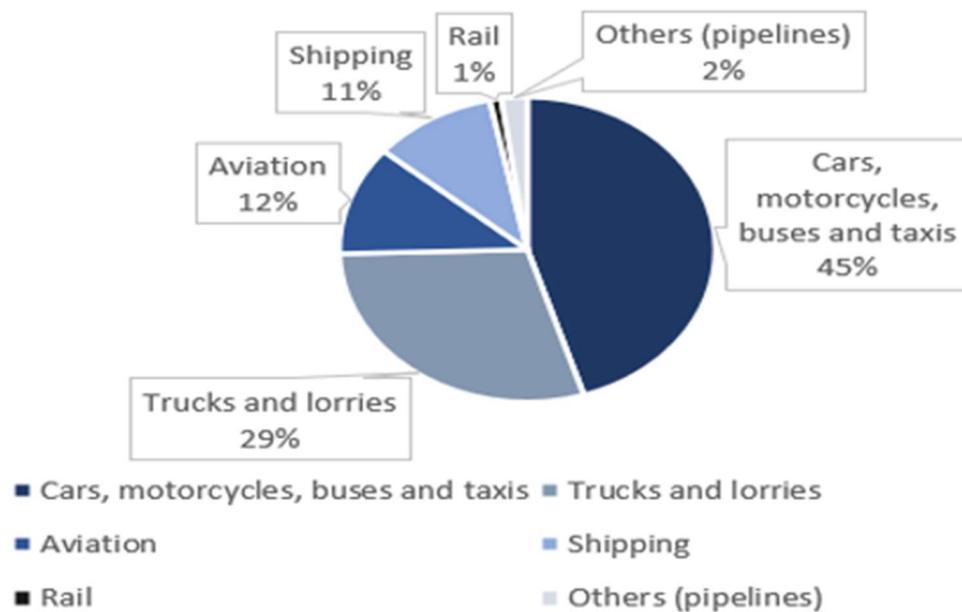
Figure 2. Estimation and forecast in changes in global surface temperature is relevant to carbon dioxide emission from 1950



Sources: IPCC (2021)

Carbon dioxide enters the atmosphere by burning fossil fuels including coal, natural gas and oil. Transportation is regarded as the main human activity resulting in air pollution (United States Environmental Protection Agency, 2021). Based on the data from the International Energy Agency (2018, quoted in Ritchie, 2020) revealed almost 74.5% of carbon dioxide is emitted from transportation with road vehicles while 45.1% of it was coming from private vehicles while 45.1%. Various types of transport emit carbon dioxide during usage. Figure 3 shows the global carbon dioxide emission from different types of transport. Most of the carbon dioxide emission comes from passenger vehicles including cars motorcycles, buses and taxis.

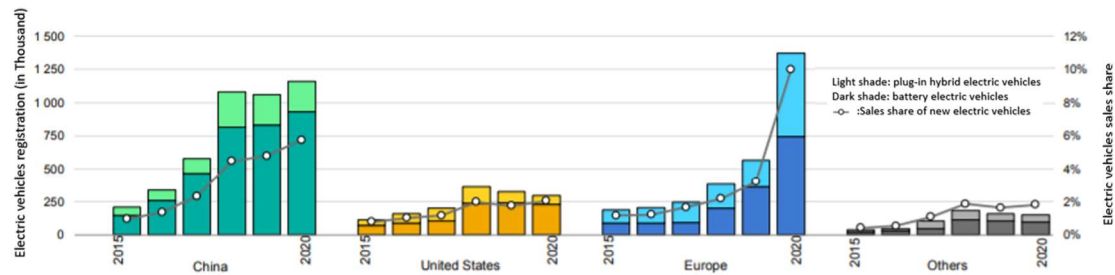
Figure 3. Percentage of global carbon dioxide emission from various types of transport



Sources: OurWorldInData (2020)

Concerning global climate changes, electric vehicles become an instrumental role in environmental sustainability to reduce air pollution and to address climate change. Consumers are gradually inclined to use electric vehicles as transport. Electricity is the main energy source for electric vehicles. Using this alternative energy source help to improve the air quality by reducing emissions of carbon dioxide. Hence, electric vehicles markets become more robust in recent years. There is a rapid growth in sales of electric vehicles in all regions around the world. Figure 4 shows the trend of global electric vehicles registration and sales shares since 2015. According to Irle (2021), the first half-year of 2021 already recorded 2.65 million new electric vehicles registered and this is about a 168% increase compared to 2020.

Figure 4. Registrations of electric vehicles and sales shares in major countries from 2015-2020.



Sources: International Energy Agency (2021)

Due to the outbreak of COVID-19, the overall global market of the automotive industry was severely impacted by the economic downturn. However, it was noted that the registration of electric vehicles increased despite the pandemic. Consumer spending on electric vehicles keeps on increasing and the demands on electric vehicles are growing. This creates opportunities for electric vehicles and challenges for conventional vehicles. According to the Press release by IEA in 2020, it claimed that China remained the largest electric vehicle market with more than 1 million electric vehicles were sold in 2019; while Europe sold 561,000 electric vehicles and became the second-largest market (IEA, 2020). It was followed by The United States with 327,000 vehicles sold (IEA, 2020). In Hong Kong, there are about 18,500 electric vehicles registered in 2020 which is about 12.4% of the market shares (Environment Bureau HKSAR Government, 2021). The Government is launching long-term policy objectives and plans to promote the adoption of electric vehicles and their supporting facilities in Hong Kong. The plans aim to guide to attain zero vehicular emission in the coming future. According to the announcement from Environment Bureau (2021), they are targeting to achieve carbon neutrality before 2050.

Considering the policies changes of the Government and the business potential towards electric vehicles, it is important to understand and analyze the purchase intention of this product for future business strategy planning and continuity of the automotive industry.

1.2 Research statement

With the changing environment and the direction of the government policy, electric vehicles are becoming more popular. The industry observer also noted the global sales of electric vehicles grew rapidly and crashed the market of petrol vehicles. In this automotive industry revolution, auto manufacturers are planning and implementing several business strategies for electric vehicles. Leading by Tesla, various auto manufacturers are increasing investment and are changing their business directions toward electric vehicles. General Motors will make only electric vehicles by 2035, Fords will kick start full electric vehicles production with Europe in 2030, Volkswagen diverts 70% of its sales towards electric, Jaguars plans to sell only electric vehicles from 2025, Lotus from 2028 and follow by Volvo in 2030 (Dooly and Ueno, 2021; Rowlatt, 2021).

However, despite the development and government policy, the current penetration rate of electric vehicles in Hong Kong is only around 12.4% as mentioned in the previous section, it seems there is still have a lot of room to grow.

The purchase intention of consumers on vehicles varies. Some consumers may purchase their vehicles to aim for their functionality, performance, or even their

branding image. To provide recommendations for business planning of electric vehicles, it is imperative to understand consumers' preferences and intentions during their purchases. Purchase intention implies the willingness or the probability of a consumer to purchase a product or service (Sam and Tahir, 2009; Dodd and Supa, 2011). It is also regarded as a conscious action of a consumer to purchase a brand (Spears and Singh, 2004). According to Fishbein and Ajzen (1975), purchase intention is composed of consumers' evaluation and attitude towards a product and another external factor. Meanwhile, it is a subjective judgement for consumers to choose a product and becomes an important indicator to predict consumer purchase behavior (Fishbein and Ajzen, 1975).

In recent years, there is a wide range of studies have been done on the purchase intention and adoption of electric vehicles, most of the studies are exploring the green attitude and behavior, subjective personal feelings on perceived value, personal innovativeness and government support (Kim et al, 2018; Lim, 2019; Tu and Yang, 2019). Hence, the integration of the subjective personal feeling on perceived value, brand image, environmental attitude and environmental concern will be studied in this research paper.

1.3 Research aim

Based on the above research background, this study focused on the consumers' purchase intention on electric vehicles in Hong Kong. We have identified a few factors in this study that may affect the consumers' purchase intention which include perceived value, brand image, environmental concern and environmental attitude.

This study attempts to examine the identified factors of perceived value, brand image, environmental concern and environmental attitude and the relationship between them toward purchase intention in the context of electric vehicles. The research of this report aims to investigate the integration of the subjective personal feeling on perceived value, brand image, environmental attitude and environmental concern to provide market insight and recommendations for the development of automotive companies.

1.4 Research objective

The objective of this research activity is to evaluate the influence and correlation of perceived value, brand image, environmental concern and environmental attitude on consumers' purchase intention on electric vehicles. This study relies on both primary and secondary data collection to achieve the aim of the research.

This research is targeted for the purchase intention of electric vehicles in Hong Kong, thus, all populations in Hong Kong are the target interviewers for this study.

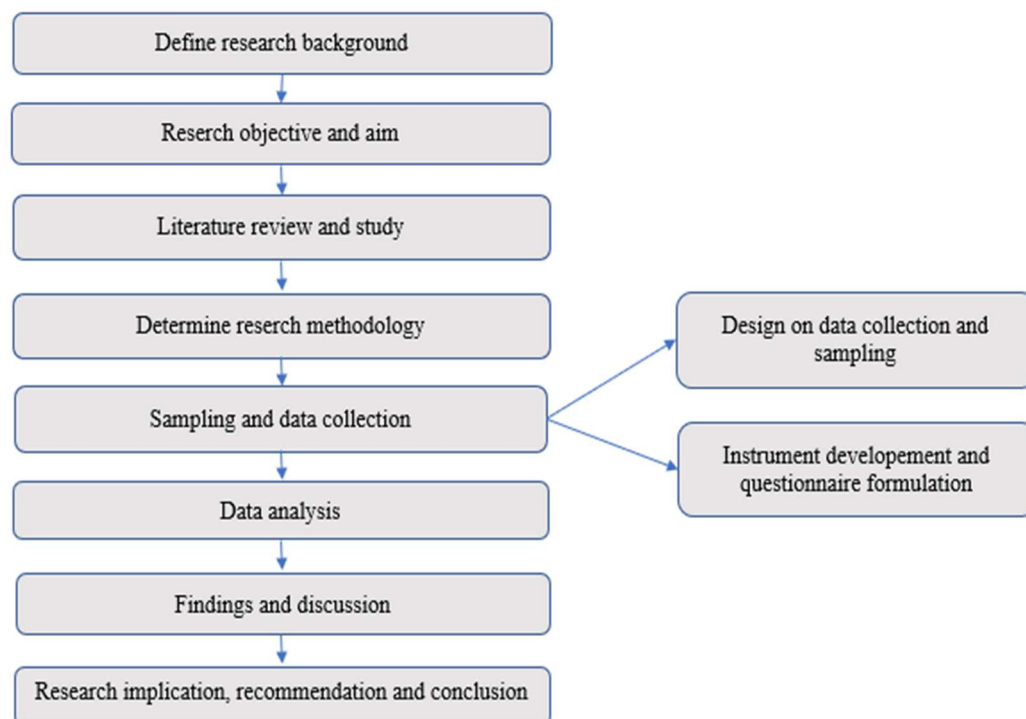
Quantitative and qualitative methods will be applied. A total of 385 questionnaires were conducted and used as the primary data source. The data were collected through a snowball and analyzed through Statistical Product and Service Solution (SPSS). Focus group interviews were arranged as the pilot study in this research project.

The secondary data sources were retrieved from books and journals; media publications and electronic public databases from the internet and library through government bodies and professional associations.

1.5 Research flow

This study's research flow starts by defining the research background, research aim, and objective. Previous studies and literature reviews were discussed and elaborated in the following section. After that, the research methodology was developed and structured as the theoretical framework for this study. Sampling size has been formulated and determined the measurement for data collection. Collected data will be analyzed and examined the result. Based on the analyzed result, a summary of findings will be discussed and provide recommendations as a business contingency for the further development of the automotive industry. The major steps of this research are outlined in Figure 5.

Figure 5. Research flow of this study



Sources: Illustrated by writer

1.6 Summary

The pollution and emission of carbon dioxide are seriously harming the global environment. Based on the environmental impacts and the automotive industry changes, the research aims to study the purchase intention of electric vehicles in Hong Kong. Identified factors of perceived value, brand image, environmental attitude and environmental concern and the relationship between them toward purchase intention will be studied via quantitative and qualitative methods with previous literature reviews and data analyzed. A managerial report will be provided as a recommendation for the further development of the automotive industry.

2. Literature review

In this section, we will rely on previous studies and research of literature reviews to determine the purchase intention on electric vehicles through perceived value, brand image, environmental attitude and environmental concern.

2.1 Perceived value

Perceived value is very important in the marketing field in studying consumers' behavior. In this section, the definition and the construct on the measurement of perceived value will be detailed discussed.

2.1.1 Definition and theoretical construct

Zeithaml (1988) believed consumers' perceptions of price, quality and value are critical determinants of purchase intention. Perceived value was defined as an exchange between the quality or benefits they perceived in the product regarding their perception by paying the price (Monroe, 1990). These studies believed that benefit and costs are the major elements of perceived value. According to Zeithaml's study in 1988, he developed a research model to study the relationship between perceived price, perceived quality and perceived value (Zeithaml, 1988). He concluded the inconclusive relationship of price, perceived quality and identified intrinsic and extrinsic attribute factors as marketing strategies (Zeithaml, 1988). He further acknowledged the dynamic nature of quality from the changes in consumers'

perception over time due to additional information, competition and changing expectations of products (Zeithaml, 1988). It can help to promote the perceived value and increase the product's value perception by adding value to products and services (Zeithaml, 1988).

There were many studies focused on the price and perceived quality relationship (Rockefeller, 1986, Zeithaml, 1988). Dodds et al. (1991) extended their studies to include the extrinsic factors and intrinsic factors to study perceived quality, perceived value and customers' purchase intention. Deming (1982) evidenced quality productivity is the most efficient and economical way for a competitive position. It was further concluded by Goetsch and Davis (1994) who believed strategic quality includes production, processing, service and other external factors.

In 1995, Fredericks and Salter identified consumers' perceived value is evaluated from their purchase experience and it is based on the quality, service, price, image and innovation (Fredericks and Salter, 1995). They believed these factors are closely related to each other and make up the package for customer value (Fredericks and Salter, 1995).

2.1.2 Construct measurement

There are various studies to examine perceived value with different constructs. Based on the previous section, Table 1 summarizes a few literature reviews with different constructs on perceived values.

Table 1. Literature reviews with different constructs on perceived values

Author	Construct measurement
Zeithaml (1988)	Consumers' perceptions included price, quality and value
Monroe (1990)	Perceived values are the exchange of quality and benefit with price
Dodds et al. (1991)	Perceived values can be determined by extrinsic factors and intrinsic factors
Fredericks and Salter (1995)	Consumers' perceived value is evaluated from their purchase experience based on the quality, service, price, image and innovation

Sources: Illustrated by writer

Fredericks and Salter (1995) analyzed perceived value in an all-round business view which included quality, service, price, brand image and innovation. Hence, we based on their research to analyze consumers' perceived value on electric vehicles. Each construct of the perceived value, quality, service, price, brand image and innovation were discussed as below.

Construct of quality

Quality is the overall judgement of consumers based on their perception (Parasuraman et al, 1988, Zeithaml, 1998). Based on previous studies, quality is multi-dimension which can be further defined as objective and perceived quality (Dodds and Monore, 1984; Jacoby and Olson, 1985). There is a difference between objective quality and perceived quality. Monroe and Krishman (1985) defined objective quality as tangible and can be measured. However, perceived quality is the consumer's assessment of the product based on the overall excellence or superiority (Zeithaml, 1988).

Perceived quality is closely related to perceived value. Previous evidence perceived

quality contributes to perceived value (Dodds et al., 1991; Auier and de Lanauze, 2011; Edward, 2013). It was further supported that perceived quality has a significant influence on perceived value (Liljander et al., 2009; Beneke et al, 2015).

Deming stated quality productivity is important in a competitive position (Deming, 1982). According to Juran, it is important to understand the needs of the consumer and the product quality has to be satisfied their needs (Juran, 1989). Fredericks and Salter also emphasized that quality is one of the factors which can help to enhance the customer loyalty of the company (Fredericks and Salter, 1995). Therefore, it is justified to believe higher consumer perception of the quality of electric vehicles may result in rising the perceived value.

Construct of service

According to Takeuchi and Quelch, quality is customer-driven, they noted managements of the company and consumers adopted divergent views of product quality in recent years (Takeuchi and Quelch, 1983). It is believed quality is not only limited to making a good product. There is a trend that automobile companies are moving towards quality assurance and extending their marketing strategy to service delivery.

Zeithaml (1988) defined perceived service quality as the assessment of the overall superiority or excellence of the service. The assessment of overall service quality depends on the difference between the expectations and perceptions of actual performance levels of the product (Parasuraman et al., 1988). Based on this,

Parasuraman, Zeithaml and Berry developed the SERVQUAL model for the measurement of service quality (Parasuraman et al., 1988). They identified service quality through five dimensions including tangible, responsiveness, reliability, assurance, and empathy (Parasuraman et al., 1988).

Fredericks and Salter (1995) stated service-focused strategy can help to attract consumers and regarded it as one of the components of the customer value package. Various empirical studies also have mentioned service will positively influence the perceived value of the product (Kuo et al., 2009; Bauer et al., 2006; Brady et al., 2001).

Construct of price

Zeithaml (1988) proposed perceived value was attributed to intrinsic and extrinsic factors. The price of electric vehicles is defined as one of the external factors contributing to their perceived value. Consumers will evaluate whether the price of the product is acceptable during purchasing (Dodds et al., 1991). Kortge and Okonkwo (1993) proposed a perceived value pricing strategy that assesses the value of the product to consumers and determines the price of the product based on the consumers' perceived value of the attributes to the product offering that received. Price is a critical determinant of perceived value. It is also identified as one of the dimensions of value and has significant influences on perceived value (Sweeney and Soutar, 2001).

Construct of brand image

A brand is not only a trademark, it provides a message of market meanings and is regarded as a relationship with consumers (Lien et al, 2015). Aaker (1991) believed brand image is the association linked in a consumer's memory to a brand. In the same vein, Keller (1993) deems brand image as a consumer's perception about a brand reflected as an association held in the memory. Delivering value to consumers is the main motivation for the brand image (Ailawadi et al., 2001, p.71).

According to Fredericks and Salter, brand image is an important element for perceived value (Fredericks and Salter, 1995). Huang et al. (2019) also evidenced there are significant positive effects of brand image on perceived value.

Construct of innovation

In recent years, technology becomes more advanced with the growth of globalization. Consumers' expectations have become more demanding. In order to maintain the competitive advantages, the company has to take on and develop along with the market trends to attract new generations. Innovation is a process that involved different stages, including, exploration of the new idea, developing and redesigning and implementing the idea (Kyffin & Gardien, 2009).

Fredericks and Salter (1995) claimed innovation is one of the components of perceived value. It can help to raise consumer satisfaction as well as loyalty. Axsen and Kurani (2012) claimed electric vehicles are a technological innovation with their

physical and functional difference when compared with conventional vehicles. Innovation of electric vehicles is regarded as one of the value packages and it can create additional value. Therefore, it is critical to the perceived value of electric vehicles.

2.1.3 Concluding summary

It is important to formulate strategies based on consumers' value standards and perceptions. Understanding the perceived value of the product can help to evaluate consumers' stand on value. There are various studies to examine perceived value with different constructs. According to the Fredericks and Salter (1995), they claimed that perceived value involved quality, service, price, image and innovation. Our study on perceived value was evaluated based on their view on perceived value.

2.2 Brand Image

Brand image is an important facet that comes up to purchase intention. The definition and the construct on the measurement of the brand image will be explained with previous studies and reviews.

2.2.1 Definition and theoretical construct

A positive brand image can help to drive consumers to consume more than the competitors. It aims to help consumers to differentiate the better option and focus on the product for a purchase decision. A positive perception can build up a long-term

relationship between the product and consumers. Conveying a brand image to a target segment of consumers is an important marketing activity (Park et al., 1986).

There are various definitions of brand image. Keller (1993) stated brand image is the awareness of a brand held in a consumers' memory. Arslan and Altuna explained there is a positive and negative feeling about a brand and brand image is defined as the perception of the product in consumers' minds (Arslan and Altuna, 2010). They believed there are three aspects to make up the image of the brand which include favorability, strength and distinctiveness (Arslan and Altuna, 2010). Brand image is also regarded as an overall mind reflection and relief on the brand through the product's specific and unique qualities (Lee et al., 2011).

Keller (1993) proposed brand image as the brand association of consumers' understanding of the branding. Based on the level of association, Keller further differentiates brand associations into three categories, i.e. Attributes, Benefits and Attitudes (Keller, 1993). An attribute is a feature of the product that will affect the consumers' purchase intention, it can be tangible or intangible in nature. Keller distinguished attributes as the relationship relate to the performance of the product or service (Keller, 1993). The benefit is the consumer's personal value towards the product or service. Benefits can be further identified as functional, experiential and symbolic according to their motivation toward benefits (Park et al., 1986; Keller, 1993). An attitude is the consumer's preference towards a brand based on the consumer's beliefs or evaluation. Brand attitudes result in the basis for consumer behavior, hence, it is important and influential from the marketing point of view (Keller, 1993).

2.2.2 Construct measurement

Various scholarly literature studied on brand image through different constructs.

Based on the previous section, different literature reviews on the brand image were summarized in Table 2.

Table 2. Literature review with different contracts on brand image

Author	Construct measurement
Park et al. (1986)	Brand image is identified as functional, experiential and symbolic
Keller (1993)	Brand associates with attributes, benefits and attitudes
Arslan and Altuna (2010)	Brand image is made up of favorability, strength and distinctiveness

Sources: Illustrated by writer

Among the previous empirical studies mentioned above, the study of Park et al. (1986) on the brand image was applied in this research as their study was targeting benefit-based dimensions of brand image. Considering it is based on the theory of needs, the brands offer benefits to consumers to attain consumers' needs. Hence, in reference to Park et al. (1986), this research is studied the brand image through the benefit-based dimensions which hold the concepts of functional, symbolic and experiential during the management stages of introduction, elaboration and fortification.

Functional concepts

According to Stobierski (2020) and Fennell (1978), functional needs are the most

tangible and clear to consumers' needs. It can be broad or unique depending on the consumer's requirements which aim to enhance the needs of the product or service that solve the consumer's obstacles.

Park et al. (1986) defined the functional concept is regarded as the actual benefits to consumers emphasizing problem-solving capabilities during specific or generic development of the existing products or new products or services to achieve consumers' demands and to generate consumption needs. Suddin et al. (2018) evidenced functional benefits are significant to consumer overall satisfaction. In order to enhance competitiveness, it is important to implement proper branding management on the functional attribute (Suddin et al., 2018). Thus, the functional concept is closely associated with the brand image.

Symbolic concepts

Symbolism is the products or services bought to the consumer to enhance or satisfy their self-esteem or social esteem. It is regarded as the added value on the products or service desire associated with fulfilling consumers' self-satisfaction, social positioning, and ego identification (Park et al., 1986).

Various literature reviews stated symbolically of products or services motivates purchase decisions (Levy, 1959; Sirgy, 1982). Based on the self-congruity theory, it is defined as the psychological process and outcome in which consumers compare their perception of a brand with their own actual, ideal, social and ideal social self-belief (Sirgy, 2018). This theory affirmed the strong relationship between the brand image

and consumers' self-esteem with a positive influence on consumer purchase decisions and behavior (Sirgy, 2019).

Experiential concepts

Mugge et al. (2008) explained product attachment is the emotional bond of a consumer experience with products or services. Experimental needs are the consumer's craving for products or services that satisfy their pleasure, variety, sensory and cognitive stimulations through brand accessory and its network (Park et al., 1986).

Previous studies evidenced that experimental marketing can promote consumer satisfaction (Tsaur et al., 2007; Lee et al., 2011) and subsequently induce consumer loyalty (Lee and Chang, 2012). It is believed brand image is formed in accordance with direct experience associated with the brand (Kim et al., 2008; Chao, 2015). Hence, the experimental concept is highly related to brand image.

2.2.3 Concluding summary

According to Dobni and Zinkhan (1990), brand image is important in studying consumer behavior, the willingness to purchase is the result of the abstract reality of the branding instead of the physical attributes and functionality of the product. Literature reviews with different construct on the brand image were studied and identified. Park et al. (1986)'s study on brand image was applied in this study, the main reason for using their view on brand image as it was targeting on theory of

needs. Definition of functional, symbolic or experiential was also discussed in this section. Further analysis on the brand image of electric vehicles on these mentioned dimensions will be covered in the next chapters.

2.3 Environmental concern

In response to the growing environmental concern and sustainability, consumption of eco-friendly products increases rapidly. Many studies and scholars developed to examine the relationship between environmental concern and purchase intention. Definition and the literature review on environmental concerns will be discussed.

2.3.1 Definition and theoretical construct

Climate change is the biggest and most observable environmental challenge we are facing now. Carson specified environmental declines as an economic phenomenon and the environment was at risk due to human intervention (Carson, 1962). The damages to the surrounding environment cause consumers more concerned about the surrounding area and become more aware of the natural resources (Maichum et al., 2017).

Climate consciousness, clean energy and alternative energy sources usage and energy saving demonstrate the personality associated with environmental concern (Zimmer et al., 1994). Fransson and Garling (1999) defined environmental concern as “a belief of certain attitude toward environmentally relevant behavior to a more encompassing value orientation”. It is a reflection of awareness for supporting efforts to protect the

environment as well as the willingness to contribute to the environmental solution (Fransson and Garling, 1999; Dunlap and Jones, 2002; Alibeli and Johnson, 2009).

Crosby et al. (1981) stated environmental concerned consumer is regarded as socially responsible person and has a strong attitude toward environmental protection.

Previous studies evidenced environmental concern is one of the factors that alter consumer decision making (Zimmer et al., 1994; Ottman, 1998). Eco-friendly behavior is performed by the consumer to express their concern for the environment and hence induce purchase intention (Chan, 2001). According to Fransson and Garling (1999), environmental concerns includes both narrow and general measurement which includes both personal and social levels.

Several studies explored the relationship between environmental concern and the purchase intention of eco-friendly products (Schuhwerk and Lefkoff-Hagius, 1995; Alwitt and Pitts, 1996; Choi and Kim, 2005; Maichum et al., 2017; Trivedi et al., 2018). Consumers who demonstrate higher concern for the environment were noticed with an intention to support eco-friendly products (Choi and Kim, 2005) including electric vehicles (Dash, 2021). Electric vehicles are considered a way to lower air pollution caused by automobiles. Kahn (2007) and Pierre et al. (2011) evidenced environmental concern consumers prefer electric vehicles.

2.3.2 Construct measurement

Based on the previous section, different literature reviews with different construct on environmental concern were studied and illustrated in Table 3.

Table 3. Literature review with different construct on environmental concern

Author	Construct measurement
Schuhwerk and Lefkoff-Hagius (1995)	Environmental concern associates with the environmental attributes of products
Fransson and Garling (1999)	Environmental concern includes both narrow and general measurement with personal and social levels

Sources: Illustrated by writer

In this study, we will target the personal level of environmental concern and the consumer's intention towards eco-friendly products. Hence, we rely on Schuhwerk and Lefkoff-Hagius's study (1995) to analyzed the impact of environmental concern on purchase intention of electric vehicles.

Consumer shows different understanding and concern on the environment. Previous studies show the consumers were concerned on the environmental impact for the product purchased (Cramer, 1991; Joshi and Rahman, 2015). According to Schuhwerk and Lefkoff-Hagius (1995), consumers with a strong belief in the environment are likely to take notice of the environmental attributes of products and hence they are more likely to purchase eco-friendly products.

2.3.3 Concluding summary

Definition of environmental concern has been discussed and supported by empirical studies. Previous researchers investigated and evidence consumers with higher environmental concerns will show a higher interest in their surroundings and have a higher preference for eco-friendly products. In this study, we applied the review of Schuhwerk and Lefkoff-Hagius (1995) to examine the environmental concern on the purchase intention of electric vehicles.

2.4 Environmental Attitude

It was mentioned environmental concern implies a positive attitude toward environmental protection (Crosby et al., 1981). Environment attitude is another important factor to influence consumer purchase decisions. We will further discuss the environmental attitude along with the different empirical studies.

2.4.1 Definition and theoretical construct

Environmental attitude and the adoption of eco-friendly products were broadly covered in various research studies. It has been recognized as an important variable that influences the purchase decision of consumers (Schligelmilch et al., 1996; Roberts and Bacon, 1997; Perrea et al. 2014).

Hogg and Vaughan (2005) claimed attitude is a relatively enduring organization of beliefs, feelings, and behavioral tendencies towards socially significant objects, groups, events or symbols. Attitudes contain the elements of affective, conative and cognitive (McLeod, 2018). Environmental attitude can be explained as a psychological trend that leads to beliefs in environmental preservation (Milfont and Duckitt, 2010).

Various research and reviews studied the environmental attitude with various conceptual and theoretical frameworks. Gifford and Sussman (2012) believed environmental attitude can be better described with preservation and utilization dimensions. It rises and falls with current events and varies with age, gender,

socioeconomic status, nation, urban-rural residence, religion, politics, values, personality, experience, education, as well as environmental knowledge (Gifford and Sussman, 2012). Milfont and Duckitt (2010) analyzed environmental attitude in very detail and in multidimensional construct, they believed the construct includes enjoyment of nature, support to invention of environmental policies, commitment to environmental activities, motivation by human welfare concern, beliefs in science and technology, vulnerable environment, right to change in nature, personal environmental protecting behavior, human dominance over nature, utilization of nature, environmental concern as well as overpopulation concern. Ma et al. (2018) evidenced environmental attitude and the impact of the individual consumer on environmental resource problems have a positive relationship to environmental awareness.

Fishbein and Ajzen (1975) defined intention as the subjective probability to perform a specific behavior. Hence, it is believed that consumers with a positive environmental attitude will have a higher intention toward eco-friendly products (Hill and Lynchehaun, 2002; Schuitema et al., 2013).

2.4.2 Construct measurement

There are various literature reviews with different construct on environmental attitude were discussed in the previous section. These studies were summarized and showed in Table 4.

Table 4. Summary of literature review on environmental attitude

Author	Construct measurement
Milfont and Duckitt (2010)	Detail analysis of environmental attitude through a multidimensional construct with personal and social level towards nature and environmental issue
Gifford and Sussman (2012)	Environmental attitude associated with preservation and utilization dimensions
Ma et al. (2018)	Environmental attitudes are based on impact of the individual consumer on environmental resource problems

Sources: Illustrated by writer

Ma et al. (2018) believed environmental attitude leads to environmental awareness, it is a responsible environmental behavior with a general concerning level of environmental issues. Their studies evidenced environmental attitude had a positive relationship with the green purchase decision (Ma et al., 2018). In this study, we targeted to study on personal level's attitude toward environmental resources issue. We aimed to study the consumers' attitude towards the electric vehicles based on the impact of environmental pollution caused by the conventional vehicles. Hence, Ma et al. (2018) was applied to investigate the influence of environmental attitudes on the adoption of electric vehicles.

2.4.3 Concluding summary

Environment attitude is an important factor when consumers make their purchase decisions. It is an attitude trend towards environmental awareness. Various studies cover environmental attitudes as discussed in this section. Ma et al. (2018) evidenced environmental attitude had a positive relationship on green purchase decision. In this study, environmental attitude toward electric vehicles will be analyzed with the support of Ma et al. (2018) on the consumers' attitude toward environmental

resources issue.

2.5 Purchase Intention

Consumers' perception of electric vehicles is the beginning of expanding the demand for electric vehicles in the automobile industry. It is an important concept in marketing literature. In this section, we will explain purchase intention with various previous research and studies.

2.5.1 Definition and theoretical construct

Purchase intention is fundamentally meaning as the target of consumers which they are planning to buy. There are various empirical researches studied in purchase intention. Purchase intention implies the likelihood of consumers' willingness to buy a product (Dodds et al., 1991; Schiffman and Kanuk, 2000). A consumer with intentions to buy the product will show a higher buying signal than those consumers who express that they have no intention to buy (Brown et al., 2003).

Fishbein and Ajzen (1975) claimed that purchase intention combines consumers' evaluation and attitude on a product with other external factors. Consumers will base on their experience, preference and external environment to get the information for evaluating any alternative for concluding their purchase decision (Zeithaml, 1988 Dodds et al., 1991; Schiffman and Kanuk, 2000). There are studies also linking purchase intention with consumer behavior. Patch et al. (2005) regard purchase intention as a conscious plan of action, it needs to be activated with specific behavior.

It is important to understand consumers' purchase intention for formulating future marketing strategies.

Different researchers used various methods and measurements to investigate purchase intention. Zeithaml (1988) mentioned purchase intention can be measured by using possible to buy, desirable to buy and plan to buy. Some of the studies applied the Theory of Reasoned Action and Theory of Planned Behavior to explore purchase intention. The Theory of Reasoned Action was established by Fishbein and Ajzen in 1975 (Fishbein and Ajzen, 1975) and further developed into the Theory of Planned Behavior in 1985 (Ajzen, 1985). Theory of Planned Behavior was also involved perceived behavioral control. This theory postulated behaviors are determined by behavioral intentions with a combination of attitude, subjective norms and perceived behavioral control (Ajzen, 1991). However, Ajzen (1991) also mentioned behavioral reliability is the limitation of this theory.

2.5.2 Construct measurement

Previous section discussed various studies on purchase intention. It was noted that different measurements were applied in their scholars to study purchase intention. Table 5 has summarized these studies and reviews.

Table 5. Literature review on measurement of purchase intention

Author	Construct measurement
Fishbein and Ajzen (1985)	Purchase intention can be determined by combination of attitude, subjective norms and perceived behavioral control
Zeithaml (1988)	Purchase intention can be measured by using possible to buy, desirable to buy and plan to buy.
Dodds et al. (1991)	Consumer purchase intention is determined with their willingness to purchase

Sources: Illustrated by writer

It was also noted previous studies on purchase intention are mainly focused on organic food and online behavior, there is not much research looking into the automobile industry. therefore, this study analyzed the purchase intention of electric vehicles. Some of the studies involved the study of attitude and behavior when examining the purchase intention. In our study, we aim to investigate the purchase intention towards electric vehicles. Considering the repeat purchase rate of vehicle is not high, we just simply to examine the willingness to purchase electric vehicles in our study. Hence, the review of Dodds et al. (1991) to determine consumers' willingness to buy was applied to examine the purchase intention of electric vehicles.

2.5.3 Concluding summary

Purchase intention is an important indicator of willingness to buy. Definition and various measurements of purchase intention were discussed. In this study, we applied Dodds et al. (1991)'s study as supporting to investigate the consumers' purchase intention of electric vehicles which aimed to aid in formulating future marketing strategies.

2.6 Relationship between variables

As discussed in the previous section, this study will rely on perceived value, brand image, environmental attitude and environmental concern to analyze the purchase intention on electric vehicles. This chapter will explain the relationship between each variable and purchase intention.

2.6.1 Perceived value and purchase intention

In the previous section, the definition of perceived value and its dimensions have been discussed in various literature reviews. Consumer's value perceptions are vital for their purchase decisions (Wang, 2015). Grewal et al. (1998) reported that perceived value has a positive effect on consumers' willingness to buy. Apart from the above mentioned, there are further studies have been suggested there is a positive relationship between the perceived value on consumers' purchase intention (Dodds et al., 1991; Fredericks and Salter, 1995; Sweeney et al., 1999; Beneke and Carter, 2015). Thus, based on this aforementioned argument, the following hypothesis was proposed.

H1: Perceived value has a positive influence on consumers' purchase intention towards electric vehicles.

2.6.2 Brand image and purchase intention

Brucks (1985) claimed that a better understanding of the product results in better

recognition. Brand image can help to induce purchasing (Park et al., 1986). According to Keller's study (1993), he stated that brand associations came from the company's marketing mix activities or its product, contributing to the Brand image to the consumers. A brand associated with unique, strong and favourable should build up a positive brand image (Keller, 1993). A positive brand image can help to create a long-term relationship between the product and consumer. Consumers prefer to buy a well-known brand product with a positive brand image. Various scholars evidenced there are positive and direct effects on brand image and purchase intention. A positive brand image increases consumers' purchase intentions (Wu et al., 2011; Wang and Tsai, 2014; Agmeka, 2019; Haro et al., 2020). Hence, the following hypothesis was formulated:

H2: Brand image has a positive influence on consumers' purchase intention towards electric vehicles.

2.6.3 Environmental concern and purchase intention

Zimmer et al. (1994) and Ottman (1998) claimed environmental concern is vital for consumer decision making. Newton et al. (2015) stated environmental concern can be used to predict environmental purchase intention. Kilbourne and Pickett (2008) evidenced that consumer environmental concern increased with consumption towards eco-friendly goods and services.

Several studies established the positive relationship between consumers' environmental concern and purchase intention of eco-friendly products through behavior towards the environment (Schuhwerk and Lefkoff-Hagius, 1995; Balderjahn,

1988; Roberts and Bacon, 1997; Aman et al., 2012; Albayrak et al., 2013; Lee et al., 2014; Dash, 2021). In accordance with the above-mentioned researches and studies, environmental concern is a critical factor in supporting purchase intention, therefore, the below hypothesis was suggested:

H3: Environmental concern has a positive influence on consumers' purchase intention towards electric vehicles.

2.6.4 Environmental attitude and purchase intention

There is a close relationship between consumers' attitudes and purchase intention.

Several empirical studies applied the Theory of Reasoned Action to study the relationship between the environmental attitude and consumers' actions toward green product purchases (Baker and Ozaki, 2008; Gupta and Ogden, 2009; Kalafatis, et al., 1999). Chan (2001) described consumers with favorable environmental attitudes are significantly related to their green purchase intention.

Carley et al. (2013) and Krupa et al. (2014) found out the adoption of electric vehicles was revealed to be motivated by environmental attitude. Various scholars evidenced environmental attitude has direct effects on consumers' purchase intention (Alwitt and Pitts, 1996; Mostafa, 2007; Yadav and Pathak, 2016; Prakash and Pathak, 2017; Ma et al., 2018). Based on this aforementioned affirmation that the positive link between the environmental attitude and purchase intention, H4 is posited.

H4: Environmental attitude has a positive influence on consumers' purchase intention towards electric vehicles.

2.7 Summary

It is supported that consumers with high perceived value, awareness of the brand image, environmental concern and environmental attitude increase the willingness to purchase. Table 6 shows a summary of the literature review related to the mentioned variables applied in this study. We believed that there should be a linked relationship between mentioned variables and the purchase intention of electric vehicles.

Table 6. Summary of literature review applied in this study

Variables	Author	Construct measurement
Perceived Value	Fredericks and Salter (1995)	Consumers' perceived value is evaluated from their purchase experience based on the quality, service, price, image and innovation
Brand Image	Park et al. (1986)	A positive brand image can increase consumers' purchase intentions which can be identified as functionality, experiential and symbolic
Environmental Concern	Schuhwerk and Lefkoff-Hagius (1995)	Environmental concern is closely linked with consumer purchase decision associated with the environmental attributes of products
Environmental Attitude	Ma et al. (2018)	Environmental Attitudes influence the purchase decision of consumers based on impact of the individual consumer on environmental resource problems
Purchase Intention	Dodds et al. (1991)	Consumer purchase intention is the likelihood of their willingness to purchase

Sources: Illustrated by writer

3. Research Methodology

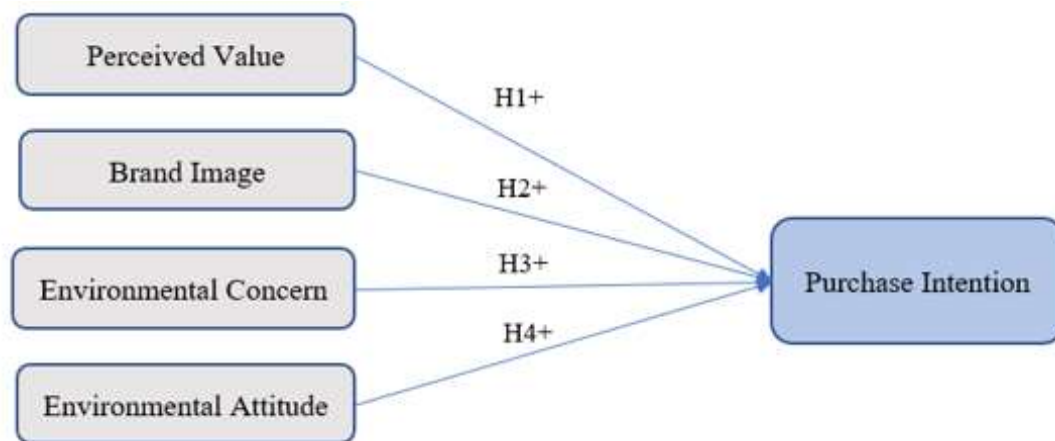
In this section, we will discuss the research methodology of this research study on the purchase intention of electric vehicles. The research model, hypotheses, construct and measurement as well as the research instrument will be described in detail.

3.1 Research Model

According to Sekaran (2003), the theoretical framework is the conceptual model for the plausibility assessments between several factors which have been identified as important for the study area. In this research study, we will base on the theoretical framework to develop a research method with various hypotheses to elaborate the network and association between the identified variables deemed to be relevant to the issue through observations, literature review and survey.

This research aims to explore the effect of perceived value, brand image, environmental concern and environmental behavior towards consumer purchase intention of electric vehicles and verify these variables on consumer decisions. With reference to the previous empirical reviews and scholars mentioned in the previous chapter, the research model of this study is developed and illustrated in Figure 6.

Figure 6. Research model



Sources: Illustrated by writer

3.2 Research Hypotheses

The hypothesis can be regarded as an assumption or suggestion or a tentative idea that is proposed based on a known fact for testing. According to Jansen (2020), a research hypothesis is a specific, testable and falsifiable statement on an expected conclusion of a scientific study. The hypothesis is also regarded as the start of the research. After formulating the hypothesis, experiments will be carried out to testify to the assumption. Davis and Mukamal (2006) stated hypothesis testing is an important process used to evaluate the relationship of the indicative data from a sample of the population.

In this research, we based on the literature review and the research model to develop and establish the research hypotheses. The below hypotheses have been proposed with the supporting of literature review as discussed in previous chapter. H1 proposed with the support from Fredericks and Salter (1995) claimed there is a positive relationship between the perceived value on consumers' purchase intention. Thus, we believed

perceived value has a positive influence on consumers' purchase intention towards electric vehicles. Park et al. (1986) mentioned brand image can help to induce purchasing. H2 was suggested as brand image has a positive influence on consumers' purchase intention towards electric vehicles. H3 was posited that environmental concern has a positive influence on consumers' purchase intention towards electric vehicles. This is based on the study of Schuhwerk and Lefkoff-Hagius (1995) who evidenced environmental concern and purchase intention of eco-friendly products are closely related. According to Ma et al. (2018), it is believed environmental attitude has direct effects on consumers' purchase intention. Hence, H4 was proposed as environmental attitude has a positive influence on consumers' purchase intention towards electric vehicles.

The hypotheses were testified through examining the result of the conducted survey with related software. The relationship between the identified variables of perceived value, brand image, environmental concern and environmental attitude, toward consumers' purchase intention on electric vehicles were investigated and analyzed in the following chapters.

3.3 Research Construct and measurement

This section will discuss the research construct, its operational description, and measurement of perceived value, brand image, environmental attitude, and environmental concern.

3.3.1 Perceived value

Perceived value is the consumer's assessment of the value of the product based on its price and quality. As the market developed along with different business growth strategies, the understanding of perceived value also extended to service and brand image. Perceived value also became the concept of creating additional value for a product or service. This is important to drive sales and create effective marketing of the product.

Various studies and scholars investigated perceived value and it has been discussed in the previous chapter. Fredericks and Salter (1995) pointed out consumers' perceived value is evaluated from their purchase experience and it is based on the quality, service, price, company image and innovation. In this study, the construct of perceived value was formulated based on Fredericks and Salter's research in 1995 of which included product quality, service quality, price and innovation. This study selects twelve measure items to assess the influence of perceived value on electric vehicles. For the company image, we applied with Park et al. (1986)'s review on brand image and it will be further discussed in the next section under the brand image. Table 7 shows the constructs and the operational definition of perceived value in this research and Table 8 shows the various measure items of perceived value in this study.

Table 7. Constructs and operational definition of perceived value

Construct	Operational definition
Product	Electric vehicles can comply with and satisfy consumers' need
Service	The selling service, knowledge of sales staff and technicians of electric vehicles can help and meet consumers' expectation
Price	The expected value of electric vehicles is attributed to its price, product feature and service offered
Innovation	The innovation and technologies of electric vehicles meet consumers' expectation

Sources: Illustrated by the writer based on Fredericks and Salter (1995)

Table 8. Measure items of perceived value on electric vehicles

Construct	Item	Question	Source
Product	PVQ1	I think electric vehicles are worth buying as their batteries will last for around 10-20 years on average.	Fredericks and Salter (1995)
	PVQ2	I think electric vehicles meet my expectation of their functionality.	
	PVQ3	I think electric vehicles are more comfortable as they are stable in performance.	
Service	PVS1	I think electric vehicles can provide better after-sales service	
	PVS2	I think the sales staffs of electric vehicles are knowledgeable.	
	PVS3	I think the technicians of electric vehicles are knowledgeable.	
Price	PVP1	I think electric vehicles are more economical than petrol cars as electricity costs are generally lower.	
	PVP2	I think the maintenance costs on electric vehicles are relatively reasonable as they do not have to change the engine oil, coolant, and transmission fluid.	
	PVP3	I think the running cost of electric vehicles are relatively low.	
Innovation	PVI1	I think electric vehicles are an innovative product.	
	PVI2	I think the new technology of electric vehicles meets my expectation.	
	PVI3	I think the innovations of electric vehicles fulfill the requirement of my driving needs.	

Sources: Illustrated by writer

Likert's seven-point scale method was used to measure interviewers' responses, it includes and ranks 1 means strongly disagree, 2 means slightly disagree, 3 means disagree, 4 means neutral, 5 means agree, 6 means slightly agree and 7 means strongly agree.

3.3.2 Brand image

Brand image is the perception of the brand in the consumers' memory which reflects the consumers' impression and beliefs appertaining to the brand. Different consumers can have different perceptions of a brand. Hence, it is critical for the company to build up a consistent brand image to gain market leverage by integrating it into its marketing strategy. Brand image can drive credibility and customer loyalty. These days, a positive brand image can even help to attract new customers and this is especially important during a new product launch.

As mentioned in the previous chapter, brand image is associated with three categories, i.e. Attributes, Benefits and Attitudes. In this study, we applied Park et al. (1986)'s review on the brand image which targets to study this variable in the benefits dimension. Park et al. (1986) explained brand image and further identified as functional, experiential and symbolic according to their motivation toward benefits. The concepts are formed on the grounds of different requirements or demands of consumers (Park et al., 1986). Park et al. (1986) explained the functional concept as the product has the capability to achieve consumers' demands and consumption needs. Symbolic was described as the consumers' aspiration of the product to meet self-satisfaction, social positioning, and ego identification (Park et al., 1986). Finally, they

claimed the experimental is the needs of the products to satisfy consumers' pleasure, sensory and cognitive stimulations through the image of the product. Based on Park, Jaworski and MacInnis's review on brand image, our research's construct on the brand image on electric vehicles was built upon functional, experiential and symbolic. Table 9 shows the constructs and the operational definition of brand image in this research and Table 10 shows the various measure items of brand image in this study.

Table 9. Constructs and the operational definition of brand image on electric vehicles

Construct	Operational definition
Functional	The tangible function of electric vehicles can satisfy the consumers' and their needs
Symbolic	The image of electric vehicles can make consumers feel pleasant and satisfied. It showed there is a strong relationship between self-esteem and brand image.
Experiential	Electric vehicles can fulfil consumers' pleasure and cognitive needs

Sources: Illustrated by writer based on Park et al. (1986)

Table 10. Measure items of brand image on electric vehicles

Construct	Item	Question	Source
Functional	BIF1	It is important that the design of electric vehicles is trendy and attractive.	Park et al. (1986)
	BIF2	It is important to have various brands and models of electric vehicles for people to choose from.	
	BIF3	It is important for electric vehicles to have a stable driving performance	
Symbolic	BIS1	Driving an electric vehicle is the new market trend.	
	BIS2	The image of driving an electric vehicle makes a good impression on other people.	
	BIS3	Driving an electric vehicle can reflect social status.	
Experiential	BIE1	Electric vehicles can experience new technologies.	
	BIE2	Driving electric vehicles is unique and feels refreshed.	
	BIE3	Driving electric vehicles would feel relaxed as it has less engine noise.	

Sources: Illustrated by writer based on Park et al. (1986)

Likert's seven-point scale method was used to measure interviewers' responses, it includes and ranks 1 means strongly disagree, 2 means slightly disagree, 3 means disagree, 4 means neutral, 5 means agree, 6 means slightly agree and 7 means strongly agree.

3.3.3 Environmental concern

Climate changes and global warming has raised global concern. Government and environmental organizations have been working hard on educating the public on environmental preservation and protection which aims to bring out concern and awareness on this serious environmental issue. The demands and awareness of environmental movements are increasing globally, this also influences the companies' practice of marketing strategy. Zimmer et al. (1994) highlighted environmental concern as one of the factors that alter consumer decision making. International companies adopted sustainability marketing strategies and corporate social responsibility to demonstrate corporate community involvement.

Numerous studies have been developed to measure this area to understand the association between environmental concerns and consumer purchase intention. According to Schuhwerk and Lefkoff-Hagius (1995), consumers with a strong belief in the environment are likely to take notice of the environmental attributes of products. Our study on environmental concern is formulated based on the research of Schuhwerk and Lefkoff-Hagius (1995) which aim to understand the interest in an electric vehicle will be higher for those consumers with strong beliefs and involvement in the environment. In this study, we have summarized three measure

items to study the environmental concern of electric vehicles. Table 11 shows the constructs and the operational definition of environmental concern in this research and Table 12 shows the various measure items of environmental concern on electric vehicles in this study.

Table 11. Constructs and the operational definition of environmental concern on electric vehicles

Construct	Operational definition
Environmental concern	Environmental concern alters consumer decision making. Involvement in the environment responds to the green product, i.e. electric vehicles.

Sources: Illustrated by writer based on Schuhwerk and Lefkoff-Hagius (1995)

Table 12. Measure items of environmental concern on electric vehicles

Construct	Item	Question	Source
Environmental concern	EC1	I worry about global warming.	Schuhwerk and Lefkoff-Hagius (1995)
	EC2	The air pollution will affect my living quality.	
	EC3	I would give up something to guard the environment.	
	EC4	My activities and actions will affect the entire environment.	

Sources: Illustrated by writer

Likert's seven-point scale method was used to measure interviewers' responses, it includes and ranks 1 means strongly disagree, 2 means slightly disagree, 3 means disagree, 4 means neutral, 5 means agree, 6 means slightly agree and 7 means strongly agree.

3.3.4 Environmental attitude

Human personality and behavior may affect by the surrounding environment. Studies and researches show environmental concern and awareness implies a positive attitude towards environmental protection. Consumers with favorable environmental attitudes are significantly related to their green purchase intention. The current market is moving towards sustainable consumption, environmental attitude becomes important for the study of environment psychology which is used to evaluate behavior towards environmental quality.

Understanding consumer behavior is important for developing a marketing strategy. Various researchers have studied and investigated the relationship between environmental attitude and consumer behavior, different theories have been developed based on it. Ma et al. (2018) studied environmental awareness and consumption value on green marketing, they evidenced environmental attitude had a significant influence on green makeup purchase intention. Carley et al. (2013) and Krupa et al. (2014) further studied the adoption of electric vehicles was revealed to be motivated by environmental attitude. In this study, we aim to evidence and understand the effect of environmental attitude on electric vehicles and the correlation with other variables. Based on Ma, Rau and Guo's study that environmental attitude has a direct influence on environmental behavior, hence, we formulated the operational definition as the adoption of electric vehicles by consumers is related to their level of concern on the environmental issue. Table 13 shows the constructs and the operational definition of environmental attitude in this research and Table 14 shows the various measure items of environmental attitude in this study.

Table 13. Constructs and the operational definition of environmental attitude on electric vehicles

Construct	Operational definition
Environmental attitude	Environmental attitude has a direct influence on environmental behavior. It is believed the adoption of electric vehicles by consumers is also related to their level of concern on the environmental issue

Sources: Illustrated by writer based on Ma et al. (2018)

Table 14. Measure items of environmental attitude on electric vehicles

Construct	Item	Question	Source
Environmental attitude	EA1	I think adoption of electric vehicles can promote a sustainable transportation system.	Ma et al. (2018)
	EA2	I think the electric vehicle is an eco-friendly product and it has a positive impact on the environment and society.	
	EA3	It is a social trend of being eco-friendly for the adoption of electric vehicles.	

Sources: Illustrated by writer

Likert's seven-point scale method was used to measure interviewers' response, it includes and ranks 1 means strongly disagree, 2 means slightly disagree, 3 means disagree, 4 means neutral, 5 means agree, 6 means slightly agree and 7 means strongly agree.

3.3.5 Purchase Intention

Purchase intention is the willingness of a consumer to purchase a product, it can be

measured by the consumers' attitude on the eagerness of purchasing. Buying motives include feeling, desire, stimulus and thought of consumer influenced and determined the purchase intention. This becomes a very critical and important factor in formulating the marketing strategy for predicting future sales and determination of consumers behavior.

There are a lot of scholars and researchers investigating and understanding consumer purchase intention. Zeithaml (1988) stated consumers get information to evaluate their purchase decision based on their experience, preference and external environment. Dodds et al. (1991) claimed consumer purchase intention is the possibility to buy a specific product. In reference to Dodds et al.'s scholarly work in 1991, the operational construct in this study developed as consumer purchase intention as the likelihood of their willingness to purchase. In our research, three measure items are used with adopting Likert's seven-point scale method to measure consumer purchase intention on electric vehicles. Table 15 shows the constructs and operational definition of purchase intention in this study and Table 16 shows the various measure items used to evaluate the purchase intention on electric vehicles.

Table 15. Constructs and the operational definition of purchase intention on electric vehicles

Construct	Operational definition
Purchase intention	Consumer purchase intention of electric vehicles implies the likelihood of their willingness to buy electric vehicles

Sources: Illustrated by writer based on Dodds et al. (1991)

Table 16. Measure items of purchase intention on electric vehicles

Construct	Item	Question	Source
Purchase intention	PI1	I am willing to have an electric vehicle.	Dodds et al. (1991)
	PI2	I will recommend electric vehicles to friends or family members.	
	PI3	I will intend to purchase an electric vehicle regardless of the price changes.	

Sources: Illustrated by writer

Likert's seven-point scale method was used to measure interviewers' response, it includes and ranks 1 means strongly disagree, 2 means slightly disagree, 3 means disagree, 4 means neutral, 5 means agree, 6 means slightly agree and 7 means strongly agree.

3.3.6 Demographic information

The interviewers' basic information will be collected to demonstrate the control on demographic variables. According to Vogt and Johnson (2011), they claimed demography is used for examining the quantifiable statistics of a particular population. The collected demographic information includes gender, age, education level and monthly personal income. We applied binary scales for gender, ordinal scales for age and monthly personal income. The age group was classified in reference to population information provided by the Census and Statistics Department's report (2021) on the population of women and men in Hong Kong. For education level, we use the nominal scale. This is aim to use to study and analyze the relationship of consumer purchase intention on electric vehicles with the different demographic backgrounds. The measure items of demographic information are

illustrated in Table 17.

Table 17. Measure items of demographic information

Item	Description
Gender	Male, female
Age	Below 20, 20-29, 30-39, 40-49, 50-59, 60 or above
Education level	Primary or below, lower secondary, upper secondary, post-secondary, degree or above
Monthly personal income	Below HKD 20,000, HKD 20,001-HKD 35,000, HKD 35,001-HKD 50,000, HKD 50,001-HKD 80,000, HKD 80,001 or above

Sources: Illustrated by writer

3.4 Research Instrument

This section covered the analysis instrument applied in this study which included descriptive statistic analysis, reliability analysis, correlation analysis and regression analysis were discussed.

3.4.1 Descriptive statistic analysis

Descriptive statistic analysis is used to compile all the collected information and presented it in an organized manner by identifying the relationship between variables and population. Kaur et al. (2018) claimed descriptive statistics is a vital first step in research, it includes nominal variables, ordinal variables, interval and ratio variables as well as measures of frequency, central tendency, variability and position. in the below section, it covered the descriptive statistic analysis of perceived value, brand image, environmental concern, environmental attitude and purchase intention. The

data were analyzed with mean and standard deviation. Mean is used to measure the central tendency while standard deviation is a measure of the distribution of the data in relation to the mean, it served as a measurement of uncertainty (Andrade, 2020).

3.4.2 Reliability analysis

Validity and reliability are the two elementary concepts for the evaluation of a scale or test. Validity is concerned with the extent to measure the quality in a quantitative study. Reliability is used to evaluate the internal consistency of the items under each variable (Chakrapani, 2004). Cronbach's alpha is the most widely used indicator of the reliability of the measuring items (Tavakol and Dennick, 2011).

Cronbach's alpha was developed by Lee Cronbach in 1951, it is expressed as a number between 0 and 1 for measuring the internal consistency (Cronbach, 1951). For the values closer to 1, this shows a greater internal consistency of the variables in the test. Hence, this indicates greater scale reliability. Various scholars identified the acceptable values of alpha lie between 0.70 to 0.95 (Nunnally and Bernstein, 1994; Bland and Altman, 1997). Ursachi et al. (2015) evidenced indirect influence from external factors may result in the difference in the values of Cronbach alpha. Tavakol and Dennick (2011) further claimed if the alpha value is too high, it may suggest that some items are redundant as the testing is measuring the same question but in a different form. In this study, we applied for the review of Taber (2018) that the Cronbach's alpha should reach 0.70 to have an acceptable level of self-consistency.

3.4.3 Correlation analysis

Correlation analysis is frequently used to study the association between two or more variables. It is widely applied to investigate the linear relationship between two intervals or variables. Pearson correlation coefficient was developed by Karl Pearson in 1948 from a related concept proposed by Francis Galton in the late 1800s (Chee, 2015) and it is commonly used to determine the linear correlation of the data (Schober et al., 2018).

The correlation coefficient ranges from -1 to 1 . A linear correlation coefficient with a value greater than 0 shows a positive relationship while a value less than 0 implies a negative relationship. A value of 0 indicates no linear dependency between the two variables.

This study adopted Pearson's correlation coefficient analysis to examine the relationship among the variables of perceived value, brand image, environmental concern, environmental attitude and purchase intention on electric vehicles. SPSS was used to tabulate the bivariate Pearson correlation coefficient as a parameter to measure the strength and direction of linear relationships among the variables on electric vehicles. The evidence of the linear relationship among the pairs of variables was studied. A two-tailed significance test was included to test the correlation of the variables (Wathan et al., 2019). The probability value, p-value, is used to measure the goodness of fit of data based on the significance level. A significance less than 0.05 indicates that a relationship exists. Hence, there was significant evidence to reject the null hypothesis that the correlation is 0 (Wathan et al., 2019).

The Pearson correlation coefficient correlation, reported as 'r', to interpret the relationships of the variables of this study. R ranges from -1 to +1 (Laerd Statistics, 2020). Table 18 illustrates the strength of association of the variables based on the r-value.

Table 18. Strength of association of the variables and r-value

Strength of Association	Coefficient, <i>r</i>	
	Positive	Negative
Small	.1 to .3	-0.1 to -0.3
Medium	.3 to .5	-0.3 to -0.5
Large	.5 to 1.0	-0.5 to -1.0

Sources: Laerd Statistics, 2020

3.4.4 Regression analysis

Regression analysis is a fundamental statistical tool for the analysis of data. It helps to identify and characterize the relationship between multiple variables. There are various regression models which include linear regression, logistic regression, cox regression and poisson regression (Schneider et al., 2010). In this study, we applied linear regression to investigate the linear relationship among the variables toward purchase intention of electric vehicles.

Regression analysis was performed with SPSS to examine the linear regression. Model summary, ANOVA table and the Coefficients table were generated and studied the relationship of perceived value, brand image, environmental concern and environmental attitude on purchase intention of electric vehicles.

R squared is used to measure the goodness-of-fits of linear regression model (Frost, 2022). It is also known as the coefficient of determination to act as a statistical measurement to study whether the data are not far from the fitted regression line (minitab, 2013). R squared is the percentage of the dependent variable variation explained by a linear model (minitab, 2013; Frost, 2022). R squared is ranged from 0 to 100%, 0% means the model shows none of the variability of the dependent variable around its meanwhile 100% means the model shows all the variability of the dependent variable around its mean (minitab, 2013). High R squared value demonstrated a strong goodness-of-fits for the linear regression model (minitab, 2013).

The F value in the ANOVA table is a value on the F distribution used to analysis of variance (IBM, 2021). A high F value indicated the variation between the data is high relative to the variation within each of the data (Zach, 2021). The significance of the regression model can be measured with the p-value. The model shows a significant difference if the p-value is less than 0.05 (Zach, 2021).

The standardized beta coefficients in the coefficients table are used to compare the strength of the effect of the independent variable to the dependent variable (Glen, 2016). A high standardized coefficients beta value indicates a stronger effect (Glen, 2016). The relative importance of each coefficient in the regression model can be compared (Glen, 2016). The significance beta coefficient can use to predict the outcome of the dependent variable. Every unit increases in the independent variable, the dependent variables will increase by the beta coefficient value (Statistics Solutions, 2022).

3.5 Questionnaire design

The questionnaire designed in this study includes two sections. The first section included measure items of perceived value, brand image, environmental concern, environmental attitude and purchase intention; the last section covered interviewers' demographic information. The questions of the questionnaire are formulated based on the construct of each variable as discussed in the last section. The formal questionnaire was attached in Appendix 1.

This study relied on the Likert Scale to measure interviewers' opinions. The Likert Scale is a rating scale that helps to indicate the attitudes or opinions of interviewers. It was invented by an American social psychologist, Rensis Likert in 1932 and was commonly used in marketing journals (Edmondson, 2005). According to Edmondson (2005), it was suggested to use Likert Scale in each study for descriptive analysis to prevent unequal weighting. In current practice, most rating scales for attitude and opinion measures contain either five or seven response categories (Shaw and Wright, 1967; Bearden et al., 1993). Bendig (1954) suggested it is better for having more scale points for measurement, however, there is a lowering result after around eleven points. Johns (2010) further stated the data from Likert scales became less significant when the number of scale points used was less than five or above seven. Hence, in this study, Likert's seven-point scale method was adopted to measure interviewers' opinion, 1 means strongly disagree and 7 means strongly agree.

3.6 Sampling design

Based on the research topic, the relationship of perceived value, brand image, environmental concern, environmental attitude and purchase intention on electric vehicles in Hong Kong was investigated. The research target of this study is the general consumers in Hong Kong. This research was performed in both a quantitative and qualitative method.

It is critical to determine the appropriate sample size of the analytic study. The sample size is used for defining the number of interviewers included in the study to represent a population (Kibuacha, 2021). The population in Hong Kong as of 2020 is around 7,481,800 (Census and Statistics Department, 2021). Considering the convenience and efficiency of this sampling, the sampling size will be calculated based on Andrew Fisher's Formula as shown in Figure 7.

Figure 7. Andrew Fisher's Formula

$$\text{Sample Size} = \frac{(Z\text{-score}) \times 2 \times \text{Standard Deviation} \times (1 - \text{Standard Deviation})}{\text{Confidence Interval} \times 2}$$

Source: GeoPoll, 2021

In this research, we adopted Glenn's study to use 5% as the confidence interval, 95% as the confidence level and a standard deviation of 0.5 (Glenn, 1992). About Kibuacha (2021), the z-score is 1.96 with a confidence level of 95%. The sample size calculated based on Andrew Fisher's Formula is 384.16. Hence, a total of 385 questionnaires were distributed in this study.

3.7 Pre-test and pre-test result

In order to make sure the reliability of the questionnaire and help identify any logical issues with the questions, we performed a pre-test along with the focus group discussion to determine whether the questionnaire meet the requirements. According to Creswell (2007), a range of three to five interviewers per discussion group can moderate bias from a single source. Six groups, with five participants in each group, have been arranged through zoom meetings due to pandemics (see Appendix 2 for a detailed description of focus group participants' profiles). The duration of each focus group discussion was around 15 minutes. The questionnaire was given out in the meeting for completion and the discussion was based on the questions. Most of the participants felt the questions were easy to understand and related to the survey topic. One male participant felt some of the questions were duplicated. After the group discussed the different constructs among the variables, he agreed without further comment. 30 questionnaires were collected and were used for the pre-test.

Reliability test performed for pre-test to see examine the internal consistency and assess the reliability of questionnaire. Cronbach's alpha should reach 0.70 to have an acceptable level of self-consistency (Taber, 2018). The pre-test result illustrated in Table 19 shows that Cronbach's alpha value of each variable is more than 0.7, which indicates the consistency in variable measurement in this study. Hence, the removal of unstable questions is not required. (See Appendix 3-7 for reliability statistics of each variable).

Table 19. Reliability of questionnaire of pre-test

Variables	Item	Pre-test Cronbach's Alpha Value
Perceived value	12	0.956
Brand image	9	0.912
Environmental concern	4	0.892
Environmental attitude	3	0.837
Purchase intention	3	0.932

Sources: Illustrated by writer

3.8 Data Collection

This study was focused on the purchase intention of electric vehicles in Hong Kong, hence, the target interviewers in this study are Hong Kong residents. The questionnaire was carried out through a snowball which aims to achieve a wider population of sampling (Chaim, 2008). The questionnaire was distributed and collected as the primary data.

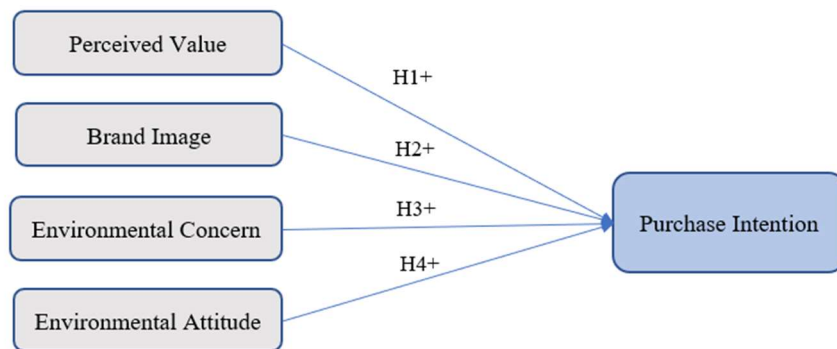
Due to the epidemic, an online survey was performed instead of face-to-face. Google form was created and used as a survey tool. This platform offers easy accessibility to can able to deliver a higher response rate in a shorter period. The survey link was distributed through social media platforms including WhatsApp, Signal, LINE, Wechat, Facebook, Instagram, etc.

Collected data were interpreted and compared with the analytical tool, Statistical Package for Social Science (SPSS). The data were analyzed and evaluated through descriptive statistic analysis, reliability test, correlation analysis and regression analysis.

3.9 Summary

The research methodology has been introduced in the chapter. The research model and research hypotheses are summarized and illustrated in Figure 8.

Figure 8. Research model and research hypotheses of the study



Hypotheses	Preposition
H1	Perceived value has a positive influence on customer's purchase intention towards electric vehicles
H2	Brand image has a positive influence on customer's purchase intention towards electric vehicles
H3	Environmental concern has a positive influence on customer's purchase intention towards electric vehicles
H4	Environmental attitude has a positive influence on customer's purchase intention towards electric vehicles

Sources: Illustrated by writer

The constructs and measurement on purchase intention of electric vehicles of perceived value, brand image, environmental concern and environmental attitude were detailed discussed in this chapter. The measurements in this study were adopted with Likert's seven-point scale targeted to collect 385 effective questionnaires. The questionnaire was created with Google form and was distributed through a snowball via different social media platforms. Finally, SPSS was used as an analytical tool to examine the data.

4. Data analysis

This study is to examine the consumers' purchase intention on electric vehicles in Hong Kong. The identified factors of perceived value, brand image, environmental concern and environmental attitude and the relationship between them toward purchase intention in the context of electric vehicles were discussed and analyzed in the following section.

Based on the above-mentioned research instrument, the collected data were examined with descriptive statistic analysis, reliability analysis, correlation analysis and regression analysis.

4.1 Sample description

The questionnaire was distributed through an online platform due to the epidemic issue. A total of 385 questionnaires were collected, all of them are completed and effectively returned. The effective return rate was 100%.

According to the result of the questionnaire analysis, the male respondents (68.1%) were more than the female respondents (31.9%). Their age was mainly lying between 30 -39 years old (48.6%) and followed by 40 – 49 years old (39%). They were mostly achieved a degree or higher education level (48.1%). It was noted that most of the respondents with monthly personal income between HKD 35,001 - HKD 50,000 (40.8%) and HKD 50,001 - HKD 80,000 (34.5%). The summary of descriptive statistics of respondents' demographic information in this study was illustrated in Table 20 (See Appendix 8 for details).

Table 20. Descriptive statistics of demographic information of this study

Item	Description	Frequency	Percentage	Key statistics in Hong Kong*	Descriptive information
Gender	Male	262	68.1%	47.7%	Most of the interviewers were male
	Female	123	31.9%	52.3%	
Age	Below 20	0	0.0%	16.0%	Age of the interviewers were mainly between 30-39 and 40-49
	20 - 29	6	1.6%	11.5%	
	30 - 39	187	48.6%	14.0%	
	40 - 49	150	39.0%	14.7%	
	50 - 59	40	10.4%	16.4%	
	60 or above	2	0.5%	27.4%	
Education level	Primary or below	2	0.5%	18.3%	Most of the interviewers lies with degrees or above
	Lower secondary	32	8.3%	14.7%	
	Upper secondary	126	32.7%	31.6%	
	Post-secondary	40	10.4%	9.2%	
	Degree or above	185	48.1%	26.3%	
Monthly personal income	Below HKD 20,000	20	5.2%	50.4%	Monthly personal income of the interviewers was mainly between HKD 35,001-HKD 50,000 and HKD 50,001-HKD 80,000
	HKD 20,001-HKD 35,000	49	12.7%	27.8%	
	HKD 35,001-HKD 50,000	157	40.8%	9.0%	
	HKD 50,001-HKD 80,000	133	34.5%	8.1%	
	HKD 80,001 or above	26	6.8%	4.7%	

Sources: Illustrated by writer and *Census and Statistics Department (2021)

4.2 Descriptive statistic analysis

Descriptive statistic analysis was applied to compile all the collected information by identifying the relationship between variables and population. The data were analyzed with mean and standard deviation. Highest value of mean and standard deviation demonstrated a significant result. Descriptive statistic analysis of perceived value, brand image, environmental concern, environmental attitude and purchase intention will be discussed in this section.

4.2.1 Perceived value

The constructs of perceived value in this study included product quality, service quality, price and innovation. The descriptive static analysis was performed in each of its constructs and its items.

On product quality, each item in this construct possessed a mean ranging from 5.18 to 5.30 with a standard deviation ranging from 1.032 to 1.15 as shown in Table 21 (see Appendix 9-1 for details).

Table 21. Descriptive statistic of product quality

Item	Question	Mean	Standard Deviation
PVQ 1	I think electric vehicles are worth buying as their batteries will last for around 10-20 years on average.	5.18	1.142
PVQ 2	I think electric vehicles meet my expectation of their functionality.	5.20	1.150
PVQ 3	I think electric vehicles are more comfortable as they are stable in performance.	5.30	1.032
The average value of mean on product quality		5.23	

Sources: Illustrated by writer

The average value of the mean on product quality is 5.23. PVQ3 had a mean of 5.3 and standard deviation of 1.032 which is the highest value among the others and it was above the average value of mean on product quality. This indicated most of the respondents agreed electric vehicles are more comfortable as they are stable in performance.

For service quality, each item in this construct possessed a mean ranging from 4.88 to 5.30 with a standard deviation ranging from 0.842 to 1.296 as shown in Table 22 (see Appendix 9-2 for details).

Table 22. Descriptive statistic of service quality

Item	Question	Mean	Standard Deviation
PVS1	I think electric vehicles can provide better after-sales service	4.88	1.296
PVS2	I think the sales staffs of electric vehicles are knowledgeable.	4.96	1.183
PVS3	I think the technicians of electric vehicles are knowledgeable.	5.30	0.842
The average value of mean on service quality		5.05	

Sources: Illustrated by writer

The average value of the mean on service quality is 5.05. PVS3 had a mean of 5.30 and standard deviation of 0.842 which is the highest value among the others and it was above the average value of mean on service quality. This indicated most of the respondents believed technicians of electric vehicles are knowledgeable for performing the after-sales service.

Looking into the construct of price, each item in this construct possessed a mean

ranging from 5.16 to 5.36 with a standard deviation ranging from 1.093 to 1.121 as shown in Table 23 (see Appendix 9-3 for details).

Table 23. Descriptive statistic of price

Item	Question	Mean	Standard Deviation
PVP1	I think electric vehicles are more economical than petrol cars as electricity costs are generally lower.	5.36	1.093
PVP2	I think the maintenance costs on electric vehicles are relatively reasonable as they do not have to change the engine oil, coolant, and transmission fluid.	5.16	1.235
PVP3	I think the running cost of electric vehicles is relatively low.	5.31	1.121
The average value of mean on price		5.28	

Sources: Illustrated by writer

The average value of the mean on price is 5.28. PVP3 and PVP1 had a mean of 5.36 and 5.31 respectively which both of them were higher than the average value of mean on price. However, PVP1 (mean = 5.36, standard deviation = 1.093) showed the highest value among the others. This indicated most of the respondents agreed electric vehicles are more economical than petrol cars as electricity costs are generally lower.

Finally, on innovation, each item in this construct possessed a mean ranging from 5.28 to 5.63 with a standard deviation ranging from 1.032 to 1.131 as shown in Table 24 (see Appendix 9-4 for details).

Table 24. Descriptive statistic of innovation

Item	Question	Mean	Standard Deviation
PVI1	I think electric vehicles is an innovative product.	5.63	1.051
PVI2	I think the new technology of electric vehicles meets my expectation.	5.38	1.032
PVI3	I think the innovations of electric vehicles fulfil the requirement of my driving needs.	5.28	1.131
The average value of mean on innovation		5.43	

Sources: Illustrated by writer

The average value of the mean on innovation is 5.43. PVI1 had a mean of 5.63 with standard deviation of 1.051 which is the highest value among the others and it was above the average value of mean on innovation. This indicated most of the respondents agreed electric vehicles is an innovative product.

4.2.2 Brand image

The constructs of brand image in this study included functional, symbolic and experiential. The descriptive static analysis was performed in each of its constructs and its items.

On functional, each item in this construct possessed a mean ranging from 5.73 to 5.79 with a standard deviation ranging from 0.841 to 0.971 as shown in Table 25 (see Appendix 10-1 for details).

Table 25. Descriptive statistic of functional

Item	Question	Mean	Standard Deviation
BIF1	It is important that the design of electric vehicles is trendy and attractive.	5.73	0.841
BIF2	It is important to have various brands and models of electric vehicles for people to choose from.	5.78	0.865
BIF3	It is important for electric vehicles to have a stable driving performance	5.79	0.971
The average value of mean on functional		5.77	

Sources: Illustrated by writer

The average value of the mean on functional is 5.77. BIF2 and BIF3 had a mean of 5.78 and 5.79 respectively which both of them were higher than the average value of mean on functional. However, BIF3 (mean = 5.79, standard deviation = 0.971) showed the highest value among the others. This indicated most of the respondents agreed having a stable driving performance is important for electric vehicles on its functionality.

For symbolic, each item in this construct possessed a mean ranging from 4.89 to 5.88 with a standard deviation ranging from 0.91 to 1.427 as shown in Table 26 (see Appendix 10-2 for details).

Table 26. Descriptive statistic of symbolic

Item	Question	Mean	Standard Deviation
BIS1	Driving an electric vehicle is the new market trend.	5.88	0.91
BIS2	The image of driving an electric vehicle makes a good impression on other people.	5.15	1.354
BIS3	Driving an electric vehicle can reflect social status.	4.89	1.427
The average value of mean on symbolic		5.31	

Sources: Illustrated by writer

The average value of the mean on symbolic is 5.31. BIS1 had a mean of 5.88 and standard deviation of 0.91 which is the highest value among the others and it was above the average value of mean on symbolic. This indicated most of the respondents agreed driving an electric vehicle is the new market trend.

Finally, on experiential, each item in this construct possessed a mean ranging from 5.14 to 5.84 with a standard deviation ranging from 0.959 to 1.183 as shown in Table 27 (see Appendix 10-3 for details).

Table 27. Descriptive statistic of experiential

Item	Question	Mean	Standard Deviation
BIE1	Electric vehicles can experience new technologies.	5.84	0.959
BIE2	Driving electric vehicles is unique and feel refreshed.	5.14	1.157
BIE3	Driving electric vehicles would feel relaxed as it has less engine noise.	5.54	1.183
The average value of mean on experiential		5.50	

Sources: Illustrated by writer

The average value of the mean on experiential is 5.50. BIE1 and BIE3 had a mean of 5.84 and 5.54 respectively which both of them were higher than the average value of mean on experiential. However, BIE1 (mean = 5.84, standard deviation = 0.959) showed the highest value among the others. This indicated most of the respondents agreed driving electric vehicles can experience new technologies.

4.2.3 Environmental concern

The descriptive static analysis was performed on environmental concern. Each item in this variable possessed a mean ranging from 5.55 to 6.03 with a standard deviation ranging from 0.809 to 1.243 as shown in Table 28 (see Appendix 11 for details).

Table 28. Descriptive statistic of environmental concern

Item	Question	Mean	Standard Deviation
EC1	I worry about global warming.	5.75	1.243
EC2	The air pollution will affect my living quality.	6.03	0.809
EC3	I would give up something to guard the environment.	5.64	1.036
EC4	My activities and actions will affect the entire environment.	5.55	1.108
The average value of mean on environmental concern		5.74	

Sources: Illustrated by writer

The average value of the mean on environmental concern is 5.74. EC1 and EC2 had a mean of 5.75 and 6.03 respectively which both of them were higher than the average value of mean on environmental concern. However, EC2 (mean = 6.03, standard deviation = 0.809) showed the highest value among the others. This indicated most of the respondents were concerned about air pollution may affect their living quality.

4.2.4 Environmental attitude

The descriptive static analysis was performed on environmental attitude. Each item in

this variable possessed a mean ranging from 5.62 to 5.69 with a standard deviation ranging from 1.003 to 1.113 as shown in Table 29 (see Appendix 12 for details).

Table 29. Descriptive statistic of environmental attitude

Item	Question	Mean	Standard Deviation
EA1	I think the adoption of electric vehicles can promote a sustainable transportation system.	5.69	1.003
EA2	I think the electric vehicle is an eco-friendly product and it has a positive impact on the environment and society.	5.67	1.113
EA3	It is a social trend of being eco-friendly for the adoption of electric vehicles.	5.62	1.085
The average value of mean on environmental attitude		5.66	

Sources: Illustrated by writer

The average value of the mean on environmental attitude is 5.66. EA1 and EA2 had a mean of 5.69 and 5.67 respectively which both of them were higher than the average value of mean on environmental attitude. However, EA1 (mean = 5.69, standard deviation = 1.003) showed the highest value among the others. This indicated most of the respondents agreed the adoption of electric vehicles can promote a sustainable transportation system.

4.2.5 Purchase intention

The descriptive static analysis was performed on purchase intention. Each item in this variable possessed a mean ranging from 4.68 to 5.31 with a standard deviation ranging from 1.379 to 1.459 as shown in Table 30 (see Appendix 13 for details).

Table 30. Descriptive statistic of purchase intention

Item	Question	Mean	Standard Deviation
PI1	I am willing to have an electric vehicle.	5.31	1.379
PI2	I will recommend electric vehicles to friends or family members.	5.17	1.412
PI3	I will intend to purchase an electric vehicle regardless of the price changes.	4.68	1.459
The average value of mean on purchase intention		5.05	

Sources: Illustrated by writer

The average value of the mean on purchase intention is 5.05. PI1 and PI2 had a mean of 5.31 and 5.17 respectively which both of them were higher than the average value of mean on purchase intention. However, PI1 (mean = 5.31, standard deviation = 1.379) showed the highest value among the others. This indicated most of the respondents are willing to have an electric vehicle.

4.2.6 Concluding summary

The result revealed that the respondents agreed with the questions in general and every study variable had different responses from the respondents with the existence of acceptable variability within the responses.

4.3 Reliability analysis

Reliability analysis is aimed to evaluate the internal consistency of the variables. As mentioned in previous chapter, we applied for Taber (2018)'s review of Cronbach's alpha, it should reach 0.70 to have an acceptable level of self-consistency.

In this section, the reliability test was performed on each of the variables including perceived value, brand image, environmental concern, environmental attitude and purchase intention on electric vehicles. Cronbach's alpha was computed with SPSS for testing the reliability of its variables and constructs. Table 32 illustrated the Cronbach's alpha value of study constructs and variables on electric vehicles (see Appendix 14-18 for the detailed result of the reliability test). The alpha value calculated is greater than 0.7, hence, this indicates the items showed satisfactory reliability with an acceptable level of self-consistency.

Table 31. Summary of the reliability analysis of the study constructs and variables on electric vehicles

Constructs/ Variables	Cronbach's Alpha
Perceived value	
Product quality	0.794
Service quality	0.847
Price	0.836
Innovation	0.867
Brand image	
Functional	0.796
Symbolic	0.816
Experiential	0.848
Environmental concern	0.879
Environmental attitude	0.869
Purchase intention	0.909

Sources: Illustrated by writer

4.4 Correlation analysis

Correlation analysis was applied to study the linear relationship between two

variables. This study adopted Pearson's correlation coefficient analysis to examine the relationship among the variables of perceived value, brand image, environmental concern, environmental attitude and purchase intention on electric vehicles.

Table 32 revealed the Pearson's correlation coefficient of variables in this study on electric vehicles including perceived value, brand image, environmental concern, environmental attitude and purchase intention. In this study, it was founded that there is a positive relationship between perceived value, brand image, environmental concern and environmental attitude towards purchase intention. Perceived value, brand image and environmental concern expressed a largely positive relationship on purchase intention with r scored 0.853, 0.824, 0.702 respectively while environmental attitude has a moderate positive relationship on purchase intention as $r = 0.692$. The p-value quoted under Sig. (2-tailed) is reported as ' $p < .001$ ' which is less than 0.05 (See Appendix 19).

Table 32. Pearson's correlation coefficient of variables in this study on electric vehicles

	Perceived value	Brand image	Environmental concern	Environmental attitude	Purchase intention
Perceived value	1				
Brand image	0.893**	1			
Environmental concern	0.641**	0.701**	1		
Environmental attitude	0.787**	0.851**	0.568**	1	
Purchase intention	0.853**	0.824**	0.702**	0.692**	1

Remarks: ** Correlation is significant at the 0.01 level (2-tailed) with a sample size of 385

Sources: Illustrated by writer

Hence, the variables perceived value, brand image, environmental concern, environmental attitude and purchase intention were significantly and positively correlated $r > 0.692$, $N = 385$, $p < .001$.

4.5 Regression analysis

Regression analysis was applied to study the relationship between multiple variables. This study applied linear regression to investigate the linear relationship among the variables toward purchase intention of electric vehicles. In the following section, 385 sample sizes were analyzed and examined, the detailed result of the regression analysis on perceived value, brand image, environmental concern and environmental attitude on purchase intention of electric vehicles was revealed.

4.5.1 Perceived value and purchase intention

Regression analysis on perceived value and purchase intention on electric vehicles was analyzed as shown in Table 33 (see Appendix 20 for details). R squared is 0.728 which indicates there was 72.8% variance in the purchase intention that is explained by a linear model. F value is 1023.248 with a p-value is less than 0.05 revealed the regression model is significant. The standardized beta coefficients is 0.853 (with t-value = 31.988 and p-value < 0.001). This demonstrated the linear relationship of perceived value and purchase intention on electric vehicles. Perceived value was found to positively influence purchase intention.

Table 33. Regression analysis on perceived value and purchase intention on electric vehicles

Model summary		ANOVA		Coefficients		
R square	Adjusted R square	F value	Significant	Standardized coefficients Beta value	t value	Significant t
0.728	0.727	1023.248	<0.001	0.853	31.988	<0.001

Sources: Illustrated by writer

Hence, this supported the hypothesis, H1, perceived value has a positive influence on consumers' purchase intention towards electric vehicles.

4.5.2 Brand image and purchase intention

Table 34 revealed the regression analysis on brand image and purchase intention on electric vehicles (see Appendix 21 for details). R squared is 0.679 which indicate there was 67.9% variance in the purchase intention that is explained by a linear model. F value is 809.369 with p-value is less than 0.05 revealed the regression model is significant. The standardized beta coefficients is 0.824 (with t-value = 28.449 and p-value < 0.001). This indicated the linear relationship of brand image and purchase intention on electric vehicles. Thus, it was evidenced that brand image was positively influenced purchase intention.

Table 34. Regression analysis on brand image and purchase intention on electric vehicles

Model summary		ANOVA		Coefficients		
R square	Adjusted R square	F value	Significant	Standardized coefficients Beta value	t value	Significant
0.679	0.678	809.369	<0.001	0.824	28.449	<0.001

Sources: Illustrated by writer

This supported the hypothesis, H2, brand image value has a positive influence on consumers' purchase intention towards electric vehicles.

4.5.3 Environmental concern and purchase intention

Regression analysis on environmental concern and purchase intention on electric vehicles was studied and shown in Table 35 (see Appendix 22 for details). R squared is 0.492 which indicate there was 49.2% variance in the purchase intention that is explained by a linear model. F value is 371.48 with p-value is less than 0.05 evidenced that the regression model is significant. The standardized beta coefficients is 0.702 (with t-value = 19.274 and p-value < 0.001). The relationship of environmental concern and purchase intention on electric vehicles was illustrated. In consequence, environmental concern was found to positively influence purchase intention.

Table 35. Regression analysis on environmental concern and purchase intention on electric vehicles

Model summary		ANOVA		Coefficients		
R square	Adjusted R square	F value	Significant	Standardized coefficients Beta value	t value	Significant
0.492	0.491	371.48	<0.001	0.702	19.274	<0.001

Sources: Illustrated by writer

Accordingly, this supported the hypothesis, H3, environmental concern has a positive influence on consumers' purchase intention towards electric vehicles.

4.5.4 Environmental attitude and purchase intention

Regression analysis on environmental attitude and purchase intention on electric vehicles was deliberated and exhibited in Table 36 (see Appendix 23 for details). R squared is 0.479 which indicate there was 47.9% variance in the purchase intention that is explained by a linear model. F value is 351.785 with p-value is less than 0.05 revealed the regression model is significant. The standardized beta coefficients is 0.692 (with t-value = 18.756 and p-value < 0.001). This displayed the linear relationship of environmental attitude and purchase intention on electric vehicles. Therefore, the environmental attitude was positively influenced purchase intention.

Table 36. Regression analysis on environmental attitude and purchase intention on electric vehicles

Model summary		ANOVA		Coefficients		
R square	Adjusted R square	F value	Significant	Standardized coefficients Beta value	t value	Significant
0.479	0.477	351.785	<0.001	0.692	18.756	<0.001

Sources: Illustrated by writer

Consequently, this supported the proposed hypothesis, H4, environmental attitude has a positive influence on consumers' purchase intention towards electric vehicles.

4.5.5 Concluding summary

The result revealed that the independent variables of perceived value, brand image, environmental concern and environmental attitude can be explained by a linear model as supported by the R squared. The ANOVA table demonstrated that the regression model of each independent variable was significant. Finally, the coefficient table exemplified that all independent variables had a positive relationship with purchase intention. A summary of the result was shown in Table 37. Hence, it was concluded that perceived value, brand image, environmental concern and environmental attitude had a positive influence on consumers' purchase intention towards electric vehicles.

Table 37. Summary of the regression analysis of the study variables on electric vehicles

	Model summary	ANOVA		Coefficients	
Independent variables	R square	F value	Significant	Standardized coefficients Beta value	Significant
Perceived value	0.728	1023.248	<0.001	0.853	<0.001
Brand image	0.679	809.369	<0.001	0.824	<0.001
Environmental concern	0.492	371.48	<0.001	0.702	<0.001
Environmental attitude	0.479	351.785	<0.001	0.692	<0.001

Sources: Illustrated by writer

4.6 Summary

In this chapter, collected data from the questionnaire on consumers' purchase intention on electric vehicles in Hong Kong was deliberated. 385 sample data were analyzed with SPSS. Descriptive statistic analysis, reliability analysis, correlation analysis and regression analysis were performed. The results of each of the analyses was summarized in Table 38.

Table 38. Summary of the analytic result of the study on purchase intention on electric vehicles

Type of Analysis	Result summary
Descriptive statistic analysis	It revealed that the respondents in generally agreed that perceived value, brand image, environmental concern and environmental attitude have influence on the purchase intention on electric vehicles in Hong Kong.
Reliability analysis	Cronbach's alpha of perceived value, brand image, environmental concern, environmental attitude and purchase intention on electric vehicles is greater than 0.7 which demonstrated the result showed satisfactory reliability with an acceptable level of self-consistency
Correlation analysis	The result of Pearson's correlation coefficient illustrated perceived value, brand image, environmental concern, environmental attitude on purchase intention were significantly and positively correlated
Regression analysis	The regression models of perceived value, brand image, environmental concern, environmental attitude on purchase intention were significant and they exemplified a positive relationship on purchase intention

Sources: Illustrated by writer

The result supported the proposed hypotheses of this study and evidenced perceived value, brand image, environmental concern and environmental attitude had a positive influence on consumers' purchase intention towards electric vehicles.

5. Discussion

Previous studies were are mainly target green attitude and behavior, subjective personal feeling on perceived value, personal innovativeness and government support. The objective of this current research is to investigate the perceived value, brand image, environmental attitude and environmental concern and the relationship between them toward purchase intention in the context of electric vehicles. This study covered the subjective personal feeling on perceived value, brand image, environmental attitude and environmental concern to examine the purchase intention of electric vehicles in Hong Kong.

In the following section, the finding of this study, managerial implications, limitation and recommendations of this research were discussed and explained.

5.1 Research implication

In this study, four hypotheses on the purchase intention on electric vehicles were proposed based on the identical factors of perceived value, brand image, environmental concern and environmental attitude. Analytical analysis has been performed and discussed in the previous chapter, it evidenced that the proposed hypotheses were valid. The result of the hypotheses of this research model was summarized in Table 39.

Table 39. Hypotheses result of the research model

Hypothesis	R square	F value	Significant	Standardized coefficients Beta value	Significant	Result
H1	0.728	1023.248	<0.001	0.853	<0.001	Valid
H2	0.679	809.369	<0.001	0.824	<0.001	Valid
H3	0.492	371.48	<0.001	0.702	<0.001	Valid
H4	0.479	351.785	<0.001	0.692	<0.001	Valid

Hypotheses	Preposition
H1	Perceived value has a positive influence on customer's purchase intention towards electric vehicles
H2	Brand image has a positive influence on customer's purchase intention towards electric vehicles
H3	Environmental concern has a positive influence on customer's purchase intention towards electric vehicles
H4	Environmental attitude has a positive influence on customer's purchase intention towards electric vehicles

Sources: Illustrated by writer

The results of this study are consistent with the previous finding and reviews. The research model in this study suggested perceived value, brand image, environmental concern and environmental attitude had significant influence on purchase intention.

Perceived value has a positive relationship on purchase intention (Dodds et al.,1991; Grewal et al.,1998; Sweeney et al.,1999; Beneke and Carter,2015; Wang, 2015).

Based on the study of Fredericks and Salter (1995), we evidenced the hypothesis 1 is valid and perceived value has a positive influence on consumers' purchase intention towards electric vehicles.

It was found out a positive brand image has a significant influential on purchase intention (Park et al., 1986; Dobni and Zinkhan,1990; Wu et al., 2011; Wang and Tsai, 2014; Agmeka, 2019; Haro et al., 2020). Supporting with Park et al. (1986), our study concurred to the hypothesis and revealed brand image has a positive influence on consumers' purchase intention.

Environmental concern was evidenced to be closely linked with attitude and consumer purchase decisions (Crosby et al., 1981; Zimmer et al., 1994; Ottman, 1998; Alwitt and Pitts, 1996; Choi and Kim, 2005; Newton et al., 2015; Maichum et al., 2017; Trivedi et al., 2018). The result of our finding support to Schuhwerk and Lefkoff-Hagius's study in 1995 that environmental concern has a positive influence on consumers' purchase intention on electric vehicles.

Consumers with favorable environmental attitudes are significantly related to their green purchase intention (Kalafatis, et al., 1999; Baker and Ozaki, 2008; Gupta and Ogden, 2009; Chan, 2001; Carley et al., 2013; and Krupa et al., 2014). In reference to Ma et al. (2018), it was revealed that environmental attitude has a direct influence on environmental behavior. It was believed the adoption of electric vehicles by consumers is also related to their level of concern on the environmental issue. Our hypothesis and finding on environmental attitude on purchase intention was compatible to previous studies.

As mentioned above, our finding focusing on purchase intention of electric vehicles were complementary to the result of previous research, hence, it was concluded that perceived value, brand image, environmental concern and environmental attitude had significant influence on purchase intention of electric vehicles in Hong Kong

Kaufmann et al. (2012) claimed the idea of altruism and collectivism may also affect the pro-environmental behavior towards the purchase intention of green products. Chen and Zhang (2021) stated demographic factors might affect the association between the environmental concern and purchase intention. Therefore, this might be

one of the reasons that our sample data showed a less sensitivity on environmental concern and environmental attitude toward the purchase intention on electric vehicles. Various previous reviews conducted to investigate the demographic factors on environmental concern and attitude toward green purchasing behavior. It was noted that environmental conscious consumers were female, professional and younger (Harris et al., 2000). Further studies study found there were stronger positive relationship between environmental concern and attitude toward green product adoption for females than males (Leonidou et al., 2010; Hwang and Choi, 2018). In our study, most of the respondents were male with around 68.1%. There might be a positive indirect effect from environmental concern on their purchase intention for an electric vehicle. Hence, due to the moderating effect of gender, the sensitivity of environmental concern and environmental attitude on purchase intention of electric vehicles is lesser when compared with perceived value and brand image.

Environmental concern is closely linked with attitude and consumer purchase decision (Crosby et al., 1981; Zimmer et al., 1994; Ottman, 1998; Alwitt and Pitts, 1996; Choi and Kim, 2005; Newton et al., 2015; Maichum et al., 2017; Trivedi et al., 2018).

Level of concern on environmental issues might affect the association of environmental attitude on purchase intention. This might be the reasons of our finding that the environmental attitude towards the purchase intention on electric vehicles exemplified the weakest relationship among the variables.

In reference to the Pearson's correlation coefficient, both perceived value and brand image demonstrated strong positive relationship toward purchase intention on electric vehicles. Price and innovation of perceived value and experiential of brand image

demonstrated the most significant relationship on purchase intention of electric vehicles under its constructs.

5.2 Managerial implication

The findings of this study have various implication for marketing strategic planning to regards as motivation for consumers' adoption of electric vehicles. this can be done through the investigated variables of perceived value, brand image, environmental concern and environmental attitude. It may be summarized that the environmental concern and attitude towards purchase intention is complex and controversial, there might be moderating effects on the adoption of electric vehicles. From the perspective of marketing and in the view of the findings in this study, there may be value in integrating the variables and moderating factors for enhancing the purchase intention within the promotional strategy for encouraging the purchase intention.

Based on the results of the finding, it indicated that consumers reacted to the price, innovation and experience on new technologies in their responses towards purchase intention on electric vehicles. Hence, the perception of economic benefits and the technological innovation for the adoption of electric vehicles have a strong impact on its purchase intention. This shows the consumers recognize the advantages of using electric vehicles as regards economic efficiency which included low running costs and the new technologies introduced in electric vehicles. Recent years high oil prices depress the demand and technological innovations enhance charging experience, these are likely to boost the sales on electric vehicles (Smith, 2019; Krauss, 2022). The automotive companies should ride on this demanding and focus to promote their branding and products. Adding resources in the product development department for

inventing innovative charging infrastructure and car battery to enhance the driving experience. With a positive brand image and these economic benefits can help to increase the awareness among the consumers for the adoption of electric vehicles and attract them to replace the existing conventional vehicles to electric vehicles.

Consumers who expressed interest in the study were mainly males with high educated background, hence, the company can target on this segment as their target client on promotion. Ogilvy, Google and TNS found out 74% of consumers believed word of mouth is the critical influencer as their purchase decision and Nielsen identified 92% of consumers trust recommendations from friends and family (Mahadevan, 2018). This can help to build recognition and trust on the automotive company arouse consumers' interest in their branding and lead to sales. Word-of-mouth advertising through various automotive associations and car owners' clubs can be explored as a way of promotion tactics.

During purchasing, consumers access the overall value of innovative products, especially electric vehicles. The automotive company should also focus on enhancing their technology, servicing point and car battery. Esmaeilpour and Mohseni (2019) claimed consumer experience can induce purchase intention. Through offering free test drives to the potential consumer can help them to understand the functionality of electric vehicles and increase the comfortability of the driving experience. Sharing the free test drivers' experience can further aid to bring up awareness to the public on the company branding.

Parallel to this, positive brand image is important for the company to induce purchase intention. Automotive company can develop corporate social responsibility to build

up the environmental sustainability on brand image. Dodd and Supa (2011) evidenced there is a positive association between the corporate social responsibility and financial performance of the company. Social responsibility and endeavors can help to arose the corporate reputation and goodwill (Holmes, 1976). In this study, it was identified that environmental concern and environmental attitude are closely linked and both of them have a positive relationship towards purchase intention of electric vehicles. This shows consumers' concern about environmental like global warming and air pollution eventually have a supportive attitude to eco-friendly electric vehicles and sustainable transportation systems. This favors their response for purchasing electric vehicles. Thus, the automotive company looks to convert environmental concern and environmental attitude into purchase intention would be wise to invest in and build up corporate social responsibility.

Automotive company can drive their business into social issue for sustainable production and operation for emphasizing on environmental production by lowering the energy consumption and clean energy usage. The company can formulate corporate social responsibility strategies, participate to relevant projects and partner with ecofriendly partners to build up their reputation and socially responsible image on their company branding. Issuance of a corporate social responsibility report in accordance to the Global Reporting Initiative standard or sustainability guideline, this can reveal the company's practice and achievements in sustainability which enhances the transparency to the stakeholders, promote the corporate value, establishing a positive socially responsible brand image.

Although this study shows less interest in females in electric vehicles. According to the World Bank Data as shown in Figure 9, it was noted there is an increasing trend for the female population in Hong Kong.

Figure 9. Percentage of female in total population in Hong Kong from 2010 to 2020



Source: The World Bank Data, 2022

Furthermore, UBER noticed the female driver-partners has risen by over 5 times in 2019 with a more gender balance of driver-partners in Hong Kong (Uber Hong Kong, 2020). Considering the increase in female population and also the phenomenon of rising in female drivers, automotive company can explore to expand their client segment to female customers. Female purchase power should not be underestimated, it is growing and become a driving force of spending. Female regard 85% of all purchases and they drive 70-80% of all consumer spending (Matthews, 2019). Previous section also mentioned that there is a stronger positive relationship between environmental concern and attitude toward green product adoption for females (Leonidou et al., 2010; Hwang and Choi, 2018). Automotive company should concentrate specifically on the environmental advantages of electric vehicles and shift them to the female consumers to bring up their awareness and attention. Furthermore, the automotive company can take a bifurcate approach to promoting their brand image

by offering education course on road safety for their female consumers as an additional service. Rely on this to gain trust of female consumers in electric vehicle technology and raise the positive perception on the value of electric vehicles for accelerating the adoption.

Given the carbon dioxide emission and global warming has already bring the awareness of the environmental organizations and the Government, the policies changes of the Government create the business potential of electric vehicles. This research model provides an interface for the automotive company to formulate their marketing strategies to expand the electric vehicles markets and increase purchase intension. The company's strategic planning can be collaborated with the factors affecting consumers' purchase intention on electric vehicles which including perceived value, brand image, environmental concern and environmental attitude.

5.3 Summary

In this chapter, research implication and practical managerial implication have been provided. Based on the research implication, the automotive company can rely on the finding of this study for business strategic planning. Strategic promotion on electric vehicles can be formulated and collaborated with perceived value, brand image, environmental concern and environmental attitude.

6. Conclusion

In conclusion, based on the findings of this study, it was noted that perceived value, brand image, environmental concern and environmental attitude have a positive relationship toward consumers' purchase intention on electric vehicles.

In this new era of the automotive industry and the booming of electric vehicles, automotive companies should implement strategic plans for their business continuity. This study relied on both theoretical and methodological directions to examine consumers' purchase intention on electric vehicles in Hong Kong. The idea of this study contributes to the automotive industry on factors affecting the consumers' intention for purchasing electric vehicles. The evidence in this study emphasizes the positive relationship between perceived value, brand image, environmental concern and environmental attitude on purchase intention of electric vehicles. In this study, the managerial implication has been provided on strategic promotion targeting consumers' economic efficiency, building up a positive brand image by demonstrating corporate social responsibility and exploring the female client segment.

6.1 Research limitation and recommendation

Despite the findings of this study and the market insight provided in the managerial implications, there were some limitations that could be recommended to expand for future studies.

This research study is conducted in Hong Kong via different social media platforms. Due to the limitation on time and resources, the questionnaire was distributed through

a snowball, this may restrict the generalization of result since the interviewers are mostly high educated with high income. 385 survey samples were collected in this study. Wiśniowski, et al. (2020) stated there is problem on achieving accuracy and measuring uncertainty data for non-probability sampling. In order to generalize our findings, a larger population is recommended for a more diversified sample by widening the sample frame across different channels, including live one-on-one interviews, phone interviews, etc, to avoid common source bias and help to increase the representatives of the findings.

Furthermore, the demographic features of the interviewers have not been detailed investigate in this study. The effect of demographics, including gender, education level and monthly personal income, on perceived value, brand image, environmental concern and environmental attitude was not detail exanimated. Future research suggests to add another layer of complexity to further investigate the correlations between the demographic factors and various variables on consumers' purchase intention of electric vehicles.

Finally, the finding of this study is limited to electric vehicles. Future studies on different types of energy saving vehicles, e.g. Hybrid electric vehicles, hydro powered vehicles. This can help the automotive companies to have a better understanding on consumers' demand and perception on purchasing eco-friendly vehicles for their future business planning.

In short, the limitation of generalization and analysis of demographic factors have been highlighted and recommended for future study. In order for business continuity

and strategic development planning of automotive company, a study on consumers' purchase intention should also expand to different types of energy-saving vehicles.

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9. Appendix

Appendix 1. Questionnaire

Section 1. Opening

Purchase Intention of Electric Vehicles in Hong Kong

Hi, we are welcome you to participate in this survey. This questionnaire will be used for the final dissertation. It is related to the study towards consumers' purchase intention on electric vehicles in Hong Kong.

This questionnaire is completely voluntary and anonymous. It should take about 5 minutes; participants may withdraw at any time. Your response will be treated confidentially. Collected data will only be used for the research purpose and it will be disposed of after the completion of the study.

Likert 7-point scale will be adopted in this survey with the response choices ranging from 1 (strongly disagree) to 7 (strongly agree).

Your assistance is greatly appreciated, thank you for your time and participation!

Appendix 1. Questionnaire (Continued)

Section 2.

Part A. Questions

Item	Question
PVQ1	I think electric vehicles are worth buying as their batteries will last for around 10-20 years on average.
PVQ2	I think electric vehicles meet my expectation of their functionality.
PVQ3	I think electric vehicles are more comfortable as they are stable in performance.
PVS1	I think electric vehicles can provide better after-sales service
PVS2	I think the sales staffs of electric vehicles are knowledgeable.
PVS3	I think the technicians of electric vehicles are knowledgeable.
PVP1	I think electric vehicles are more economical than petrol cars as electricity costs are generally lower.
PVP2	I think the maintenance costs on electric vehicles are relatively reasonable as they do not have to change the engine oil, coolant, and transmission fluid.
PVP3	I think the running cost of electric vehicles are relatively low.
PVI1	I think electric vehicles is an innovative product.
PVI2	I think the new technology of electric vehicles meets my expectation.
PVI3	I think the innovations of electric vehicles fulfill the requirement of my driving needs.

Sources: Illustrated by writer

Part A. Question (Continued)

Item	Question
BIF1	It is important that the design of electric vehicles is trendy and attractive.
BIF2	It is important to have various brands and models of electric vehicles for people to choose from.
BIF3	It is important for electric vehicles to have a stable driving performance
BIS1	Driving an electric vehicle is the new market trend.
BIS2	The image of driving an electric vehicle makes a good impression on other people.
BIS3	Driving an electric vehicle can reflect social status.
BIE1	Electric vehicles can experience new technologies.
BIE2	Driving electric vehicles is unique and feel refreshed.
BIE3	Driving electric vehicles would feel relaxed as it has less engine noise.
EC1	I worry about global warming.
EC2	The air pollution will affect my living quality.
EC3	I would give up something to guard the environment.
EC4	My activities and actions will affect the entire environment.
EA1	I think adoption of electric vehicles can promote a sustainable transportation system.
EA2	I think the electric vehicle is an eco-friendly product and it has a positive impact on the environment and society.
EA3	It is a social trend of being eco-friendly for the adoption of electric vehicles.
PI1	I am willing to have an electric vehicle.
PI2	I will recommend electric vehicles to friends or family members.
PI3	I will intend to purchase an electric vehicle regardless of the price changes.

Sources: Illustrated by writer

Part B. Demographic information

Item	Deceptive
Gender	Male, Female
Age	Below 20, 20-29, 30-39, 40-49, 50-59, 60 or above
Education level	Primary or below, lower secondary, upper secondary, post-secondary, degree or above
Monthly personal income	Below HKD 20,000, HKD 20,001-HKD 35,000, HKD 35,001-HKD 50,000, HKD 50,001-HKD 80,000, HKD 80,001 or above

Sources: Illustrated by writer

Appendix 2. Profile of focus group participants

Items	Participants (n=30)	Percentage
Gender		
Male	20	67%
Female	10	33%
Grand Total	30	100%
Age		
Below 20	0	0%
20 - 29	0	0%
30 - 39	16	53%
40 - 49	9	30%
50 - 59	5	17%
60 or above	0	0%
Grand Total	30	100%
Education level		
Primary or below	0	0%
Lower secondary	4	13%
Upper secondary	13	43%
Post-secondary	5	17%
Degree or above	8	27%
Grand Total	30	100%
Monthly Income		
Below HKD 20,000	1	3%
HKD 20,001 - HKD 35,000	2	7%
HKD 35,001 - HKD 50,000	16	53%
HKD 50,001 - HKD 80,000	10	33%
HKD 80,001 or above	1	3%
Grand Total	30	100%

Sources: Illustrated by writer

Appendix 3. Reliability statistics of perceived value

Reliability Statistics	
Cronbach's Alpha	N of Items
.956	12

Sources: From this research

Appendix 4. Reliability statistics of brand image

Reliability Statistics	
Cronbach's Alpha	N of Items
.912	9

Sources: From this research

Appendix 5. Reliability statistics of environmental concern

Reliability Statistics	
Cronbach's Alpha	N of Items
.892	4

Sources: From this research

Appendix 6. Reliability statistics of environmental attitude

Reliability Statistics	
Cronbach's Alpha	N of Items
.837	3

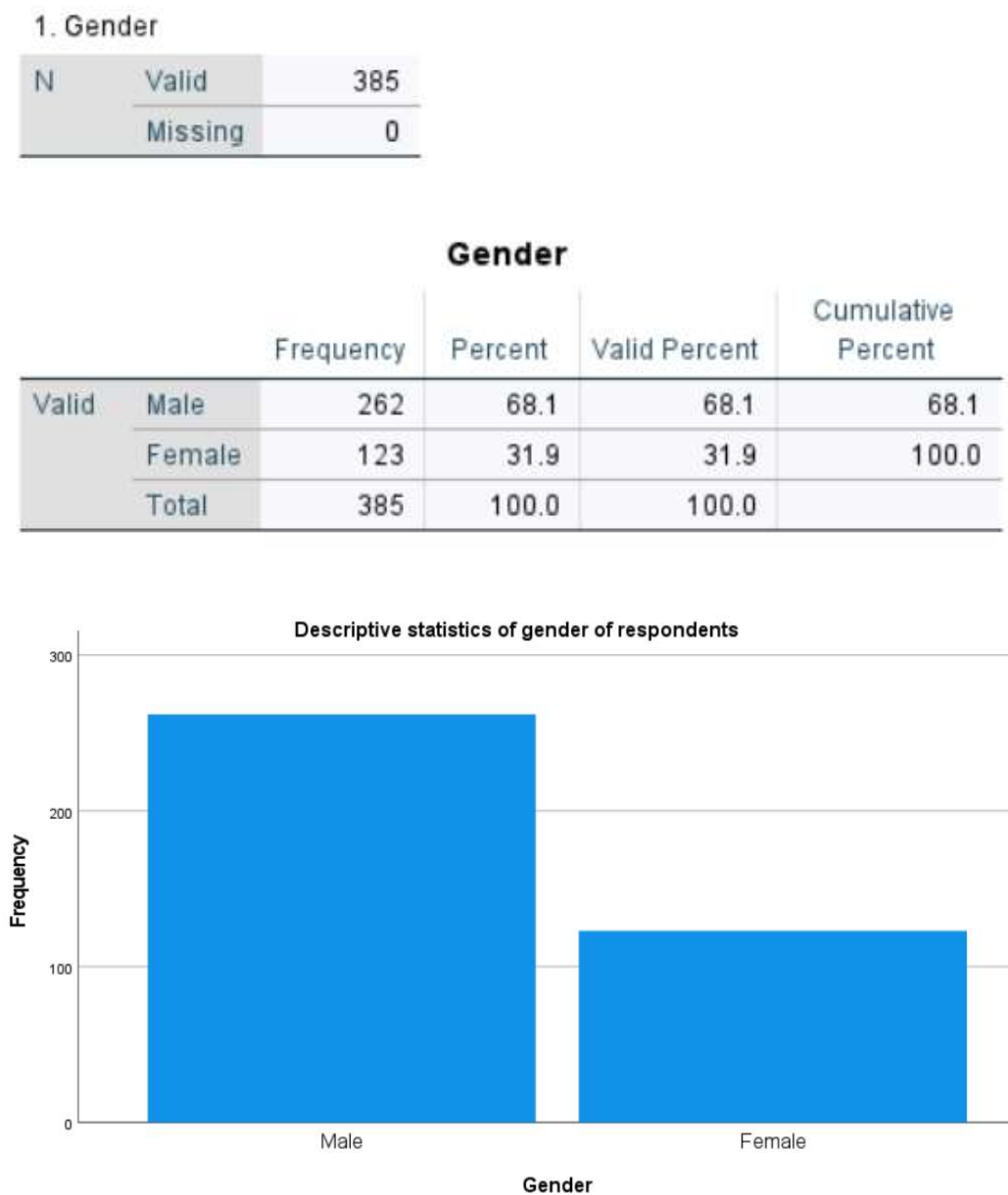
Sources: From this research

Appendix 7. Reliability statistics of purchase intention

Reliability Statistics	
Cronbach's Alpha	N of Items
.932	3

Sources: From this research

Appendix 8. Descriptive statistics of demographic information in this study



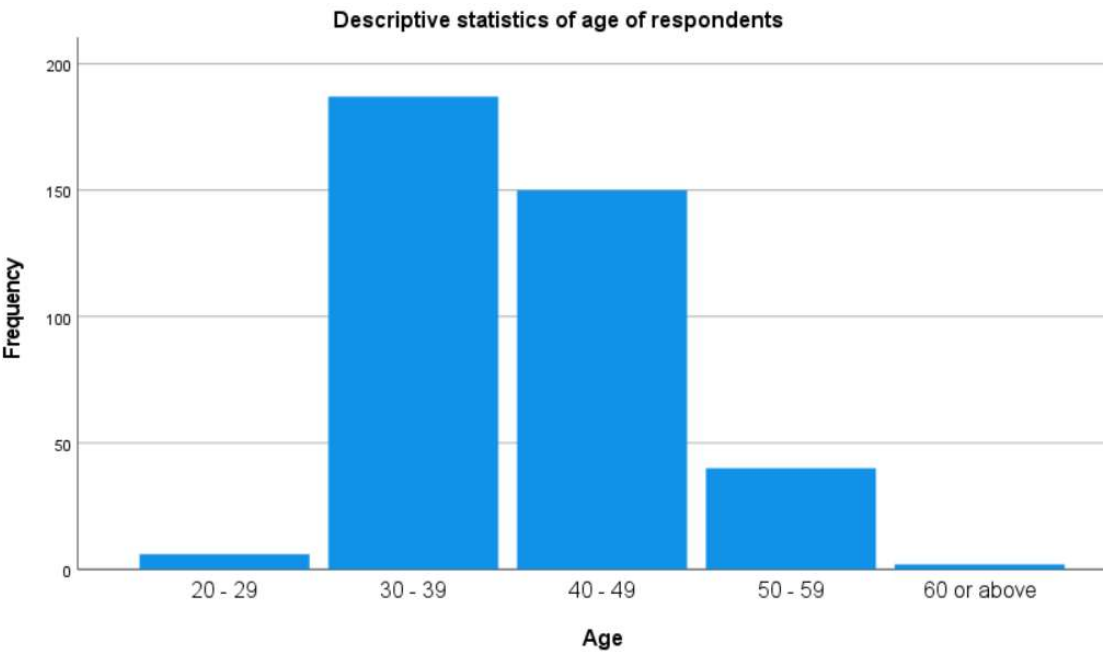
Sources: From this research

Appendix 8. Descriptive statistics of demographic information in this study
(Continued)

2. Age

N	Valid	385
	Missing	0

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 - 29	6	1.6	1.6	1.6
	30 - 39	187	48.6	48.6	50.1
	40 - 49	150	39.0	39.0	89.1
	50 - 59	40	10.4	10.4	99.5
	60 or above	2	.5	.5	100.0
	Total	385	100.0	100.0	



Sources: From this research

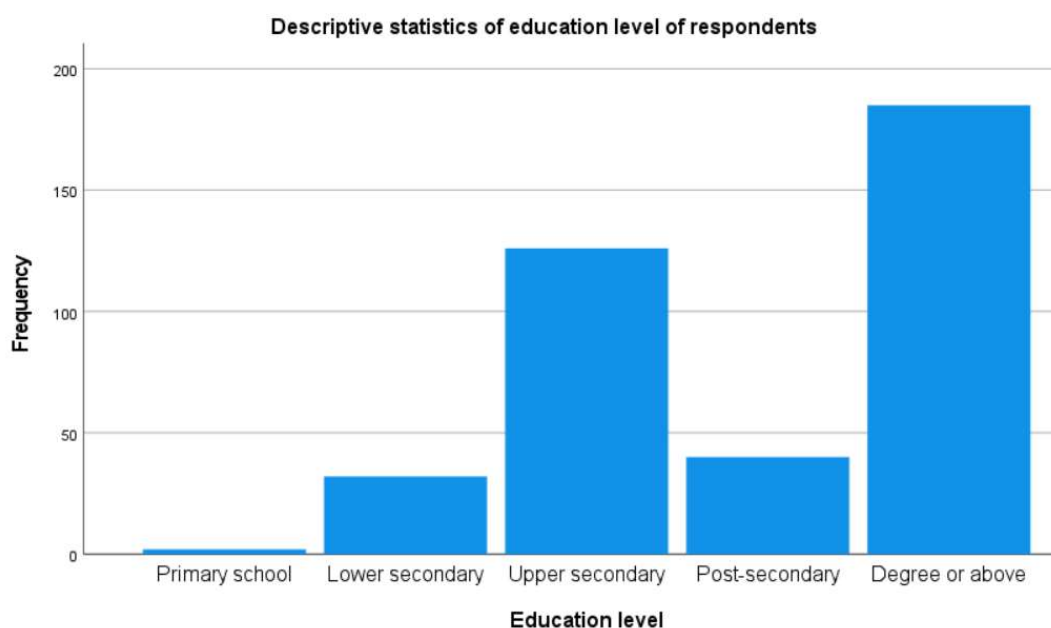
Appendix 8. Descriptive statistics of demographic information in this study
(Continued)

3. Education level

N	Valid	385
	Missing	0

3. Education level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary or below	2	.5	.5	.5
	Lower secondary	32	8.3	8.3	8.8
	Upper secondary	126	32.7	32.7	41.6
	Post-secondary	40	10.4	10.4	51.9
	Degree or above	185	48.1	48.1	100.0
	Total	385	100.0	100.0	



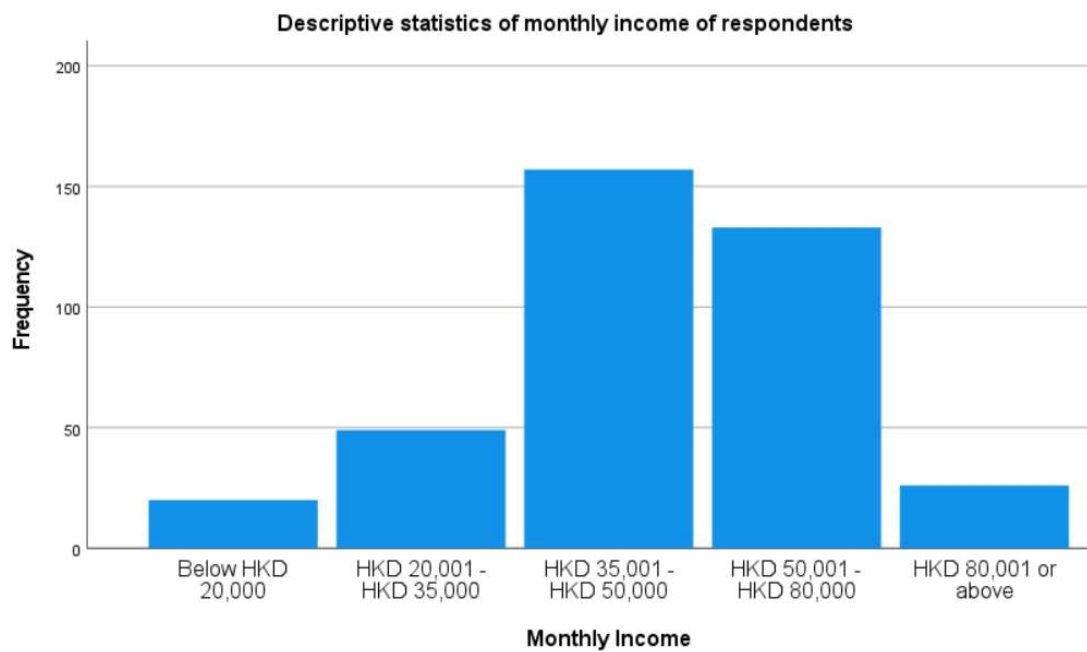
Sources: From this research

Appendix 8. Descriptive statistics of demographic information in this study
(Continued)

4. Monthly Income

N	Valid	385
	Missing	0

		Monthly Income			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below HKD 20,000	20	5.2	5.2	5.2
	HKD 20,001 - HKD 35,000	49	12.7	12.7	17.9
	HKD 35,001 - HKD 50,000	157	40.8	40.8	58.7
	HKD 50,001 - HKD 80,000	133	34.5	34.5	93.2
	HKD 80,001 or above	26	6.8	6.8	100.0
	Total	385	100.0	100.0	



Sources: From this research

Appendix 9. Descriptive statistic analysis of different constructs of perceived value

1. Product quality

	N	Minimum	Maximum	Mean	Std. Deviation
PVQ 1. I think electric vehicle are worth buying as their batteries will last for around 10-20 years on average.	385	2	7	5.18	1.142
PVQ 2. I think electric vehicles meet my expectation of their functionality.	385	2	7	5.20	1.150
PVQ 3. I think electric vehicles are more comfortable as they are stable in performance.	385	3	7	5.30	1.032
Average PVQ	385	3	7	5.23	.933
Valid N (listwise)	385				

Sources: From this research

2. Service quality

	N	Minimum	Maximum	Mean	Std. Deviation
PVS 1. I think electric vehicles can provide better after-sales service	385	1	7	4.88	1.296
PVS 2. I think the sales staffs of electric vehicles are knowledgeable.	385	1	7	4.96	1.183
PVS 3. I think the technicians of electric vehicles are knowledgeable.	385	4	7	5.30	.842
Average PVS	385	2	7	5.05	.983
Valid N (listwise)	385				

Sources: From this research

3. Price

	N	Minimum	Maximum	Mean	Std. Deviation
PVP 1. I think electric vehicles are economical then petrol cars as electricity costs is generally lower.	385	2	7	5.36	1.093
PVP 2. I think the maintenance costs on electric vehicles are relatively reasonable as they do not have to change the engine oil, coolant, and transmission fluid.	385	1	7	5.16	1.235
PVP 3. I think the running cost of electric vehicles are relatively low.	385	2	7	5.31	1.121
Average PVP	385	3	7	5.28	.999
Valid N (listwise)	385				

Sources: From this research

4. Innovation

	N	Minimum	Maximum	Mean	Std. Deviation
PVI 1. I think electric vehicles is an innovative product.	385	3	7	5.63	1.051
PVI 2. I think the new technology of electric vehicles meets my expectation.	385	3	7	5.38	1.032
PVI 3. I think the innovations of electric vehicles fulfill the requirement of my driving needs.	385	2	7	5.28	1.131
Average PVI	385	3	7	5.43	.953
Valid N (listwise)	385				

Sources: From this research

Appendix 10. Descriptive statistic analysis of different constructs of brand image

1. Functional

	N	Minimum	Maximum	Mean	Std. Deviation
BIF 1. It is important that the design of electric vehicles is trendy and attractive.	385	4	7	5.73	.841
BIF 2. It is important to have various brands and models of electric vehicles for people to choose from.	385	3	7	5.78	.865
BIF 3. It is important for electric vehicles to have a stable driving performance.	385	4	7	5.79	.917
Average BIF	385	4	7	5.77	.737
Valid N (listwise)	385				

Sources: From this research

2. Symbolic

	N	Minimum	Maximum	Mean	Std. Deviation
BIS 1. Driving an electric vehicle is the new market trend.	385	3	7	5.88	.901
BIS 2. The image of driving an electric vehicle makes a good impression on other people.	385	1	7	5.15	1.354
BIS 3. Driving an electric vehicle can reflect the social status.	385	1	7	4.89	1.427
Average BIS	385	2	7	5.31	1.068
Valid N (listwise)	385				

Sources: From this research

Appendix 10. Descriptive statistic analysis of different constructs of brand image
(Continued)

3. Experiential

	N	Minimum	Maximum	Mean	Std. Deviation
BIE 1. Electric vehicles can experience new technologies.	385	3	7	5.84	.956
BIE 2. Driving electric vehicles is unique and feel refresh.	385	2	7	5.14	1.157
BIE 3. Driving electric vehicles would feel relaxed as it has less engine noise.	385	1	7	5.54	1.183
Average BIE	385	2	7	5.50	.966
Valid N (listwise)	385				

Sources: From this research

Appendix 11. Descriptive statistic analysis of environmental concern

	N	Minimum	Maximum	Mean	Std. Deviation
EC 1. I worry about global warming.	385	1	7	5.75	1.243
EC 2. The air pollution will affect my living quality.	385	4	7	6.03	.809
EC 3. I would give up something to guard the environment.	385	3	7	5.64	1.036
EC 4. My activities and actions will affect the entire environment.	385	3	7	5.55	1.108
Average EC	385	3	7	5.74	.909
Valid N (listwise)	385				

Sources: From this research

Appendix 12. Descriptive statistic analysis of environmental attitude

	N	Minimum	Maximum	Mean	Std. Deviation
EA 1. I think adoption of electric vehicles can promote a sustainable transportation system.	385	3	7	5.69	1.003
EA 2. I think the electric vehicle is an eco-friendly product and it has a positive impact on the environment and society.	385	3	7	5.67	1.113
EA 3. It is a social trend of being eco-friendly for the adoption of electric vehicles.	385	3	7	5.62	1.085
Average EA	385	3	7	5.66	.951
Valid N (listwise)	385				

Sources: From this research

Appendix 13. Descriptive statistic analysis of purchase intention

	N	Minimum	Maximum	Mean	Std. Deviation
PI 1. I am willing to have an electric vehicle.	385	1	7	5.31	1.379
PI 2. I will recommend electric vehicles to friends or family members.	385	1	7	5.17	1.412
PI 3. I will intend to purchase an electric vehicle regardless of the price changes.	385	1	7	4.68	1.459
Average PI	385	1	7	5.05	1.303
Valid N (listwise)	385				

Sources: From this research

Appendix 14. Reliability test of the constructs of perceived value

1. Product quality

Reliability Statistics				
Cronbach's Alpha	N of Items			
.794	3			

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PVQ 1. I think electric vehicle are worth buying as their batteries will last for around 10-20 years on average.	10.50	3.834	.604	.754
PVQ 2. I think electric vehicles meet my expectation of their functionality.	10.48	3.875	.583	.778
PVQ 3. I think electric vehicles are more comfortable as they are stable in performance.	10.38	3.820	.732	.625

Sources: From this research

2. Service quality

Reliability Statistics				
Cronbach's Alpha	N of Items			
.847	3			

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PVS 1. I think electric vehicles can provide better after-sales service	10.25	3.482	.731	.789
PVS 2. I think the sales staffs of electric vehicles are knowledgeable.	10.18	3.661	.803	.696
PVS 3. I think the technicians of electric vehicles are knowledgeable.	9.84	5.339	.680	.847

Sources: From this research

3. Price

Reliability Statistics

Cronbach's Alpha	N of Items
.836	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PVP 1. I think electric vehicles are economical then petrol cars as electricity costs is generally lower.	10.47	4.635	.670	.799
PVP 2. I think the maintenance costs on electric vehicles are relatively reasonable as they do not have to change the engine oil, coolant, and transmission fluid.	10.67	3.887	.733	.739
PVP 3. I think the running cost of electric vehicles are relatively low.	10.52	4.438	.696	.774

Sources: From this research

4. Innovation

Reliability Statistics

Cronbach's Alpha	N of Items
.867	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PVI 1. I think electric vehicles is an innovative product.	10.65	4.013	.725	.833
PVI 2. I think the new technology of electric vehicles meets my expectation.	10.90	3.915	.781	.783
PVI 3. I think the innovations of electric vehicles fulfill the requirement of my driving needs.	11.01	3.685	.738	.823

Sources: From this research

Appendix 15. Reliability test of the constructs of brand image

1. Functional

Reliability Statistics

Cronbach's Alpha	N of Items
.796	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
BIF 1. It is important that the design of electric vehicles is trendy and attractive.	11.58	2.625	.573	.790
BIF 2. It is important to have various brands and models of electric vehicles for people to choose from.	11.53	2.333	.686	.674
BIF 3. It is important for electric vehicles to have a stable driving performance.	11.52	2.230	.665	.695

Sources: From this research

2. Symbolic

Reliability Statistics

Cronbach's Alpha	N of Items
.816	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
BIS 1. Driving an electric vehicle is the new market trend.	10.04	6.858	.552	.871
BIS 2. The image of driving an electric vehicle makes a good impression on other people.	10.76	4.056	.804	.595
BIS 3. Driving an electric vehicle can reflect the social status.	11.03	4.043	.731	.691

Sources: From this research

3. Experiential

Reliability Statistics

Cronbach's Alpha	N of Items
.848	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
BIE 1. Electric vehicles can experience new technologies.	10.68	4.798	.643	.859
BIE 2. Driving electric vehicles is unique and feel refresh.	11.37	3.542	.809	.694
BIE 3. Driving electric vehicles would feel relaxed as it has less engine noise.	10.97	3.713	.721	.787

Sources: From this research

Appendix 16. Reliability test of the constructs of environmental concern

Reliability Statistics

Cronbach's Alpha	N of Items
.879	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
EC 1. I worry about global warming.	17.22	6.468	.824	.814
EC 2. The air pollution will affect my living quality.	16.93	9.532	.607	.895
EC 3. I would give up something to guard the environment.	17.32	7.281	.870	.794
EC 4. My activities and actions will affect the entire environment.	17.42	7.666	.706	.859

Sources: From this research

Appendix 17. Reliability test of the constructs of environmental attitude

Reliability Statistics

Cronbach's Alpha	N of Items
.869	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
EA 1. I think adoption of electric vehicles can promote a sustainable transportation system.	11.29	4.035	.767	.802
EA 2. I think the electric vehicle is an eco-friendly product and it has a positive impact on the environment and society.	11.31	3.814	.709	.854
EA 3. It is a social trend of being eco-friendly for the adoption of electric vehicles.	11.36	3.709	.777	.789

Sources: From this research

Appendix 18. Reliability test of the constructs of purchase intention

Reliability Statistics

Cronbach's Alpha	N of Items
.909	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PI 1. I am willing to have an electric vehicle.	9.85	7.333	.810	.876
PI 2. I will recommend electric vehicles to friends or family members.	9.99	6.607	.922	.779
PI 3. I will intend to purchase an electric vehicle regardless of the price changes.	10.48	7.375	.730	.944

Sources: From this research

Appendix 19. Correlations of the study variables on electric vehicles

		Correlations				
		Perceived value	Brand image	Environmental concern	Environmental attitude	Purchase intention
Perceived value	Pearson Correlation	1	.893**	.641**	.787**	.853**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001
	N	385	385	385	385	385
Brand image	Pearson Correlation	.893**	1	.701**	.851**	.824**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001
	N	385	385	385	385	385
Environmental concern	Pearson Correlation	.641**	.701**	1	.568**	.702**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001
	N	385	385	385	385	385
Environmental attitude	Pearson Correlation	.787**	.851**	.568**	1	.692**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001
	N	385	385	385	385	385
Purchase intention	Pearson Correlation	.853**	.824**	.702**	.692**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	
	N	385	385	385	385	385

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

Sources: From this research

Appendix 20. Regression analysis of perceived value on purchase intention of electric vehicles

Regression

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Perceived value ^b		Enter

a. Dependent Variable: Purchase intention

b. All requested variables entered.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.853 ^a	.728	.727	.681

a. Predictors: (Constant), Perceived value

b. Dependent Variable: Purchase intention

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	474.694	1	474.694	1023.248	<.001 ^b
	Residual	177.677	383	.464		
	Total	652.371	384			

a. Dependent Variable: Purchase intention

b. Predictors: (Constant), Perceived value

Appendix 20. Regression analysis of perceived value on purchase intention of electric vehicles (Continued)

Coefficients ^a								
Model	Unstandardized Coefficients			Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error		Beta			Tolerance	VIF
1	(Constant)	-1.556	.209		-7.427	<.001		
	Perceived value	1.260	.039	.853	31.988	<.001	1.000	1.000

a. Dependent Variable: Purchase intention

Sources: From this research

Appendix 21. Regression analysis of brand image on purchase intention of electric vehicles

Regression

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Brand image ^b	.	Enter

a. Dependent Variable: Purchase intention
b. All requested variables entered.

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.824 ^a	.679	.678	.740

a. Predictors: (Constant), Brand image
b. Dependent Variable: Purchase intention

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	442.823	1	442.823	809.369	<.001 ^b
	Residual	209.547	383	.547		
	Total	652.371	384			

a. Dependent Variable: Purchase intention
b. Predictors: (Constant), Brand image

Coefficients ^a								
Model	Unstandardized Coefficients			Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error		Beta			Tolerance	VIF
1	(Constant)	-2.222	.258		-8.597	<.001		
	Brand image	1.316	.046	.824	28.449	<.001	1.000	1.000

a. Dependent Variable: Purchase intention

Sources: From this research

Appendix 22. Regression analysis of environmental concern on purchase intention of electric vehicles

Regression

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Environmental concern ^b	.	Enter

a. Dependent Variable: Purchase intention

b. All requested variables entered.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.702 ^a	.492	.491	.930

a. Predictors: (Constant), Environmental concern

b. Dependent Variable: Purchase intention

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	321.205	1	321.205	371.480	<.001 ^b
	Residual	331.166	383	.865		
	Total	652.371	384			

a. Dependent Variable: Purchase intention

b. Predictors: (Constant), Environmental concern

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.723	.303		-2.383	.018		
	Environmental concern	1.006	.052	.702	19.274	<.001	1.000	1.000

a. Dependent Variable: Purchase intention

Sources: From this research

Appendix 23. Regression analysis of environmental attitude on purchase intention of electric vehicles

Regression

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Environmental attitude ^b	.	Enter

a. Dependent Variable: Purchase intention

b. All requested variables entered.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.692 ^a	.479	.477	.942

a. Predictors: (Constant), Environmental attitude

b. Dependent Variable: Purchase intention

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	312.328	1	312.328	351.785	<.001 ^b
	Residual	340.042	383	.888		
	Total	652.371	384			

a. Dependent Variable: Purchase intention

b. Predictors: (Constant), Environmental attitude

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.316	.290		-1.089	.277		
	Environmental attitude	.949	.051	.692	18.756	<.001	1.000	1.000

a. Dependent Variable: Purchase intention

Sources: From this research