The electric upswing: A quantitative study of electric vehicle attributes and consumer attitudes influence on purchase intent in Sweden

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ABSTRACT

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Keywords: Electric Vehicles, Innovation, Purchase Intent, Consumer Attitude
Research Question: Do price, performance and environmental attributes as well as consumer attitude of electric vehicles influence the intent to purchase one?

Purpose:
The aim of this study is to measure the attributes of electric vehicles that influence consumers' attitudes towards EVs. The consumers’ attitude and their intent to purchase is also measured in this study. This is done in order to explore whether the attributes of EVs have an influence on the attitude towards innovation and whether the attitude of a consumer has an influence on their purchase intent.

Method:
Employing the innovation of electric cars in Sweden as the empirical setting, a quantitative research approach was adopted. The primary data was collected through a questionnaire that was conducted among non-car and car owners over the age of 18 in Sweden.

Conclusion:
As a result of the conducted study, it was found that the importance of the selected attributes has a positive influence on the consumers’ attitude towards electric cars. Moreover, it was found that the attitude of the given respondent has a statistically significant correlation with their intention to purchase one in the future. However, a non-correlation was found between the variable of attributes and intent to purchase.
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1. Introduction

1.1 Background

Over the course of the past year, many of the world’s biggest car manufacturers have gone *all in* on electric vehicles according to a news article from Financial Times (Campbell & Miller, 2021). Statistics from the International Energy Agency (IEA), show that there is a yearly increase in purchases of electrical vehicles around the world, suggesting that it is a growing market (IEA, 2021). Regarding the industry itself, there is a large engagement in R&D around the world. Volvo Car Sverige AB is one of the main R&D companies in Sweden and they are opening a new battery factory together with the battery giant Northvolt which is set out to be finished by 2025 (Volvo Car Sverige AB, 2022). To further illustrate the growth of this market, statistics from Trafikanalys, which is part of the Official Swedish Statistics group assigned by the Swedish government, show that the total number of newly registered cars during 2021 was 314,313 passenger cars. Moreover, it is mentioned in the report that 2021 was the first year in history where the number of newly registered cars of which were electric, exceeded the number of newly registered cars that are driven by diesel. The report shows that electric cars amounted to 18% while diesel landed at 17% (Trafikanalys, 2021). Furthermore, an annual statistics report from Mobility Sweden shows that an increase of 106% has been noted in electric cars ownership between 2020 and 2021. This increase accounts for a total of 57,470 vehicles. There are a lot of different alternatives for consumers when it comes to electric cars. This can be seen in (Appendix 1), which shows the five longest and five shortest range electric vehicles (EV Database, 2022).

As for previous research, there are many studies that investigate the variables studied in this paper. More of these are mentioned later in the paper under theoretical framework. However, worth mentioning now is the study conducted by Indriani et al. (2019) which found in their research that environmental knowledge has a direct effect on the attitude toward green products, which in itself is shown to have a direct effect on green purchase intention.
1.1.1 Climate Impact of Passenger Cars

The rapid progress of the global economy and technology has advanced human civilization; however, it has also caused tremendous damage to the global ecological environment according to a report from IPCC (Masson-Delmotte et al., 2021).

Moon (2020) states that more than 30% of the gas emissions released in the US are from the transportation sector. The Numbers presented by the Swedish environmental Protection agency (Naturvårdverket, n.d) are similar to the numbers presented by the Moon (2020) as shown in (Figure 1). Statistics from this state-owned agency show that 31% of all CO₂ emissions in Sweden originate from the transport sector. This illuminates the fact that a large portion of CO₂ emissions from around the world is caused by different types of transportation. Furthermore, it can be seen in (Figure 1) that the majority within that category stems from passenger cars rather than trucks.

Since the issue of global warming is still a growing problem, humans are becoming more aware about the environment and its sustainable development. One of the solutions to environmental problems is new energy vehicles (Tu & Yang, 2019). According to Moon (2020) the interest for EVs have increased, Although the fact that electric vehicles tend to have a much lower impact on the climate because of the lack of a combustion engine, many consumers are still not convinced to buy one.

![Figure 1 – Sweden’s Territorial Emissions 2020](image-url)
### 1.1.2 Attributes of Electric Cars

There are many things for the consumer to consider when buying a new car or any product. The authors of this paper have identified three categories of attributes regarding electric cars that may have an influence on consumers' attitude and intent to purchase an electric vehicle. The three categories are; price, performance, and environmental. The associated attributes to the different categories can be seen in (Figure 2). These will be further explained in the theoretical framework.

![Figure 2 - Attributes of Electric Vehicles](image)

### 1.2 Problematization

As the environment has worsened over the last couple of decades the attitude towards green products has changed and people are looking for ways to make their daily lives “greener” (Chen, et al., 2010). Society is constantly evolving and people are becoming more aware of the environment (Kilbourne & Pickett, 2008) which is reflected in the purchasing patterns of cars (Mobility Sweden, 2021). As previously mentioned, electric vehicles tend to be seen as an environmentally friendly alternative to conventional cars which becomes apparent in the statistics that show us how the market is growing. However, it is still a controversial topic and the general attitude towards them is dispersed which can be seen in the national benchmark report on consumer views on EVs (Singer, 2016) as well as in the previous bachelor paper by (Zarifnejad & Garmiani, 2021). This previous study further show that consumers perceive electric cars in a negative way regarding the car's usability and utility, which in turn has a negative impact on consumer preferences (Zarifnejad & Garmiani, 2021). The authors continue to show that uncertainty over charging and mileage is to blame for this low user-friendliness impression. Because of these uncertainties, as well as a poor opinion of the electric car's cost, people have a negative perception of the electric car's usefulness, even
though there is a recognition of the advantage of the electric car's environmental friendliness (Zarifnejad & Garmiani, 2021).

Coffman et al. (2017) mention that there are different factors that have a great influence on how electric vehicles are perceived. The main factors emphasized are; vehicle ownership cost, driving range and charging time (Coffman et al., 2017). These attributes are considered the most influential factors to electric vehicles adoption which is further supported by (Hindrue et al., 2011; Rajper & Albrecht, 2020).

A problem identified by the researchers of this study is a lack of quantitative studies about the Swedish EV market and the consumer perspective regarding the mentioned attributes and the extent to which they affect the intent of purchase. This problem lays the foundation for this research to be conducted and the theories used in this research are all strongly connected to the related concepts. In essence, the problem is the lack of knowledge regarding consumer attitude toward electric cars as an innovation in Sweden as well as the purchase intent of consumers and an understanding of what specific attributes within an electric car that influence these concepts.

1.3 Research Question

- Do price, performance and environmental attributes as well as consumer attitude of electric vehicles influence the intent to purchase one?

Keywords: electric vehicles, innovation, purchase intent, consumer attitude

1.4 Purpose

This study aims to measure the attributes of electric vehicles that influence consumers' attitudes towards EVs. The consumers’ attitude and their intent to purchase is also measured in this study. This is done to explore whether the attributes of EVs have an influence on the attitude towards them and whether the attitude towards EVs of a consumer has an influence on their purchase intent. The relationship between attributes and intent to purchase is also explored.
2. Theoretical Framework

2.1. Literature Review on Price Attributes

Price attributes are some of the most important factors when a consumer is considering purchasing an electric vehicle (Hindrue et al., 2011). This claim is further strengthened by Rajper and Albrecht (2020). Price attributes in this study consist of the price of the car, price of electricity, price of fuel, price of service, the price of possibly installing a charging station at home and the price of the vehicle's tax.

As presented by Hindrue et al. (2011) the likelihood of a person purchasing an electric car increases amongst people that believe that fuel prices will increase in the future. This is a current topic as an increase in fuel prices has been seen in the last couple of months in Sweden (Sveriges Radio, 2022). Furthermore, Gallagher and Muehlegger (2011) found in their study that the increase in fuel prices is associated with the increase in electric vehicle sales. This shows that consumers recognize that a lot of money can be saved by driving an EV and paying for electricity instead of petrol or diesel.

Another price attribute that could influence consumer attitude towards electric vehicles is the price of fuel. Rajper and Albrecht (2020) state that “One of the major reasons to use EVs is fuel cost savings compared to gasoline vehicles”. This can be connected to the study made by Hagman et al. (2016) where the authors found that electric vehicles can have a lower total cost of ownership than a normal combustion engine car in Sweden.

Just like the price of fuel, the price of electricity is also a price attribute that must be evaluated when looking to buy an electric vehicle. The price of electricity and the price of fuel are the two factors that together “determine a majority of EV operating expenses which in turn have an impact on adoption rates" (Sierzchula et al., 2014). On the other hand, Zhuge et al. (2019), found that the price of electricity and the price of fuel have very minimal influence on EV adoption today, but may be more influential in the future.
2.2 Literature Review on Performance Attributes

The growing environmental issues around the world have pushed many car manufacturers to offer different alternatives to the internal combustion engine vehicle (ICEV) (Jeong, 2016). The electric motor and battery EVs are one of the key components that helps with decreasing the environmental impact, instead of requiring fossil fuel the battery just runs on electric power. Those batteries can come in different sizes, and they influence how closely the performance of an EV matches the traditional cars (Poullikkas, 2015).

A study by Berkeley (2018) has shown that the driving range is one of the most important factors when it is time for consumers to make their decision about whether they should or should not purchase an EV, while Schulz (2022) suggests that charging time is also an important factor.

The concern for the driving range of an EV is connected to the availability of charging stations around the world. This concern stands out because of how many fuel stations there are for ICEVs while there is a lack of charging stations. It is further stated that the potential adopters of EVs do not yet understand fully that the recharging process is easy and convenient. It could be done while at home or work, but the fact remains that the public do not trust the lack of infrastructure of charging stations, especially those who do not have access to their own charging stations (Berkeley, 2018).

A news article from a Swedish newspaper (Aftonbladet, 2022) announced that there is a lack of charging stations in Swedish parking lots; less than one percent of 650,000 parking spots offer charging. M Sverige (2021) also presented similar results, only seven of the Swedish counties passed in the amount of charging stations required, the rest of the counties have far too few charging stations according to recommendations from the EU.

According to the statistics presented by an interest organization in the Swedish electric power industry, PowerCirle, there is a clear yearly increase in charging stations. At the end of 2021, there are reportedly 13,362 charging stations in Sweden (M Sverige, 2021). A more detailed chart of the number of charging stations in each county in Sweden is presented by M Sverige, which among other things shows that the charging infrastructure must develop to be able to keep up with the increasing number of cars that need to be charged (M Sverige, 2021).
becomes a problem since the charging time is much longer than fueling a car, the average time Norwegian people spent their time in charging stations was 21.9 minutes (Gnann, 2018).

Schulz (2022) explains that as of right now the driving range of a fully recharged EV is lower than a fully fueled ICEV and takes longer time to charge. Though there is an argument that the battery industry is still improving with bigger and better batteries being developed. Schulz (2022) further explains that even though the EVs are not able to drive as far as traditional cars, consumers and potential adopters might look past it if the charging infrastructure improves.

2.3 Literature Review on Environmental Attributes

Electric vehicles belong to a category of advanced vehicle technology that aims to reduce the consumption of petroleum in the world (Singer, 2016). Due to the lack of combustion engines, electric vehicles do not require petroleum which in turn makes fully electrical vehicles emission-free. Although electricity production may contribute to air pollution, the U.S. Environmental Protection Agency categorizes all-electric vehicles as zero-emission vehicles because they produce no direct exhaust or tailpipe emissions (U.S. Department of Energy. n.d.). However, although the car itself is considered to be an environmentally friendly alternative to transportation, they need electricity which can come from various sources of production.

According to the Swedish Energy Agency during 2021, total electricity output was around 166 TWh, while total electricity consumption was roughly 140 TWh. This equates to an increase of around 4% for both categories when compared to 2020. In all, renewable energy accounted for nearly 68 percent of total power output (Perez & Arvidsson, 2022). As for Poland by the end of 2020, only 10.75% of energy was produced from renewable energy sources (International Trade Administration, 2021).

Another common argument regarding electric cars and their level of sustainability or environmental friendliness, is that the production of the car and especially their batteries require materials that other cars do not. According to a report from the Union of Concerned Scientists written by Nealer and Anair (2015), electric cars store their power in batteries
rather than traditional fuel tanks and with larger batteries come longer range. These batteries tend to have a high environmental impact because of the materials they require to be produced. Furthermore, the paper mentions Rare Earth Elements (REE) like lithium, nickel, cobalt or graphite are necessary to produce the battery. The results also show that all these materials are found underground and demand mining activities which are polluting in themselves (Nealer & Anair 2015).

Another common argument against the sustainability of electric cars is that they are not fully sustainable due to the fact that the electricity that they are charged with originates from unsustainable sources of power such as coal and oil. As previously mentioned, in all, renewable energy accounts for nearly 68% in Sweden. This means that the majority of electricity produced is renewable and it should contribute to sustainable driving with an electric vehicle. Appendix 2 and Appendix 3 illustrates the differences in life cycle emissions in gCO₂ / km between Sweden and Poland.

Comparing to the previously mentioned numbers of renewable energy within Sweden and Poland, it can quickly be understood that driving and charging an electric car is substantially more sustainable in Sweden since so much more of the energy comes from renewable energy sources. Although the difference is big, driving an electric car in Poland is still more sustainable compared with gasoline or diesel which indicates that electric cars in fact are more sustainable when driven as well as the fact that Sweden as a country is well equipped for having electric vehicles.

2.4 Hypotheses (H1) Development

The gathered knowledge about the attributes presented together with the information on how it may influence the consumer view, the foundation is laid for hypotheses 1:

\[ H1: \text{Attributes of electric vehicles such as price; performance; and environmental have a positive influence on consumers' attitude towards EVs.} \]
2.5 The Diffusion of Innovation Theory

Innovation and constant development have obvious benefits, however, this does not necessarily imply that society will easily adjust to it or accept it. Adjusting to new innovations is often a challenging task that takes a long time. This process, the maturing process of innovation, can take up to several years to be accepted by society. This is where the question of how to speed up this process of adaptation to innovations becomes serious. The process by which inventions are communicated through to society through the various communication channels is known as the diffusion of innovations theory (DOI) (Rogers, 1983). Al-Jabri and Sohail (2012) state that DOI is one of the most popular theories that have made attempts to investigate the different factors that influence an individual's willingness to embrace new innovations or technology in their lives.

DOI can be used to get a comprehensive tool for researching the success of eco-innovations from the consumer's perspective. It could be beneficial to understand why different marketing strategies have different outcomes of eco-innovations (Moon, 2020). Moreover, the author continues by defining Eco-Innovations as innovations that have a lower impact on the environment than conventional or long-established technology. This means that any product/technology in all forms of business can be considered an eco-innovation if the new innovation has lower environmental impact than the dominant design (Moon, 2020). Eco-innovations are just like all other products and must compete in the market with all other products, but many governments have put in different forms of policies to give the companies with eco-innovations a chance to compete with the regular market (Sierzchula et al., 2012). This indicates that EVs could be regarded as eco-innovations because of the positive aspects it offers towards a cleaner environmental impact (Moon, 2020).

Rogers (1983) mentions four key elements; innovation, communication channels, time and the social system. These four elements refers to the process of diffusion to new technology. “An innovation is an idea, practice, or object that is perceived as new by an individual.” (Rogers 1983, p.11). Since perception is subjective, it is an innovation if the thought appears new in the eyes of the individual. As presented by Rogers (1983) in his book, in the minds of potential consumers, a technological innovation can raise one kind of uncertainty about its potential effects, while also indicating a possibility for reduced uncertainties in terms of the technology's information base. Fliegel and Kivlin (1966) and MacVaugh and Schiavone
show that there are several attributes that influence the adoption of the different innovations. Attributes such as cost, returns, efficiency, saving of time, saving of discomfort, perceived utility and technological infrastructures. MacVaugh and Schiavone (2010) furthermore state that there are other "external" factors influencing the adoption of new technology since they are closely linked to the characteristics of old technology that innovation needs to replace.

Saving time is directly related to the economic consequences, while saving discomfort is conceptually identical to saving of time it does not involve the economical aspects. Rogers (1983) explained the communication channel as the place where information about new innovation is shared between people in order for them to have a common understanding. This means that the communication channel is merely the ground for the information to spread between individuals that have used the new innovation and individuals that have not (Rogers, 1983). Throughout the years different methods of communication have been used to reach new and potential adopters. Some of the different communication methods are mass media channels, newsletters, TV, and internet. These channels allow for the possibility of creating knowledge of a new innovation quickly to a high quantity of potential adopters (Scott, McGuire, 2017). Through the DOI process, time is a relatively important aspect and the importance of it during the DOI process has been acknowledged by the author (Rogers, 1983). Rogers proceeds to explain there are three important stages where time is an important dimension. The three stages are the innovation-decision process, innovativeness and adopter categories, and rate of adoption. In DOI, a social system is defined as a group of people who work together to solve a problem. It can take the form of individuals, informal groups and organizations etc. It is also stated that people who are acquainted with one another frequently communicate with each other, which may result in information about new innovations spreading between the parties (Rogers, 1983).

Appendix 4 is a general visualization of the theory of diffusion of innovation. As stated by Robertson (1967), innovators are the people who are the first in the adoption process. The adaptation process ends with the laggards, who are the last to adapt to the innovation when the majority has already adapted (Robertson, 1967).

In their article, Dedehayir et al. (2020) mention that similarly to innovators, early adopters are also found to have a significant level of opinion leadership, which is essential for spreading an
idea to bigger market sectors. The next part of the adopters is the early majority. In his book, Rogers (1983), describes the importance that the early majority has in the diffusion process, mentioning their unique position in the midst of the adopters and how they play an important role in the diffusion process as the link between the very early and the relatively late adopters. This is in correlation with the DOI model, where an innovation’s spread takes off (Rogers, 1983).

The next part of the diffusion process is the early majority. This group of adopters adapt to a new innovation just before the majority of people are. This behavior is perfectly explained by Rogers, where he states that “the majority may deliberate for some time before completely adopting a new idea”. Adapting to new ideas also means that the early majority group takes their time before making a decision. This decision-making process is longer than the one for the innovators and the early adopters (Rogers, 1983).

When the early majority has adopted a new idea, comes the late majority and the laggards. These two groups of adopters are the last ones to adapt to a new innovation and differently to the earlier groups, the late majority and the laggards really take their time before adapting to a new innovation. As described by Rogers (1983), the late majority group approaches innovations with skepticism. As for the laggards, Rogers (1983) states that this group is so late in adapting to innovations that when they adapt, innovators might already be adapting to a more recent innovation. It is furthermore mentioned that laggards “tend to be frankly suspicious of innovations and change agents” (Rogers, 1983).

2.6 Theory of Technology Acceptance

Evolution within technology has throughout time been met with resistance from the consumers. Scholars have tried to understand the factors influencing the consumers, factors such as adoption, acceptance and continued use of technology. One of the most commonly used theories to study these different factors is the technology acceptance model (TAM), which was originally created by Fred Davis in 1989 (Al-Emran & Shaalan, 2021). Lala (2014) mentions that the model designers' inspiration to develop TAM came from the theory of reasoned action. Fred Davis stated that TAM was developed to create and provide an overview of the concept of computer acceptance that is generally capable of
explaining the behavior of users across a wide range of computing technology. Fred Davis (1989) also mentions in his paper that TAM was also developed because a consumer perception of a new innovation or technology influences the consumer's intention to use it, despite the time and careful effort of implementation of new technology. Davis introduces two variables that previous research has shown are essential to explain the use of technology (Chen & Chao, 2011).

The first variable is the perceived usefulness. This variable suggests that people make their decision on if they should use an application depending on how much it will help them achieve better results. The second variable is perceived ease of use. This variable suggests that a consumer might not be interested in adopting a product if it might not be useful or easy to use, if it gives the impression that it is hard to use, then the consumer might react negatively towards it. It is further explained that these two variables are interconnected and they have an influence on each other (Davis, 1989). Furthermore, the author states that the variables can be affected by unknown external variables.

2.7 Theory on Purchase Intent

Purchase intention is a broad subject with many points of research to it, however, the most commonly known theory is the theory of planned behavior. Ajzen (1991) describes in his article about the theory that it is an extension of the previous theory of reasoned action. He also shows the different variables and discusses them (Appendix 5). The theory of Planned Behavior by Ajzen (1991) is a theory that is useful when investigating consumer behavior. It is a theory that is constructed of different aspects that all contribute to the understanding of a certain behavior. In the context of this paper, it utilizes the traditional meaning of purchasing something. The overarching idea of the theory is to understand what influences a consumer's purchasing decision and ultimately why the consumer made the purchase. This knowledge can then be used to analyze patterns amongst many consumers and draw conclusions that can later be utilized in business. (Ajzen, 1991)

Ajzen (1991) explains that an individual's favorable or negative appraisal of completing an activity is represented by their attitude which is presented as the first variable of the theory. It is further explained that any given behavior or activity is immediately regarded to some extent
as either positive or negative. The variable of subjective norm, however, reflects any potential social pressure towards a certain behavior that an individual might experience and becomes apparent when doing something because others think you should do it. (Ajzen, 1991). Perceived behavioral control presents the control beliefs: It is the apparent availability or scarcity of necessary resources and opportunities and means that an individual is looking to the different resources and opportunities and allows it to influence the decision of behavior (Ajzen, 1991).

Indriani et al. (2019) show in their research that environmental knowledge has a direct effect on the attitude toward green products, which in itself is shown to have a direct effect on green purchase intention. This means that the more knowledge a consumer has on environmental issues and their potential solutions, the more aware the consumer will be about the products they buy and their potential impact on the environment. Furthermore, this will trigger a larger intent to purchase green products (Indriani et al., 2019). Along the lines of this, the authors also mention that the results show that environmental knowledge is found to have a significant influence on attitude. These results are in line with several previous studies (Smith & Paladino, 2010; Wulandari et al., 2015; Saichao, 2016). Another study by (Mostafa, 2007) reveals that consumer awareness about environmental issues is a key component in influencing consumer attitudes in Egypt to be more environmentally friendly. Green Purchase Intention can be influenced by one's attitude toward green items (Mostafa, 2007).

When individuals need knowledge, skills, opportunities, or other resources to complete an activity, they perceive barriers and obstacles based on the availability of those resources. In these cases, the theory of planned behavior, which takes into consideration the ease and difficulty of carrying out the activity, is suitable (Hansen, 2008). Planned behavior control must be considered when predicting EV adoption because it necessitates not only internal resources like individual abilities and self-efficacy but also external resources including opportunities and information; it also represents the effects of social impact, a variable typically associated with Diffusion of Innovation theory (Crespo & del Bosque, 2008; Liao et al., 2017).
2.8 Hypotheses (H2 & H3) Development

The collected information and knowledge regarding purchase intent and its functions, together with the previous research on attitude as well as climate knowledge and green products, H2 is developed:

\[ H2: \text{The attitude that consumers have towards electric vehicles have a direct positive influence on their intent to purchase an electric vehicle.} \]

The third hypothesis comes as a byproduct to H1 and H2 since the relationship between them inevitably creates an indirect relationship between the attributes and purchase intent:

\[ H3: \text{Attributes of electric vehicles such as price; performance; and environmental have an indirect positive influence on consumers' purchase intent.} \]

2.9 Conceptual Model

As for the design of this research, the variables can be seen in Figure 3. “Attributes of electric vehicles” is the chosen independent variable, where the study measures the importance of different attributes (see Figure 2). The different attributes are divided into different themes which are “price attributes”, “performance attributes” and “environmental attributes”. Continuing, the variable “Attitude towards electric cars” will be measured in the survey and acts as an independent variable that is directly influenced by the perceived importance of the different attributes. The last variable is “intent to purchase an electric vehicle” and directly measures the probability that a given respondent's next car will be electric. This variable is directly dependent on the attitude that the respondent shows towards electric vehicles and therefore is indirectly dependent on the importance of certain attributes of electric cars. This relationship is illustrated in the model by using whole lines showing the direct influence and its direction, and dotted lines showing an indirect influence and its direction, respectively. These respective relationships are built on assumptions with inspiration from previous research and the hypotheses developed in this paper. Worth mentioning is that structural equation modeling could be a viable method for testing and evaluating the multivariate causal relationships which is not done in this paper. While doing this study, hypotheses are made and tested. Derived from previous research as well as the theories presented and the conceptual model, the following hypotheses are tested in this study:
2.10 Hypothesis

**H1:** Attributes of electric vehicles such as price; performance; and environmental have a positive influence on consumers’ attitude towards EVs.

**H2:** The attitude that consumers have towards electric vehicles have a direct positive influence on their intent to purchase an electric vehicle.

**H3:** Attributes of electric vehicles such as price; performance; and environmental have an indirect positive influence on consumers' purchase intent.
3. Methodology

3.1 Research Approach

Applying the correct research approach to the study contributes to the overall structure of the study that it will follow. This study uses a deductive research approach as it was found most relevant to the structure of the paper. Saunders et al., (2019) states that a trait of the deductive research approach is that when drafting the research question of a study that will be tested, a clear theoretical viewpoint must be developed. Furthermore, to describe a specific event and provide suggestions and conclusions, the deductive approach uses a highly structured process and frequently analyses the relationship among variables (Ragab & Arisha, 2018).

In the case of this research study, three existing theories were introduced. These theories were found most relevant to the topic of the study. With the use of the theories and literature reviews on electric vehicle attributes, the hypotheses were developed. Data will be collected through a survey and will be analyzed in order to accept or reject the proposed hypotheses.

3.1.1 Chosen Literature

To conduct a study about electric cars and their influence on people's purchasing intent, previous literature was used. Previous literature was conducted from research articles and news articles found from scientific libraries such as Google Scholar and MDU Primo. To attain previous literature that is relevant to this study, specific keywords were used. The keywords selected for this paper are electric vehicles, innovation, purchase intent, consumer attitude. With the use of these keywords, the most relevant scientific articles for this study could be found. The mentioned keywords were specifically picked to capture all parts of an electric car and consumers. As mentioned previously in the paper, electric cars are still a relatively new innovation and it felt therefore necessary to include “innovation” as a keyword in the study. As for consumer attitude, this study aims to measure the attributes of electric vehicles that influence consumers' attitudes towards EVs. It felt, therefore, fundamental to include consumer attitude as a keyword in the study. Some of the sources used throughout this research have been used in previous courses, indicating that the researchers deem them
reliable and appropriate in this context. Additional scientific articles and other sources were chosen for their relevance to the research topic as well as their reliability.

When exploring relevant research theories, however, a few preliminary google searches were done to explore what theories could be most relevant for this study. This was done with the use of the presented keywords to only explore relevant research theories. After further research and close examination of the selected theories, the diffusion of innovation theory, the technology acceptance theory and the theory of planned behavior were found to be relevant.

3.2 Research Design

To investigate what affects the transition from regular combustion engine cars to electric cars in Sweden, a deep understanding is required. Previous literature has been used to get a general understanding of the factors but the need for a deeper understanding leads the study to apply a quantitative research method. This is done through a survey where adults of the Swedish population will be asked about the factors that affect them most from making this transition.

Quantitative research, as presented by Creswell (2004) as cited in Duffy and Chenail (2009), translates human experiences into numbers. This is in correlation with the purpose of the study as the aim is to translate consumers' attitudes toward electric cars into numbers. In accordance with the quantitative method, this study used a survey which was sent out to people living in Sweden through different social media channels. Facebook, Instagram and LinkedIn were the chosen communication channels where the survey was sent out to reach out to as many people as possible. As a result of the target population being adults in Sweden, the survey was constructed with the use of Swedish language.

3.3 Data Sources

3.3.1 Primary Data

According to Hox and Boeije (2005), the primary data is the information gathered while conducting a search for a specific research problem. All the data collected is also expanding the current base knowledge of a specific problem. Hox and Boeije (2005) further explain that
choosing to collect the data on your own leads to some significant advantages. Researchers are able to customize the structure of the study so it fits the research problem, making sure the study is consistent and the information gathered does help with finding an answer to the problem. To understand the research question fully in this study, the collection of primary data of a quantitative nature was deemed necessary. The quantitative data will help analyze consumer attitude and variables towards EVs for this study and future ones. This is possible since the questions will be adjusted towards the consumer and their attitude toward this particular phenomenon.

During the data collection the researcher conducting the quantitative study must carefully collect and store information in some form of survey or questionnaire, then transfer it to a computer-readable program preferably in the form of numbers in order to present and analyze the data. The gathered data can support the finding of connections between the variables and results in a study (Choy, 2014). This study seeks to gather large quantities of respondents to enable a thorough analysis. Therefore, as Neuman, (2006) states, quantitative research enables a study to gather large amounts of computer-generated results, allowing the researcher a way of deciphering the data.

3.4 Data Collection Method

Data collection is the process of gathering and analyzing information through different techniques. Allowing researchers and studies to ask and distribute questions through different media channels in order to get relevant data (Chatzitheochari et al., 2018).

One form of data collection is surveys, and surveys are described by De Leeuw (2005) as an ever-expanding method, with technological advances allowing researchers to ask their questions to a larger audience in a more seamless manner. A survey, according to Pinsonneault and Kraemer (1993), is a method for collecting information about the attributes, behavior, or perspectives of a significant number of people.

A questionnaire could be distributed to gather a large number of respondents for a study that seeks to ask the same set of questions to as many people as possible. This method of data collection is one of the most widely used because respondents who complete the questionnaire are asked to answer a series of questions, allowing for many responses to be collected (Saunders et al., 2019). Hox and Boeije (2005) also states that structured
questionnaire surveys are an important data collection strategy because they typically collect data from a broad and diverse sample of respondents on a variety of characteristics. Using surveys allows for more versatile answers in terms of the numbers that can be analyzed, it takes little time to share a survey, and it also allows for easy sampling of answers (Bell, 1996).

According to Bell (1996), it is worth noting an important weakness to a survey, one example might be when there is a low response rate from the intended target group or if the respondents do not put effort into the survey a form of bias can sometimes occur. Inaccuracies may also appear if respondents intentionally tamper with the survey to impact the results (Bell, 1996). To avoid these weaknesses, the authors ensured that the survey was distributed to the intended target group via various media, as well as reviewing each answer for inconsistencies and if needed, deleting them.

3.4.1 Sampling

For this study a non-probability sampling method was chosen since the authors wanted to choose samples from a population, in this case car owners or potential owners over 18 in Sweden. By using non-probability sampling, the survey's creators avoid having random sections and instead select samples based on their subjective judgment (Saunders et al., 2019). Furthermore, as Saunders et al. (2019) mentions, one reason for using non-probability sampling is that it is becoming more common with the rapid growth of online surveys as well as being able to choose the sample size. The authors continue by mentioning a clear disadvantage of using non-probability sampling which is that almost all methods of non-probability sampling have a low likelihood of representing the whole population since the samples are not random.

3.4.2 Questionnaire Development

The authors of this study created a survey to find the relationship between the different variables of owning an EV and the intent to purchase a product. To find these correlations, the authors created questions based on the different attributes of owning an EV that needed to be studied. It was through Google Forms that the survey was created and distributed with the intention to get as many respondents as possible and being able to share the survey smoothly
on social media. Before officially sharing the survey on social media and other platforms that reach the possible target group, it was sent out individually to students of Mälardalen University as a pilot test. The structure of the survey was looked at and the possible questions were also looked at. Questions that confused the pilot group would be rewritten or rephrased. To make the survey comprehensive for the audience, the questions asked avoided mentioning complex terms or long sentences.

What was gathered from the pilot survey was that if the questions are not mandatory to answer, the respondents are given a chance to skip questions. In that case, an increased amount of missing data would have been present. To avoid this scenario, every question but one in the survey was obligatory to answer and the survey could not be sent in until every question was responded to, which allowed for fewer missing values.

3.5 Data Analysis Method

To analyze the collected data properly, the data must first be classified so that proper analysis methods can be applied. Saunders et al. (2019) mention in their book about research methods that many business statistics textbooks use a hierarchy of measurement to classify data for quantitative analysis, typically in progressive order of numerical accuracy. While realizing that the data collected in this paper comes from a survey, it is also noted that the data can be measured numerically as quantities. However, the data cannot theoretically take any value within a certain range. This leads to the understanding that the data in this study is numerical, discrete and is presented as interval data. Furthermore, the standard confidence interval of 95% is selected for the analysis. Following the collection of a large number of responses on the survey, the data needed to be transferred and converted to the analyzing program IBM SPSS. All relevant survey data will be analyzed in IBM SPSS.

3.5.1 Regression Analysis

For this paper, the chosen method for analysis is linear regression analysis. Jaggia and Alison (2019) mention in their book that this is one of the most significant statistical approaches used in business, engineering, and the social sciences. Furthermore, the authors
explain that it is a method used to investigate the connection between two or more variables. Regression analysis examines the linear connection between the target variable, known as the response variable, and other factors, known as explanatory variables. As a result, we utilize explanatory variable information to forecast and/or characterize changes in the response variable. The explanatory variables are also known as independent variables, whereas the response variable is known as the dependent variable. It is vital to notice that regression models at first glance seem to be looking for causality when in reality they are looking for correlation (Jaggia & Alison, 2019).

The choice of this method can be justified by understanding the hypothesis and the conceptual model as well as the way it will be analyzed. The three hypotheses developed in this paper will be analyzed separately, meaning that only one explanatory variable and one response variable will be used at once. This comes as a result of the fact that constructs were created in order to simplify the analysis process, while still yielding similar results. For example, H1 requires analysis of all the attributes, but rather than doing multiple linear regression using all the attributes as individual independent variables, they are clustered into a single variable leading to the use of simple linear regression analysis.

Another common method of analysis is correlation analysis. However, because of the fact that linear regression allows for $R^2$ to be analyzed, which explains the proportion of variation in Y, explained by X which allows for a deeper analysis of the studied relationships.

3.6 Quality Criteria

3.6.1 Reliability

The concern over whether a study's results are repeatable is addressed by the concept of reliability (Bryman & Bell, 2019). The authors further state that quantitative research must show consistency and faith to be reliable. This is in line with the interpretation of Sürücü and Maslakçı (2020), where they refer to reliability as the stability of measured values acquired in repeated measurements under the same conditions with the same measuring device. This means that obtained results should be approximately the same when other studies are
conducted on the same topic (Heale & Twycross, 2015). The reliability of the data presented in this study is stable since the same collection method was used throughout the process and answers which deviate from the target demographics have been filtered out. Furthermore, the number of answers to the survey amounted to 246 which makes the amount of data sufficient for proper non-probability analysis, however this means that the data cannot be considered representative of the population.

3.6.1.1 Cronbach’s Alpha & Constructs

Cronbach’s alpha is a reliability test that is used to find values that show how much certain data-points correlate with each other (Saunders et al., 2019). It consists of an alpha coefficient with a value between 0 and 1. Values of 0.7 or above suggest that the questions in the scale are internally consistent, however for this study a value close to 0.6 or above are deemed adequate. In the survey there are seven questions that aim to measure the variable of attitude and the found value of Cronbach’s Alpha correlation is 0.583 (see table 1) which is considered a low correlation, yet deemed adequate for this paper. Furthermore, Cronbach's Alpha value for the other variables such as price attributes and performance attributes can be seen in table 1. As a result of this, the gathered data from these questions are used to compute a new variable construct which represents their respective variable.

When computing these new variables or constructs, a Σ formula was used which calculates the sum of each item within the construct. This was done together with a “.n” command in SPSS to determine how many valid items are required to present any form of result in the construct. Without this command, any given respondent who has answered “Don’t know / do not wish to answer” will have all their answers excluded from the construct. However, by using the .n value at 5 for the items relating to Attitude, only 21 respondents were excluded from the data. This means that these respondents had put “Don’t know” in at least three or more questions, which caused their answers to be deemed non-sufficient to be included in the data. For price, the .n value was set to 6, meaning that all answers that are included, have provided data for all the items, while any respondent who has 1 or more “Don’t know” will be excluded from the new construct. In this case, there are 17 excluded respondents. As for the performance attribute construct, there are 5 items within the construct. The .n Value was set to five, which yields similar results as for the price construct meaning that all respondents who are included, have provided data for all items. For this construct, there are a total of 12
excluded respondents. As for the environmental attributes, no significant correlation was found, which leads to the use of the individual item of importance of “being green”. Furthermore, these two constructs together with the data values of the environmental question are made into one higher order construct named “Attributes” which represent the importance of these attributes in a single value for each point of data. A reliability test for this construct was also conducted using Cronbach’s alpha, which yielded the value of 0.638.

![Figure 4 - Visualization of attributes construct (C1 = Construct 1 etc.)](image)

### Table 1 - Reliability Test: Cronbach’s Alpha

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cronbach Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>0.583</td>
<td>7</td>
</tr>
<tr>
<td>Price attributes</td>
<td>0.833</td>
<td>6</td>
</tr>
<tr>
<td>Performance attributes</td>
<td>0.875</td>
<td>5</td>
</tr>
<tr>
<td>Attributes (Higher order construct)</td>
<td>0.638</td>
<td>3</td>
</tr>
</tbody>
</table>
3.6.1.2 Testing Residuals: Normality & Homoscedasticity

First, the normality assumption was checked to see if the regression residuals had a normal distribution. This was accomplished by inspecting each of the regression analysis normal P-P plots, in which the data should follow the normality line. The overall trend, as seen in their respective plots (Appendix 6, Appendix 7, Appendix 8), follows the line, with minor positive and negative deviations.

Furthermore, to establish that the residuals of the regression analysis are distributed evenly the data is tested for homoscedasticity. This was done through making a scatterplot in which the standardized residuals are plotted together with the standardized predicted values. By observing that the data points in these plots seem randomly distributed and dispersed, it is established that the homoscedasticity is validated. As a result of this, correlation parameters that are theoretically imprecise are avoided (Chatterjee & Hadi, 2012). The test results for the respective analysis can be seen in Appendix 9, Appendix 10 and Appendix 11 respectively.

3.6.2 Validity

Bryman and Bell (2011) state that validity is in many ways the most significant research criteria. The integrity of the findings drawn from a piece of research is referred to as validity. Bryman and Bell (2011) describe validity as a concept that can be defined as many different things and thus have different meanings under certain contexts. Regardless, it is something that should be kept in mind while doing research. Validity comes with a range of different aspects such as: measurement validity; face validity; concurrent validity; predictive validity; construct validity; and convergent validity (Bryman & Bell, 2011).

3.6.2.1 Construct Validity

The criteria of measurement validity is typically used in quantitative research and the search for measurements of social scientific concepts. Measurement validity is also known as construct validity. Essentially, it is an issue of whether or not a measure developed of a notion truly reflects the idea that it is designed to denote (Bryman & Bell, 2011). In line with this definition lies Saunders et al. (2019) who states that construct validity (or measurement validity) relates to how well a collection of questions assesses the presence of the construct you wanted them to measure. In the case of this study, the measurement validity was
established by using previous research which was conducted with similar methods and applicable theories. Furthermore, to establish reliability of the constructs that were created, the items within the constructs were tested using a reliability test utilizing Cronbach’s Alpha.

3.6.2.2 External Validity

Bryman and Bell (2011) as well as Saunders et al. (2019) state that the topic of whether a study's findings can be generalized outside of the specific research environment is addressed by external validity. In this setting, the question of how people or organizations are chosen to engage in research becomes critical. This external validity is considered while constructing the research design. With the aim of gathering a sufficient amount of data as well as making a comprehensive analysis, the relevance of this study comes to be significant not only for the industry but also for municipalities and other governmental bodies in the country of Sweden since it provides an understanding of where electric cars as a phenomenon is lacking.

3.7 Operationalization

In order to measure the presented concepts, a survey has been constructed and handed out digitally. The questions asked in this survey represent these concepts and aim to measure them within each individual respondent. As previously mentioned, the importance of the attributes of electric vehicles are measured in three categories; price; performance; and environmental. The price aspect is started with the question: To what extent are these price aspects important to you when buying an electric car? Following is a collection of attributes where the respondent is asked to put each attribute on a likert scale of 1-5 with 1 being not important at all and 5 being very important. Here, the attributes that are measured are; price of the car; price of electricity; price of gasoline; price of service/maintenance of the car; vehicle tax; and a potential installation of a charging station in your home. Furthermore, the importance of the different attributes are measured and it can then be understood how aware the consumer is of the different aspects but mostly how important they are to themselves.

In order to measure the attitude, the given individual has towards electric vehicles, certain questions are asked throughout the survey. Questions or statements that aim to measure the attitude are; Electric cars are better for the environment than "ordinary" cars; Electric cars contribute to a sustainable future; You can save money by owning an electric car instead of an
“ordinary” car; Electric cars are overpriced; Electric cars are affordable alternatives. These questions or statements are answered using a likert scale of 1-5 and measure to which extent the respondent’s attitude is positive or negative through insights in the consumers opinions about electric cars as both an innovation and an alternative to their regular idea of what owning a car means.

Finally, the intent to purchase is measured through a question where the respondent is asked; on a scale of 0-100%, how likely is it that your next car will be electric? Where the respondent answers in intervals of 10 (0%, 10%, 20% etc.). This question provides an understanding of to what extent the consumer is likely to buy an electric car as their next car. Utilizing this knowledge, the intent to purchase becomes a clear numerical data-value, which successfully brings the concept of purchase intent to measurable, analyzable numerical data.

The questions in the survey are designed to bring abstract concepts such as attitude or intent to purchase down to a comprehensive level which can easily be reflected upon and answered by the respondent. By having these questions in the survey, the study successfully manages to measure each concept individually, and yields data that is capable of being analyzed in order to test the hypotheses and ultimately, answer the research question.

Table 2 visualizes the operationalization of the belonging concepts and how they are measured. Table 3 visualizes the questions that were asked in the survey and how they relate to each concept as well as through what instrument they are measured. Some questions are asked only with the goal of receiving the demographic background of the respondent. Note that the full questionnaire is presented in Appendix 16.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Variable</th>
<th>Indicator</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase intent</td>
<td>Probability of next car being electric</td>
<td>% of likeliness to buy go electric</td>
<td>Likert scale 0-100% (intervals of 10)</td>
</tr>
<tr>
<td>Attitude</td>
<td>Consumer attitude</td>
<td>Value of electric</td>
<td>Likert Scale</td>
</tr>
<tr>
<td>Question</td>
<td>Reasoning / Identity</td>
<td>Demographic</td>
<td>Attitude</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------</td>
<td>-------------</td>
<td>----------</td>
</tr>
<tr>
<td>Age</td>
<td>Demographic</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Demographic</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Living situation</td>
<td>Demographic</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Demographic</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Salary</td>
<td>Demographic</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Do you own a car today?</td>
<td>Demographic</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>If yes, what car?</td>
<td>Demographic</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Electric cars &amp; the climate</td>
<td>Collection of statements</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Price attributes</td>
<td>Collection of price attributes</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Electric cars can save you money</td>
<td>x</td>
<td>x</td>
<td>Likert 1-5 (dis)-agree</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---</td>
<td>---</td>
<td>----------------------</td>
</tr>
<tr>
<td>General attributes</td>
<td>x</td>
<td></td>
<td>Likert 1-5 Importance</td>
</tr>
<tr>
<td>EV market</td>
<td></td>
<td>x</td>
<td>Likert 1-5 (dis)-agree</td>
</tr>
<tr>
<td>Charging availability</td>
<td></td>
<td>x</td>
<td>Likert 1-5 (dis)-agree</td>
</tr>
<tr>
<td>Social pressure to be “green”</td>
<td></td>
<td>x</td>
<td>Yes or no</td>
</tr>
<tr>
<td>If yes ^, from whom?</td>
<td>x</td>
<td></td>
<td>Text answer</td>
</tr>
<tr>
<td>War &amp; worry</td>
<td>x</td>
<td>x</td>
<td>Likert 1-5 Worry level</td>
</tr>
<tr>
<td>Probability for next car to be electric</td>
<td></td>
<td>x</td>
<td>0-100% Likert</td>
</tr>
</tbody>
</table>
4. Findings & Analysis

4.1 Descriptive Statistics

Regarding the descriptive statistics and demographics presented in this study is not used for the analysis, however, included for future research purposes.

The survey has been answered by a total of 246 respondents from where 240 answers were deemed usable. The majority of the 240 respondents were males (55.6 percent), meanwhile women accounted for (45.0 percent). The most common highest level of education from the respondents were high-school degrees accounting for a total of (55.8 percent) and bachelor’s degrees (24.6 percent).

Table 4 is a visualization of the age groups of the respondent. The largest group of respondents are between the ages of 18 and 25 while all other groups also account for a sufficient part of all responses. This gives the study great ground as a lot of data was collected from different age groups containing consumers who are looking to buy a new car in the near future.

<table>
<thead>
<tr>
<th>Age</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-25</td>
<td>119</td>
<td>49.6</td>
</tr>
<tr>
<td>26-32</td>
<td>26</td>
<td>10.8</td>
</tr>
<tr>
<td>33-40</td>
<td>23</td>
<td>9.6</td>
</tr>
<tr>
<td>41-50</td>
<td>27</td>
<td>11.2</td>
</tr>
<tr>
<td>51-65</td>
<td>34</td>
<td>14.2</td>
</tr>
<tr>
<td>66+</td>
<td>11</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Table 5 presents the gender of the respondents. It can be seen that the majority of respondents
are males (54.6 percent) and women (45.0 percent). The almost equal spread of genders gives more credibility, and the study can draw conclusions to both men and women.

Table 5 - Gender of Respondents

<table>
<thead>
<tr>
<th>Gender</th>
<th>Count</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man</td>
<td>131</td>
<td>54.6</td>
</tr>
<tr>
<td>Woman</td>
<td>108</td>
<td>45.0</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Appendix 12 is a visualization of the highest achieved education amongst the respondents. Furthermore, Appendix 12 presents that the authors managed to gather data from consumers with many different education levels. The highest achieved education level amongst most of the respondents was high school, accounting for (55.8 percent) of the responses. Respondents with bachelor’s degree and master’s degree were also significant.

Appendix 13 shows an overview of the monthly salaries before tax between the respondents. Gathering this data gives an idea for the authors about the attitude consumers have towards electric vehicles. This is because, as of today electric vehicles are quite expensive and a higher monthly salary may have a potential influence on purchase intent. There is a good spread between the responses which indicates that the survey reached out to many different people with different salaries. Majority of the respondents have a monthly salary before tax between 25.000 - 40.000kr (26.3 percent), the second largest group have a monthly salary between 10.000 - 25.000kr (24.2 percent) and the third largest group (19.6 percent) doesn’t work. The large number of respondents who don’t work indicates that they are currently studying or are without a job.

Lastly, the question about car ownership shows how many of the respondents own a car at this point of their life. Most of the respondents as can be seen in Table 6 own a car. This was very expected since the survey was mostly shared on car designated pages and media. About 82.1% of the 156 people who own a car, own a regular combustion engine car and only 9.6% of the respondents own fully electric vehicles. This can be seen in Table 7.
Table 6 - Car Ownership

<table>
<thead>
<tr>
<th>Car Ownership</th>
<th>Count</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>156</td>
<td>65.0</td>
</tr>
<tr>
<td>No</td>
<td>84</td>
<td>35.0</td>
</tr>
</tbody>
</table>

Table 7 - Type of Car

<table>
<thead>
<tr>
<th>What type of car</th>
<th>Count</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular gasoline/diesel</td>
<td>128</td>
<td>82.1</td>
</tr>
<tr>
<td>Electric vehicle</td>
<td>15</td>
<td>9.6</td>
</tr>
<tr>
<td>Hybrid</td>
<td>5</td>
<td>3.2</td>
</tr>
<tr>
<td>Plug-In Hybrid</td>
<td>6</td>
<td>3.8</td>
</tr>
<tr>
<td>Other type of green vehicle</td>
<td>2</td>
<td>1.3</td>
</tr>
</tbody>
</table>

As a concluding remark to the descriptive statistics, these questions were asked in order to get a deeper insight into the demographics of the respondents, and to allow for further analysis. However, no conclusions were made regarding these statistics but are still deemed relevant for the understanding of the data.

4.2 Correlation

The most common way for presenting the relationship between two or more variables in quantitative studies, whether positive or negative, is through a correlation analysis or also called as correlation (Gogtay & Thatte, 2017). The purpose of the correlation test carried out is to confirm the relationship between two different variables. In the case of this study, the variables analyzed are attributes, attitude and intent. As demonstrated in Table 8, the Pearson correlation of 0.386 as well as the significance level of p<0.001 indicates a positive correlation between attitude and attribute. Similar results of Pearson correlation 0.327 and p<0.001 indicates a positive correlation between attitude and intent (intent to purchase).
However, as for the relationship between attribute and intent, the p value is p=0.360. There could be a correlation between these variables, however since the p-value is >0.05, the correlation is not statistically significant.

**Table 8 - Correlation Coefficients**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Pearson Correlation</th>
<th>Sig. 2-(Tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>0.386**</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Intent</td>
<td>-0.063</td>
<td>0.327**</td>
</tr>
</tbody>
</table>

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

4.2.1 Regression Analysis for Hypothesis 1

When doing the analysis for H1, the dependent variable is “attitude”, and the predictor is “attributes”. As previously mentioned under 3.6.1.1, these variables are constructs which are reflective of the data provided by the survey which have been totaled and then computed into new variables. The model summary shows (Table 9) us that the R Square value is 0.149 which means that 14.9 percent of the variance in attitude is explained by the independent variable.

**Table 9 - Model Fit Summary**

<table>
<thead>
<tr>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of The estimated</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.386a</td>
<td>0.149</td>
<td>0.145</td>
<td>4.63587</td>
</tr>
</tbody>
</table>
a. Predictors: (Constant), attributes
b. Dependent Variable: Attitude

Looking at the given Anova table (Table 10) after the analysis has been conducted, it is shown that the p-value is statistically significant with $p<0.05$, which indicates that the model is well-fitting.

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>754.848</td>
<td>1</td>
<td>754.848</td>
<td>35.123</td>
</tr>
<tr>
<td>Residual</td>
<td>4319.753</td>
<td>201</td>
<td>21.491</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5074.601</td>
<td>202</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Looking at the regression coefficients (Table 11) the independent variable of attributes has a significance level $p<0.05$ and a t-value of $t=5.926$ meaning that attributes has a statistically significant effect on attitude.

<table>
<thead>
<tr>
<th>Unstandardized B</th>
<th>Coefficients std. Error</th>
<th>Standardized Coefficients beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>13.896</td>
<td>1.563</td>
<td>8.891</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Attributes</td>
<td>0.205</td>
<td>0.035</td>
<td>0.386</td>
<td>5.926</td>
</tr>
</tbody>
</table>

Furthermore, it can be seen in Table 11, that the Unstandardized B value is 0.205, which indicates a change in attitude for each additional unit of attributes.
4.2.2 Regression Analysis for Hypothesis 2

When doing the analysis for H2, the dependent variable is “intent”, and the predictor is “attitude”. Table 12 shows us that the R Square value is 0.107 which means that 10.7 percent of the variance in intent to purchase is explained by the predictor attitude.

**Table 12 - Model Fit Summary**

<table>
<thead>
<tr>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of The estimated</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.327&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.107</td>
<td>0.103</td>
<td>30.76197</td>
</tr>
</tbody>
</table>

- a. Predictors: (Constant), attitude
- b. Dependent Variable: Intent

Looking at the given Anova table (Table 13) after the analysis has been conducted, it is shown that the p-value is statistically significant with p<0.05, which indicates that the model is well-fitting.

**Table 13 – ANOVA<sup>a</sup>**

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>23972.034</td>
<td>1</td>
<td>23972.034</td>
<td>25.322</td>
<td>&lt;0.001&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Residual</td>
<td>200615.350</td>
<td>212</td>
<td>946.299</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>224587.383</td>
<td>213</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- a. Dependent Variable: Intent
- b. Predictors: (Constant), attitude

Looking at the regression coefficients (Table 14) the independent variable of attitude has a significance level p<0.05 and a t-value of t=5.033 meaning that attitude has a statistically significant effect on intent (purchase intent).
### Table 14 - Regression Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Unstandardized B</th>
<th>Coefficients std. Error</th>
<th>Standardized Coefficients beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-1.545</td>
<td>9.973</td>
<td>-0.155</td>
<td>0.877</td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>2.141</td>
<td>0.425</td>
<td>0.327</td>
<td>5.033</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

a. Dependent variable: Intent

Furthermore, it can be seen in Table 14 that the Unstandardized B value is 2.141, which indicates a change in intent for each additional unit in attitude.

4.2.3 Regression Analysis for Hypothesis 3

When doing the analysis for H3, the dependent variable is “intent”, and the predictor is “attributes”. Table 15 shows us that the R Square value is 0.004 which means that 0.4 percent of the variance in intent to purchase is explained by the predictor attitude.

### Table 15 - Model Fit Summary

<table>
<thead>
<tr>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of The estimated</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.063a</td>
<td>0.004</td>
<td>-0.001</td>
<td>32.11615</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Attributes  
b. Dependent variable: Intent

Looking at the given Anova table (Table 16) after the analysis has been conducted, it is shown that the p-value is not statistically significant with p=0.360, which indicates that the model is not well fitted.
Looking at the regression coefficients (Table 17) the independent variable of attributes has a significance level $p=0.360$ and a $t$-value of $t=-0.918$ meaning that attributes do not have a statistically significant effect on intent (purchase intent).

4.3 Hypotheses Testing Results

As the findings presented above are analyzed, the hypotheses presented in this paper are also tested. The results outlined in the findings lead to $H1$ as well as $H2$ being accepted. However, $H3$ must be rejected.

The first hypothesis tested showed a significance level of $p<0.001$ which indicates that the null hypothesis: $H0$: *Attributes of electric vehicles such as price; performance; and*
environmental do not have a positive influence on consumers’ attitude towards EVs. should be rejected. This means that H1: Attributes of electric vehicles such as price; performance; and environmental have a positive influence on consumers' attitude towards EVs can be accepted and supported.

The second hypothesis that was tested using linear regression also showed a statistically significant p-value of p<0.001 which means that the null-hypothesis H0: The attitude that consumers have towards electric vehicles do not have a direct positive influence on their intent to purchase an electric vehicle, is rejected. Meanwhile the alternative hypothesis H2: The attitude that consumers have towards electric vehicles have a direct positive influence on their intent to purchase an electric vehicle, can be accepted and supported.

As for the third and final hypothesis tested using linear regression, a p-value that is not statistically significant can be seen at p=0.360. This means that the null hypothesis H0: Attributes of electric vehicles such as price; performance; and environmental do not have an indirect positive influence on consumers' purchase intent, is accepted and the alternative hypothesis H3: Attributes of electric vehicles such as price; performance; and environmental have an indirect positive influence on consumers' purchase intent, must be rejected.

![Figure 5 - Updated Conceptual Model](image-url)
<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Variable (ind. ; dep.)</th>
<th>Relationship</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Attributes ; Attitude</td>
<td>Direct</td>
<td>Accepted</td>
</tr>
<tr>
<td>H2</td>
<td>Attitude ; Intent</td>
<td>Direct</td>
<td>Accepted</td>
</tr>
<tr>
<td>H3</td>
<td>Attributes ; Intent</td>
<td>Indirect</td>
<td>Rejected</td>
</tr>
</tbody>
</table>
5. Discussion

5.1 Theory of Planned Behavior

To discuss the findings of this paper, the earlier presented theories will be used. For starters, the overarching idea of the theory of planned behavior (TPB) is to understand what influences a consumer's purchasing decision and ultimately why the consumer made a purchase. When looking at the findings and the analysis presented, it can be noticed that the importance of different attributes has a direct positive influence on consumer attitude. This can to some extent be explained by the variable of attitude in TPB since it is reflective of the consumer’s instantaneous positive or negative perception of the innovation. More importantly, the perceived behavioral control reflects the apparent availability or scarcity of necessary resources and opportunities within the behavior. In the case of this study, the application of the theory can be used to understand that if a consumer or respondent realizes that the attributes within EVs are lacking in availability, it will influence the person's attitude. For instance, if a respondent does not believe that the mileage is something that will live up to the needs of him/her, or if there is a lack of charging stations close to where he/she travels, it is going to influence the attitude of that person towards electric vehicles.

One of the findings of this study is the positive influence of attitude on intent to purchase. This result can be compared to the previous study by Indriani et al. (2019) who found in their research that environmental knowledge has a direct effect on the attitude toward green products. Attitude in turn is shown to have a direct effect on purchase intention. These findings can once again be connected to TPB, which states that a consumer’s attitude toward a certain product or behavior (together with other variables) have an influence on intention, which in effect influences behavior (purchase).

Finally, worth mentioning in this discussion regarding TPB is the question of social pressure. As a worthy factor in the theoretical model, subjective norm is presented. As mentioned in the theoretical framework, it speaks for any social norms or pressure that the consumer is subject to. As shown in Appendix 14, roughly a fourth of the respondents in this survey said that they felt social pressure to be climate friendly. This pressure could be one explaining variable to the attitude of some respondents. However, this was not properly analyzed in this paper.
5.2 Diffusion of Innovation Theory

The diffusion of innovations theory (DOI) discusses how new ideas, behaviors, or products move across a population and the speed of this progress. This theory can be connected to the findings of this paper and the phenomenon studied. The different parts in the DOI theory measure the attitude that people have towards electric vehicles. Hypothesis 2 (H2) aims at measuring consumers' attitude towards electric vehicles and in what way it influences purchase intent. As shown in Appendix 15, a rather large part of the respondents have a very good attitude towards electric vehicles and will 100% purchase one as their next car. Furthermore, the same table shows that several other large groups of respondents are not that sure if their next car will be electric. There are many possible reasons for this such as the price attributes, performance attributes and environmental aspect. The dispersed data shown in Appendix 15 is an indication that electric vehicles are at the early majority stage in the DOI process.

5.3 Theory of Technology Acceptance

The theory of technology acceptance (TAM) aims to understand the consumer perception of a new innovation, and how new innovation influences consumers' intentions to use it. There are two variables (perceived ease of use & perceived of usefulness) that are mentioned in TAM that can influence the purchase intent as well as the attitude towards an innovation. This paper came to similar results where the two variables mentioned in TAM have a direct effect on the attitude. The variables of perceived usefulness and the variable of perceived ease of use in the case of this study can be seen through the attributes of an EV. As the result in this study has shown the attributes of price, performance and environment are variables that showcase usefulness of a product and if it helps the consumer achieve better results, this could be regarding anything from the range of a car to the environmental aspect. Meanwhile the ease of use can be related to how the consumers attitude towards EV is affected by the charging infrastructure and the batteries of EVs, these are attributes that do not work in the same way or might seem more complicated than a regular combustion vehicle will have a direct effect on the attitude towards an EV.
5.4 Results in correlation with previous research

The findings presented in this study lead to the understanding that the importance of certain attributes within electric vehicles have a positive effect on the attitude of electric cars (H1). It was also found that the consumer attitude has a significant positive effect on the purchase intent of said consumer. Therefore, it can be discussed that these results are in line with the findings of Indriani et al. (2019) as well as Mostafa (2007) which showed a similar connection between attitude and purchase intent.

As constituted by Chen, et al. (2010), people seem to want to make their daily lives greener, which is supported by the data presented in this study. Furthermore, the dispersion of the data in attitude presented in this paper presents an understanding that there is an understanding of the on-going environmental issues which goes in line with the findings of Kilbourne and Pickett, (2008). The very dispersion in attitude likewise goes in line with the findings of Singer, (2016).

Moreover, the findings of Coffman et al, (2017) validates the findings in this study regarding the importance of certain attributes, with data showing that attributes such as ownership cost, driving range and charging time are important.
6. Conclusion

In order to answer the research question: *Do the attributes as well as consumer attitude of electric vehicles influence the intent to purchase one?* This research paper has conducted a survey, from which linear regression analysis has been conducted according to the conceptual model and the proposed hypotheses. The findings & analysis chapter of this paper presents an analysis that shows how H1 and H2 alternative hypotheses could be accepted, while the H3 alternative hypothesis was rejected. This collected knowledge leads to an understanding that the importance of certain attributes within an electric car as an innovation do in fact influence the attitude of that consumer. Furthermore, by utilizing this analysis as well as the theoretical framework presented it can be concluded that the attitude toward electric vehicles of a consumer does influence their intent to purchase one.

These results contribute to the general knowledge regarding electric vehicles and its potential market in Sweden. The implication of this study is that manufacturers, resellers as well as governing organizations in Sweden can utilize this knowledge to further spread the use of electric vehicles and contribute to a more sustainable private transport.

As a result of the aim of this study, this paper is relevant to car manufacturers as it seeks to answer to what extent the attributes of electric cars influence the intention to purchase one and will hopefully bring market insights to the industry in order to optimize production, sales and marketing accordingly and increase the number of emission-free cars on the roads. This paper is also relevant from a theoretical standpoint since the study directly contributes to the quantitative knowledge regarding the electrical vehicle market and its development in Sweden. What makes this study distinct is that it brings both theoretical connections to its findings as well as providing a general idea regarding how the government or firms in the industry can work toward spreading EVs further into the market and to capture consumers from different demographics.

To put the results of this study in a broader context, the meaning of the results are highlighted. The authors of this study believe that these results are meaningful to the general and overarching understanding of electric vehicles as an innovation with the purpose of eliminating climate-toxic CO₂ emissions stemming from the transport sector. The impact of
this study might not in itself be substantial, however, the very contribution of it will hopefully be of essence to the broader context.

6.1 Limitations

There are some areas that will be lacking in this paper. One limitation of this paper will be the sample selection as the study has decided to only investigate the Swedish consumers and their behavior. This becomes a limitation because only data from the Swedish population will be gathered and no worldwide or European conclusions can be drawn.

Another limitation of the paper is that it will only investigate fully electric cars and not hybrid cars or any other type of cars. The paper did not consider the results of including hybrid cars relevant. This decision was taken since the paper is interested in analyzing EVs without any form of emissions when driving. An argument for this is that hybrid vehicles are not a long-term solution to environmental issues since they still rely on fossil fuel, whereas electric vehicles provide a better environmental alternative and contribute to a more sustainable future. There is also a risk that a majority of the people who take the survey and have not made their vehicle journey from regular combustion engine to electrical will land in the middle when participating in the survey, thus not giving a significant result to the research question. Furthermore, during the writing of this paper, there is a war going on which has affected the prices of both gas and electricity which might have a short-term effect on the attitude of the consumers towards electric cars and cars in general and can give this research biased data.

6.2 Further Research

Further research must be done to understand how the different attributes of an electric car contribute to purchase intent in different parts of the world. As for the attributes, a deeper dive into them could be done as well as selecting different attributes of a car that could have an impact on consumer preference. This would be interesting as there is a gap in the research aside from the specific choice of attributes.

As previously mentioned, the relationships between the variables in the conceptual model are based partly on pre-assumptions. Therefore, for future research, structural equation modeling
could be a viable method for testing and evaluating the multivariate causal relationships in this paper in order to further establish validity in the suggested model.
References


Bilbolaget. (2021, May 21) *Elbilar är renare än fossildrivna bilar och Sverige är bäst i klassen.* [https://bilbolaget.nu/artiklar/elbilar-renare-an-fossildrivna-bilar/#:~:text=Ingen%20bil%20%C3%A4r%20milj%C3%B6v%C3%A4nlig%20eftersom,mer%20milj%C3%B6v%C3%A4nliga%20%C3%A4n%20fossildrivna%20bilar](https://bilbolaget.nu/artiklar/elbilar-renare-an-fossildrivna-bilar/#:~:text=Ingen%20bil%20%C3%A4r%20milj%C3%B6v%C3%A4nlig%20eftersom,mer%20milj%C3%B6v%C3%A4nliga%20%C3%A4n%20fossildrivna%20bilar)

Campbell, P., & Miller, J. (2021, December 30). Electric vehicles: the carmakers wary of going ‘all in’ on batteries. *Financial Times.* [https://www.ft.com/content/92475838-97ce-4c2a-8469-5a8e59e870dd](https://www.ft.com/content/92475838-97ce-4c2a-8469-5a8e59e870dd)


https://doi.org/10.1016/j.chb.2008.04.008


[https://doi.org/10.1111/j.1470-6431.2007.00655.x](https://doi.org/10.1111/j.1470-6431.2007.00655.x)


Mobility Sweden. 2021. Fordonsåret 2021 och prognos för 2022. Retrieved 2022-04-14 https://mobilitysweden.se/storage/8C33ED02EBDE7AF5B641B3BE8F0469B30E2DCF8AFBA7523ED7D344D9211BDC45/88e82df1f819a4fb89f2807c7b7d82632/pdf/media/6f5291f975dfb45f2bae51acdb33eab56/BIL%20Sweden%20om%20fordonsa%CC%8Aret%20202021.pdf


Rask, K. (2021, August 18). Granskning: Brist på laddstolpar i många av Sveriges län – endast 7 län klarar kraven. Alltomelbil


Appendix

Appendix 1 – Five Longest Range EVs and Five Shortest Range EVs (Km)

Five longest range EVs, Five shortest range EVs (Km)

<table>
<thead>
<tr>
<th>EV Model</th>
<th>Range (Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart EQ</td>
<td>95</td>
</tr>
<tr>
<td>Renault Twingo</td>
<td>130</td>
</tr>
<tr>
<td>Fiat 500e</td>
<td>135</td>
</tr>
<tr>
<td>Dacia Spring</td>
<td>170</td>
</tr>
<tr>
<td>Honda e</td>
<td>170</td>
</tr>
<tr>
<td>BMW i4</td>
<td>470</td>
</tr>
<tr>
<td>Porsche Taycan</td>
<td>475</td>
</tr>
<tr>
<td>Tesla Model 3</td>
<td>485</td>
</tr>
<tr>
<td>BMW iX</td>
<td>505</td>
</tr>
<tr>
<td>Mercedes EQS</td>
<td>640</td>
</tr>
</tbody>
</table>

Appendix 2 – Worst Case Scenario
Appendix 3 – Best Case Scenario

Best case scenario, EU electric cars emit 80% less CO₂ than diesel and 81% than petrol

Appendix 4 – Diffusion of Innovation Model

Appendix 5 – Theory of Planned Behavior
Appendix 6 – Normal P-P Plot

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: attitude

Appendix 7 – Normal P-P Plot

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Intent
Appendix 8 – Normal P-P Plot

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Intent

Appendix 9 - Scatterplot

Scatterplot

Dependent Variable: attitude
### Appendix 12 - Highest Achieved Education

<table>
<thead>
<tr>
<th>Education</th>
<th>Count</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary school</td>
<td>6</td>
<td>2.5</td>
</tr>
<tr>
<td>High school</td>
<td>134</td>
<td>55.8</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>59</td>
<td>24.6</td>
</tr>
<tr>
<td>Masters</td>
<td>38</td>
<td>15.8</td>
</tr>
<tr>
<td>PhD</td>
<td>3</td>
<td>1.3</td>
</tr>
</tbody>
</table>

### Appendix 13 - Monthly Salary of Respondents

<table>
<thead>
<tr>
<th>Monthly Salary</th>
<th>Count</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doesn’t work</td>
<td>47</td>
<td>19.6</td>
</tr>
<tr>
<td>Under 10.000kr</td>
<td>19</td>
<td>7.9</td>
</tr>
<tr>
<td>Between 10.000 - 25.000</td>
<td>58</td>
<td>24.2</td>
</tr>
<tr>
<td>Between 25.000 - 40.000</td>
<td>63</td>
<td>26.3</td>
</tr>
<tr>
<td>Between 40.000 - 70.000</td>
<td>43</td>
<td>17.9</td>
</tr>
<tr>
<td>Over 70.000</td>
<td>10</td>
<td>4.2</td>
</tr>
</tbody>
</table>
Appendix 14 – Social pressure towards environment

Pie Chart Count of social pressure

Social Pressure
- Yes
- No

26.7%
73.3%

Appendix 15 – Intent to purchase an EV

<table>
<thead>
<tr>
<th>Intent</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>30</td>
<td>12.5</td>
<td>12.9</td>
<td>12.9</td>
</tr>
<tr>
<td>10.00</td>
<td>19</td>
<td>7.9</td>
<td>8.2</td>
<td>21.0</td>
</tr>
<tr>
<td>20.00</td>
<td>17</td>
<td>7.1</td>
<td>7.3</td>
<td>28.3</td>
</tr>
<tr>
<td>30.00</td>
<td>27</td>
<td>11.3</td>
<td>11.6</td>
<td>39.9</td>
</tr>
<tr>
<td>40.00</td>
<td>20</td>
<td>8.3</td>
<td>8.6</td>
<td>48.5</td>
</tr>
<tr>
<td>50.00</td>
<td>31</td>
<td>12.9</td>
<td>13.3</td>
<td>61.8</td>
</tr>
<tr>
<td>60.00</td>
<td>14</td>
<td>5.8</td>
<td>6.0</td>
<td>67.8</td>
</tr>
<tr>
<td>70.00</td>
<td>20</td>
<td>8.3</td>
<td>8.6</td>
<td>76.4</td>
</tr>
<tr>
<td>80.00</td>
<td>19</td>
<td>7.9</td>
<td>8.2</td>
<td>84.5</td>
</tr>
<tr>
<td>90.00</td>
<td>12</td>
<td>5.0</td>
<td>5.2</td>
<td>89.7</td>
</tr>
<tr>
<td>100.00</td>
<td>24</td>
<td>10.0</td>
<td>10.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>233</td>
<td>97.1</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>999.00</td>
<td>7</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 16 – Survey

What do you think of Electric Cars? Win a movie-ticket!

Hi and thank you for stopping by! This survey takes about 5 minutes to answer and we appreciate every answer we get.

This is a study linked to a degree project written at Mid Sweden University at Jönköping. The study aims to examine consumers’ opinions and values about electric cars. The purpose of the study is to contribute to the industry with knowledge of what is really important to consumers on an electric car.

It is essential to answer this survey and your answers will remain anonymous and no information will be linked to your identity. When the survey is complete and the information has been collected, your answers will be deleted.

For questions or comments about this survey, you can contact the authors at the respective email addresses:

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Mikael Säfvenfelt
mikael.safvenfelt@hotmail.com

Mårten Ståhl
marten.stahl@gmail.com

Do you want to take the chance to win a cinema ticket in the draw for 3 cinema tickets? If yes, please enter your E-mail address. If not, skip this question.

What is your age?
- Under 18
- 18-25
- 25-32
- 33-40
- 41-50
- 51-65
- 65+
- Do not wish to say

What is your gender?
- Man
- Woman
- Other

What is your current form of living?
- House
- Rental apartment
- Owner apartment
What is your highest achieved education?
- Elementary school
- High school (3 years)
- Bachelors degree
- Masters degree
- PhD
- Lägg till alternativ eller lägg till Övrigt

What is your monthly salary before tax? *
- Unemployed
- Under 10,000kr
- Between 10,000 - 25,000 kr
- Between 25,000 - 40,000 kr
- Between 40,000 - 70,000 kr
- Over 70,000 kr

Do you own a car today?
- Yes
- No

If yes, what type of car?
- Regular gasoline/diesel car
- Plug-in hybrid car
- Hybrid
- Electric car
- Other eco-car

Electric cars are something that is generally seen as a good innovation regarding sustainability * and the climate. What do you think about the following aspects regarding the durability of the electric car?

<table>
<thead>
<tr>
<th>1. Disagree</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5. Agree</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric cars</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>EVs are bett</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>EVs are not f</td>
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<td>☐</td>
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<tr>
<td>EVs contribu</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
To what extent are these price aspects important to you when buying an electric car? *

<table>
<thead>
<tr>
<th>1. Not impo...</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5. Very impo...</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of car</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Price of elec...</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Price of fuel</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Price of mai...</td>
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<td>○</td>
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</tr>
<tr>
<td>Price of vehi...</td>
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<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Possible inst...</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

You can save money on owning an electric car instead of a regular car.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

To what extent are these performance attributes important to me in an electric car?

<table>
<thead>
<tr>
<th>1. Not impo...</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5. Very impo...</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Charging time</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Charging ava..</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Being “green”</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>Less mainte..</td>
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<td>○</td>
<td>○</td>
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<td>○</td>
</tr>
</tbody>
</table>

More and more models of electric cars are appearing on the market from several manufacturers. What do you think about the following?

<table>
<thead>
<tr>
<th>1. Disagree</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5. Agree</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVs are over..</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>The supply o..</td>
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<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>EVs are price..</td>
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</tr>
</tbody>
</table>

There is charging availability where I live

<table>
<thead>
<tr>
<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Do you feel any social pressure to be "green"?

- Yes
- No

If yes, from whom is this pressure coming and how do you experience it?

Karen svarstext

A war is currently going on in Ukraine. Situations like this can have an impact on prices around the world. How worried do you feel about rising fuel prices and electricity prices?

- 1. Not worried at all
- 2.
- 3.
- 4.
- 5. Very worried
- Don't know

How likely is it that your next car will be electric?

- No chance
- 10%
- 20%
- 30%
- 40%
- 50%
- 60%
- 70%
- 80%
- 90%
- 100%
- Don't know