What's the extra mile for consumers' adoption of electric vehicles? A netnographic study on electric vehicles online communities

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Abstract

The progress of the global agenda for sustainable development, as well as increased concerns over climate change and global resource storage, are in the centre of this century discussions and concerns. Such concerns foster the demand for electric vehicles as these contribute to a more sustainable transportation system by reducing greenhouse gas emissions. The present dissertation aims to study online communities of electric vehicles enthusiasts, understanding their attitudes, behaviours and opinions towards electric vehicles purchase intentions. Hence, netnography is considered the most appropriate qualitative research method to conduct this research. Results demonstrate that electric vehicles purchase intentions are affected by the consumers weighting of drivers, barriers, and mostly, perceived self-image. Further, this research shows that purchase intentions of electric vehicles are highly motivated by social influence. This study contributes to current academic discussion on the influential factors of this technology diffusion, unveiling interesting findings regarding the pre-eminence of perceived self-image and vehicle performance over environmental concerns, on purchase intentions. The desired change of behaviours and attitudes towards a more sustainable lifestyle, should be enticed at a societal level through Social Marketing. Governments should promote a more sustainable behaviour on the transportation paradigm by investing in the development of charging infrastructures and promoting the adoption of electric vehicles through stricter policies and incentives. Conspicuously, companies should leverage on governments actions and policies by advocating the futuristic and innovative technology, enhancing consumers perceived self-image to hasten electric vehicles diffusion.

Keywords: Electric Vehicles, Climate change, Sustainability, Green Marketing, Social Marketing, Netnography, Diffusion of Innovations, Online communities

Título: Qual é a "milha extra" para os consumidores adotarem veículos elétricos? Um estudo netnográfico sobre comunidades online de veículos elétricos

Autora: Filipa Pereira

Resumo

O progresso da agenda global para o desenvolvimento sustentável e o armazenamento de recursos globais, estão no centro das discussões e preocupações deste século. Estas preocupações estão a fomentar a procura de veículos elétricos, uma vez que estes favorecem a redução de emissões de gases com efeito estufa e contribuem para um sistema de transporte mais sustentável. A presente dissertação visa, por isso, analisar comunidades online de entusiastas de veículos elétricos e compreender as suas atitudes, comportamentos e opiniões em relação às intenções de compra de veículos elétricos. Deste modo, netnografia é considerado o método de investigação qualitativo mais adequado para esta investigação. Os resultados demonstram que as intenções de compra de veículos elétricos são afetadas pela forma como os consumidores avaliam motivações, barreiras e percecionam autoimagem. Adicionalmente, as intenções de compra são fortemente motivadas pela influência social. Este estudo contribui para a atual discussão académica sobre os fatores influentes na difusão desta tecnologia, revelando a preeminência da perceção da autoimagem e do desempenho dos veículos em detrimento de preocupações ambientais na intenção de compra. A desejada mudança de comportamentos e atitudes para um estilo de vida mais sustentável deve ser fomentada através do Marketing Social. Os governos devem promover um comportamento mais sustentável no sistema de transporte, promovendo a adoção de veículos elétricos e investindo no desenvolvimento de infraestruturas de carregamento. Seguidamente, as empresas devem aproveitar as ações e políticas dos governos, promovendo tecnologia futurista e inovadora, potenciando a autoimagem dos consumidores para acelerar a difusão de veículos elétricos.

Palavras-chave: Veículos Elétricos, Alterações Climáticas, Sustentabilidade, Green Marketing, Marketing Social, Netnografia, Difusão de Inovações, Comunidades online

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Love you all dearly.

Contents

1. Introduction

1.1. Problem definition and relevance

The increasing amount of greenhouse house gases (GHG) accumulation in the atmosphere is one of the biggest drivers to accelerate global warming and is unfolding catastrophic changes to Earth's climate (Palmera & Stevensb, 2019). From this inevitability, scientists have ascertained that reducing or reversing GHG emissions would prevent additional warming (Palmera & Stevensb, 2019). As a result, policymakers are introducing collective worldwide agreements. The Paris agreement, requires all countries to put forward their best efforts through nationally determined contributions, and all parties report regularly on their GHG emissions and implementation efforts (United Nations, 2015).

In face of the aforementioned practices and considering that road transportation is accountable for approximately 17% of global energy use and global GHG emissions (International Council on Clean Transportation, 2017), measures to decarbonize road transportation are needed. In this sense, electric vehicles (EVs) are a viable, promising, and more sustainable alternative to internal combustion engine vehicles (ICEVs) (Hawkins, Singh, Majeau-Bettez, & HammerStrømman, 2012; Kennedy & Philbin, 2019; Santos & Davies, 2019).

The development and diffusion of EVs has played a significant role in the political agenda of many countries. The French and British governments already announced they will end the sale of vehicles emitting GHGs by 2040 (République Française: Le Ministère de la Transition Écologique et Solidaire, 2017; UK Department for Environment, Food and Rural Affairs and Department for Transport, 2019).

The evolution of contextual factors for EVs adoption generates a greater challenge for companies to rethink their strategies and move in accordance with the aforementioned patterns. As such, insights regarding the most influential determinants for the adoption and diffusion of this technology are of great significance.

As per the ongoing shift in the transportation system, previous studies often focus on consumers personal factors (e.g. sociodemographic factors, price preferences, financial benefits, previous experience, etc.) (Barth, Jugert, & Fritsche, 2016; Bühler, Cocron, Neumann, Franke, &

Krems, 2014; Junquera, Moreno, & Álvarez, 2016; Sierzchula, Bakker, Maat, & Van Wee, 2014) and contextual factors such as government support and incentives (Krupa, et al., 2014). Other studies also approach the relationship between consumers environmental attitudes and EV adoption behaviours (Egbue & Long, 2012; Oliver & Rosen, 2010). Notwithstanding, consumers purchase intentions are also driven by social influence. In this sense, consumers tend to define themselves as member of communities and they are affected by the attitudes and opinions of the members of the community they belong (Barth, Jugert, & Fritsche, 2016).

As there is still limited research on the understanding of how social networks influence EVs purchase intentions, this dissertation aims to explore that. Additionally, given increasing concerns over climate change, this study also aims to understand how environmental concerns influence consumers purchase intentions of EVs. Given the relevance of climate change and the global concern over this subject, this dissertation adopts a qualitative research method - netnography, to conduct research on the online environment and to provide valuable insights from a marketeer perspective to accelerate EVs technology diffusion.

1.2. Objective and Research Questions

In this study, an ethnographic research combined with online social interaction – netnographic approach – is used to study consumers' motivations to integrate environmentally conscious EVs communities and their attitudes towards purchasing an EV.

The purpose of this dissertation is to ascertain perceptions of climatic changes and environmental concerns related to GHG emissions, by studying EVs online communities. By doing so, the study aims to provide managerial implications to the marketeer on how to adapt the EV market to consumers.

Ultimately, the research attempts to provide insights to the EV marketeer to attract and engage customers into a more conscious lifestyle.

RQ1: *What does it mean to the online community members, to own an EV?*

This question intends to provide an understanding of consumers perceived self-image for owning an EV.

RQ2: *What are consumers' main drivers and barriers to buy an EV?*

This question intends to provide an understanding of drivers and barriers that may foster or hinder the uptake of EVs.

RQ3: *Is the social system influencing consumers' purchasing decisions? How are consumers weighting online interactions and validation?*

This question intends to scrutinise how social influence is affecting EVs purchase intentions.

RQ4: *Is sustainability influencing the adoption process? How are consumers factoring sustainability concerns in their individual purchasing intentions?*

This question intends to provide insights on the relationship between consumers environmental concerns and their intentions do adopt an EV.

1.3. Structure of the Thesis

The present dissertation subdivides into 6 chapters. Firstly, it presents the relevance of the research topic, followed by the problem definition and the research questions the researcher aims to answer. Subsequently, a review of existing literature covering EVs context, Green Marketing, factors that influence EV purchase intentions and the diffusion of technology are presented. Then, the third chapter presents the methodology used in the empirical analysis, presenting how data is collected and analysed using netnography. Thereafter, the research investigation leads to a thematic analysis for the development of grounded theory. In the fifth chapter, conclusions are withdrawn from the analysis and theoretical, and managerial implications presented. Lastly, limitations of this study are exposed, and future research suggestions presented.

2. Literature Review

2.1. Why are EVs on the spotlight?

According to World Economic Forum and Business Insider forecasts, total vehicles in circulation by 2040 will reach the 2 billion mark (World Economic Forum; Business Insider, 2020). On the other hand, road transport is responsible for approximately 17% of global energy use and GHG emissions (International Council on Clean Transportation, 2017). May the aforementioned pattern persist and the projections entail a scenario where there is a considerable increase in gasoline and diesel demands – this takes serious implications for climate change and urban air quality (Hawkins, Singh, Majeau-Bettez, & HammerStrømman, 2012).

As a result, many policymakers, individually and collectively[1], are introducing mandatory GHG emission standards including fuel-efficiency standards, market price signals, customer incentives and financing, behavioural education, etc. (McKinsey & Company, 2009). Such concerns regarding climate change, as well as concerns over reliable supplies of hydrocarbons, are fostering the search of EVs as an alternative to ICEVs (Kennedy & Philbin, 2019).

In fact, various studies[2] indicate that demand for vehicles with a less polluting propulsion system, which have a lower impact in GHG emissions, is increasing – in a recent report, Bloomberg estimates that by 2040 "57% of all passenger vehicle sales, and over 30% of the global passenger vehicle fleet, will be electric" (BloombergNEF, 2019).

In comparison to ICEVs, EVs present powertrain efficiency, and zero tailpipe emissions (U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy's - Vehicle Technologies Office, 2020), endowments which imply a perception of such technology as environmentally benign (Hawkins, Singh, Majeau-Bettez, & HammerStrømman, 2012). Notably, Larson et al, (2014) argue that the success in increased EV adoption not only depends on policymakers, but also upon understanding consumer perceptions and attitudes towards it. On the other hand, sustainability is an idea that emerged in the early '80s, from the scientific perspective of relation between nature and society, where the need of meeting human needs are fulfilled while

[1] The Paris Agreement requires all countries to put forward their best efforts through nationally determined contributions, and all parties report regularly on their GHG emissions and implementation efforts.

[2] Please refer to Garling and Thøgersen, (2001) and Hawkins, Singh, Majeau-Bettez, and HammerStrømman, (2012).

the preservation of planet Earth system is maintained (Kates, et al., 2001). In fact, EVs adoption is contemplated as a crucial factor towards sustainability in the automotive industry - but the marketeer plays an important role (Cronin, Smith, Gleim, Ramirez, & Martinez, 2011; Larson, Viáfara, Parsons, & Elias, 2014).

Whilst some authors suggest that EV producers should advertise the product based on its unique selling proposition of being sustainable and less detrimental to the welfare of people and nature (Garling & Thøgersen, 2001), others seem to point out that a new technology product based approach to marketing management will foster future growth (Mangram, 2012), as it is the case of Tesla, one of the largest EV producers in the world (Campbell & Tian, 2020). When analysing the strategic marketing plan of Tesla, Mangram (2012) compared it to the one undertaken by Apple, which targets a high-end segment, focusing on its high-tech attractiveness proposition.

Regardless of the marketing strategy ultimately adopted, given the barriers imposed to a potential EV customer, skilful marketing strategies are required to diffuse acceptance throughout the market (Garling & Thøgersen, 2001).

2.2. Green marketing

"Climate change has become a defining factor in companies' long-term prospects. (…) But awareness is rapidly changing, and I believe we are on the edge of a fundamental reshaping of finance. The evidence on climate risk is compelling investors to reassess core assumptions about modern finance."

Larry Fink, Chairman and CEO of BlackRock (2020)

As the sustainability agenda progresses – governments enact legislation and consumers' awareness grows –, corporate leaders also understand that businesses have an important role in addressing challenges such as climate change (Harvard Business Review, 2019). One business area where the businesses' environmental innovation approach is shaped is marketing (Hauser, Tellis, & Griffin, 2006). Terms like "Green Marketing" and "Environmental Marketing" have thus become commonly accepted within the marketing landscape (Polonsky, 1994).

Green marketing is frequently associated with the *greening*[3] of the different aspects of traditional marketing (Kilbourne, 1998). As defined by Peattie & Charter (1997), green marketing refers to the collection of processes where a company identifies, anticipates, and satisfies costumers and society needs with conscientization in its own profitability, and sustainable way to achieve those means.

Unlike traditional marketing, it generally involves the production of *green* products for sale to *green* consumers who are cautioned to recycle the waste from their consumption (Kilbourne, 1998). Berns, et al., (2009) suggest that a sustainability-driven business can potentially provide new sources of competitive advantages such as developing new products, identifying new markets, stimulating innovation, seize on emerging technologies, and mitigating risks.

Junquera et al., (2016) advocate that "costumers must perceive a value increasing to choose a product eco-innovation when there are conventional products in the market" (p.7). The authors argue that EV companies would benefit from a powerful competitive advantage through a combination of communicating the attributes of the vehicles as well as their environmentally friendliness. In fact, Aggeri, Elmquist, and Pohl (2009) added that the new marketing strategies should be explored in the automotive industry.

The literature suggests[4] that consumers' brand image conceptualization affects their behaviour on brand-purchase of automobiles. Hence, a higher level of consumer abstraction, encompassing a brand advertisement more focused on its *greenness* than on a specific product's attributes, provide guidelines for strategic marketing of vehicles (Hsieh, Pan, & Setiono, 2004).

The current EV technology environment characterized by the last phenomenon of new digital technology and the increasing concerns about environmental issues, suggests that environmentally friendly marketing (encompassing a green marketing concept) (Cronin, Smith, Gleim, Ramirez, & Martinez, 2011) is a possible approach to advertise EV's environmental benefits (Cherubini, Iasevoli, & Michelini, 2015). Additionally, Cronin et al., (2011) state that green marketing strategies are in accordance with market tendencies and imposed pressures, such as increase of energy costs, public pressures, and environmental awareness. Further, it is strongly

[3] For ease of communication, except if specified otherwise, please refer to terms as greening, green, or environmentally friendly, as actions that are not harmful to the environment.

[4] Please refer to Cronin, Smith, Gleim, Ramirez, & Martinez (2011) and Menon and Menon (1997)

suggested by Menon and Menon (1997) that *green* based marketing strategies respond with improved corporate and consumer responses.

Against this backdrop, the discussion of the impact environmental strategies take on firms performance is crucial (Menon & Menon, 1997).

2.2.1. Green Marketing: does it pay off?

As the literature suggests[5], from the consumer's perspective, corporate social responsibility (CSR) and green marketing practices, can refer to the same management process of identifying consumers and society needs, satisfying them in a sustainable way, remaining competitive in the markets. In this sense, corporate identity associated with CSR can encompass the understanding of consumers' awareness towards green marketing and how it affects purchase intentions (Ko, Hwang, & Kim, 2012; Rios, Martinez, Moreno, & Soriano, 2006).

Studies held by (Berens, Riel, & Bruggen, 2005; Madrigal, 2000) on companies and its products, supported the existence of a relationship between corporate associations and product response that is positively influenced by CSR associations. Further, in a 2014 study, Olsen et al. (2014) reinforced this association and authenticated that "products that offer environmentally sustainable features" (p.119) impact attitudes of consumers towards a brand. Anecdotal evidence is observed in General Electric's (GE) case; The company had a long history of polluting activities and poor sustainable undertakings and invested $15billion to begin the production of green products - by 2014, GE ranked 23rd on Interbrand's Best Global Green Brands list (Pritchard & Wilson, 2017).

Additionally, "green new products" associated with CSR initiatives emphasize environmental efforts and impact on brand attitude (Peloza & Shang, 2011). Studies concluded that positive consumer perceptions and profitability increases are potentially earned if a firm is associated with environmentally responsible practices (Luo & Bhattacharya, 2006; White, Habib, & Hardisty, 2019). Brand managers can emphasize, through marketing efforts, specific brand or product characteristics to achieve a desired brand perception or identity (Olsen, Slotegraaf, &

[5] Please refer to, Kang & Yang (2010), Ko, Hwang, & Kim (2012) and Paço, Raposo, & Filho (2009).

Chandukala, 2014). Thus, a green marketing approach can be responsible for an improved, reinforced and desired corporate image (Ko, Hwang, & Kim, 2012; Olsen, Slotegraaf, & Chandukala, 2014).

Sen & Bhattacharya (2001) also note that there are positive implications between socially responsible actions from a company and its consumers, which have a direct impact in creating a C to C bond and customers' product attitude. Ultimately, Ko, Hwang, & Kim (2012), conclude that the consumer's perception of green marketing has a greater impact on positive image of a company than traditional marketing. Further, Menon and Menon (1997), conclude from their study that environmental efforts and marketing strategies, encompass in increased distinguishability, competitive advantages over competitors and subsequentially, a positive response from consumers and firm's performance is achieved.

Yet, literature diverges regarding the impact of green strategies in firm's financial performance (Leonidou, Katsikeas, & Morgan, 2012). As the research performed by Bansal (2005) indicates, there is a negative correlation between corporate sustainable development and a firm's return on equity. The author takes the short-term cost of investing in such organizational strategy, as corporate sustainable development, accountable for the negative relationship on return on equity. Further, Hassel, Henrik, & Nykist (2005) also conclude in their study that environmental performance is negatively associated with a firms' market value. Concurrently, other authors seem to suggest that social responsibility initiatives that overpass the legally required minimum result in additional costs (Cronin, Smith, Gleim, Ramirez, & Martinez, 2011), implying poor economic performance (Ullmann, 1985).

Conversely, in the research conducted by Leonidou, Katsikeas, & Morgan (2012), is demonstrated that green marketing has a positive correlation in motivating managers, customers, and shareholders when countering firms return-on-assets and performance. These findings also argue with Cronin et al. (2011) argue that different stakeholders' groups have inherently different motivations and therefore a companies' marketing role varies in respect of the dissimilarities of such groups – understanding drivers of customer response is determinant.

2.3. Understanding consumer response

Technological development has been recently portrayed by technologists and policymakers by two detached views – technical and social concerns (Sovacool, 2009). According to Egbue & Long (2012) social concerns may present as much as an important characteristic to consumers as technical concerns.

2.3.1. Vehicle attributes, technical factors, and pricing concerns

Many studies have focused their research on the technical attributes of EV to understand consumers' willingness to buy an EV (Junquera, Moreno, & Álvarez, 2016). In fact, Rasouli and Timmermans (2013) suggest that the most important factors for consumers acceptance of EVs are its attributes and relative cost.

Specifically, EVs face important market barriers such as high prices, short drive ranges, long recharging times, and an insufficient recharging infrastructure (Bonges & Lusk, 2016; Coffman, Bernstein, & Wee, 2016; Nilsson & Nykvist, 2016; Martin Weiss, 2019).

Regarding EVs cost, the literature[6] suggests that it presents simultaneously a barrier and a driver to adoption, being the high front cost perceived as a barrier to adoption but regardless, the lower operational costs promote consumer adoption. In addition to that, fuel for EVs is inexpensive, electric motors last significantly longer than internal combustion engines, and motor maintenance is minimal (Garling & Thøgersen, 2001). Junquera, Moreno, and Álvarez (2016) conclude that a decrease in the price of EVs should be one of the primary focuses for manufacturers, pointing the advantage of reaching young costumers with lower incomes.

Further, EVs range is considered a substantial disadvantage for the adoption of this technology, since these vehicles offer substantially less range then ICEVs (Skippon & Garwood, 2011). However, as the limited range may seem a barrier, Rezvani, Jansson, and Bodin (2015) state that it can be "more of a perceived barrier than an actual one*"* (p.130). In contradiction, Jensen et al. (2013), conducted a study where 369 drivers experienced an EV, and concluded that individuals

[6] Please refer to Egbue and Long (2012), Graham-Rowe, et al. (2012), Jensen, Cherchi, and Mabit (2013), Lieven, Mühlmeier, Henkel, and Waller (2011), and Sovacool and Hirsh (2009).

preferred a greater range and even after a trial period range was still a concern. Likewise, range anxiety, which relates to the anxiety of being stranded on the road to their destination, influences consumers adoption intentions (Egbue & Long, 2012). To this point, the authors ascertain that costumers would be willing to accept interchangeability between faster recharging's with longer driving ranges. However, Degirmenci & Breitner (2017) suggest that driving experience can significantly improve costumers range confidence and demonstrate that the driving range needed is in fact inferior than expected.

As discussed, pricing concerns, technical factors, and vehicle attributes are determinant considerations to understand consumers response to EVs. Notwithstanding, the literate on consumer response also accounts individual-specific characteristics as determinant influential factors.

2.3.2. Consumer characteristics

Junquera et al. (2016) studied what age groups would be more willing to adopt an EV. They concluded that marketeers should focus on the younger group age[7], as these have superior environmental education and are more prone to innovation. Further, a medium or high level of disposable income may influence the increase of EVs adoption (Junquera, Moreno, & Álvarez, 2016; Sierzchula, Bakker, Maat, & Van Wee, 2014).

Concurrently, individuals' levels of knowledge and experience with EVs also influence their adoption behaviour – if consumers' awareness towards EV is higher, so is their willingness to adopt and recommend it (Barth, Jugert, & Fritsche, 2016; Bühler, Cocron, Neumann, Franke, & Krems, 2014). Particularly, environmental values present a major role in adoption of EVs (Egbue & Long, 2012; Oliver & Rosen, 2010). Gallagher & Muehlegger (2011), found that consumers preferences for environmentalism increased more EVs sales than gas price decreases or tax incentives have.

Although Egbue and Long (2012) findings seem to suggest that cost and performance present higher influencing rates on adoption of EVs than environmental advantages (although

[7] The researchers refer to younger group age as people between their mid-twenties and mid-sixties.

sustainability and environmental concerns also present major influence), Degirmenci and Breitner (2017), conclude that environmental performance is a more substantial determinant than cost and performance. Further, it is suggested in the academic literature regarding influential factors of consumers EVs purchase intentions, that besides consumers individual characteristics, social influence also plays a major role.

2.3.3. Social norms and networks

Another cornerstone in EV purchase intentions is social influence – Barth, Jugert and Fritsche (2016) argue that social norms are also a driver for costumers decision-making process. According to the authors, a customer perceives himself not only as an independent individual but also as an integrant part of a group or a community. Moreover, an individual is influenced by his social network (e.g. family, friends, colleagues); that influence can either encourage purchase behaviour of an EV or hinder such desire (Rasouli & Timmermans, 2013).

Not only that, a study conducted by Noppers, Keizer, Bolderdijk, and Steg (2014) suggests that by adopting a sustainable innovation, costumers may perceive a positive social image or status, and therefore increase purchase behaviour.

As discussed, vehicle attributes, technical factors, pricing concerns, consumer individual characteristics, social norms and networks are influencing consumers' purchasing behaviours. Conspicuously, the literature points to the need of understanding how consumers response to abovementioned factors influences and deters EV technology diffusion in the markets.

2.4. Diffusion of new technology – a theoretical overview

Consumers awareness for ethical and/or sustainable behaviour is growing (Carrington, Neville, & Whitwell, 2010). As ethical concerns become more prominent, consumers begin to act accordingly (Shaw, 2007). In that respect, the United Nations have put in place a 10-year initiative which incites innovation and cooperation among all stakeholders aiming to accelerate sustainable consumption and production patterns (United Nations Environment Program, 2012).

As stated by Hauser, Tellis, and Griffin (2006), "the success of innovations depends ultimately on consumers accepting them" (p.688). Therefore, is important to understand the academia research behind the diffusion of new technology to explain or predict how consumers react to EVs. Specifically, regarding the EV industry, Barth et al. (2016) state that one needs identify the variables related and responsible for the acceptance of EVs. The authors suggest that acceptance is not only dependent upon technical or cost-related features, but also on the social aspect of interactions between individuals, thus the need to study how new technologies diffuse in the market.

In the course of the past 50 years, various studies have approached the process of adopting new innovations. The theoretical framework put forth by Everett M. Rogers in his vast literature, but notably on his 1962 book - *Diffusion of Innovations* (Rogers, 1962) – is one of the most frequently used among the literature (Sahin, 2006).

As defined by Rogers (2003) "diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system*"* (p.6). The diffusion innovation theory is characterized by four key components elements – innovation, time, communication channels and social system (Rogers, 2003).

Innovation is perceived by an individual if the idea is new to him (Huang, Hou, & Chen, 2017). Indeed, Rogers (2003) proposed a curve of diffusion of innovation to better characterize adopter categories as he named: innovators, early adopters, early majority.

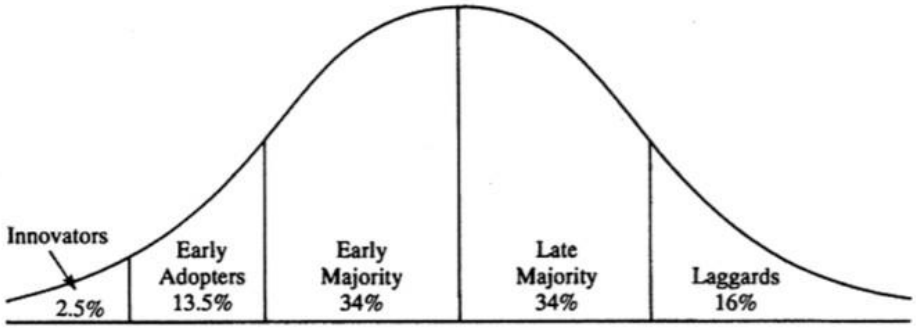

Fig.1 Distribution of the categories of individual Innovativeness.

Source: Rogers (2003)

According to Rogers (2003), the innovator plays an important role on the social system by launching the innovation and thus, starting the diffusion process. Notwithstanding, the author states that the innovator must also be prepared to cope with the inherent uncertainty and inevitable failure of some innovations. The early adopters are described by Rogers (2003) as the category with greatest degree of influence. These adopters are also characterized for having most opinion leaderships and thus, decrease uncertainty among the social system and accelerate the diffusion process (Rogers, 2003). The early majority follows the previous categories and provide "interconnectedness" among the social system, as stated by the author. The late majority need to trust the innovation and to be pressured by the social system to motivate their adoption (Rogers, 2003). Finally, the author describes the last category - the laggards, as the slowest and resistant to adoption in the social system (Rogers, 2003).

The author argues that the adoption of innovation is a process that relies in communication between an adopter and a probable adopter, foreseeing a positive experience from the adopter, enhancing product adoption for the second one. For Rogers (1995), the information that leads to decision comes from the mass media and WoM (Word of Mouth). According to Van Eck, Jager, and Leeflang (2011) marketing needs to understand how communication affects the diffusion of innovations through mass media (correlated to external influences) and then through WoM (interpersonal influences).

Greenhalgh et al. (2004) add that mass communication plays an important role in creating awareness but nonetheless, interpersonal influence plays the dominant stimulus for diffusion. Van Eck et al. state that "WoM has the most important influence in the consumer decision-making process" (p.190). In fact, technological change acceptance is influenced by opinion leaders (Rogers, 1995). Further, companies with high reputations can act as opinion leaders in the market and therefore, accelerate the diffusion process of an innovation (Dell'Era & Verganti, 2011).

Additionally, Van Eck et al., (2011) state that opinion leaders are most likely early adopters due to their pursue of search to influence or give advice of new products. Therefore, in the diffusion process, early adopters (especially opinion leaders) have a crucial impact on the adoption process of later stages since they have more experience and legitimize the innovation. On this subject, some authors call attention to the devastating effects an early adopter, opinion leader or expert can have

in the diffusion process by having a dissatisfactory experience with the innovation (Wind & Mahajan, 1987; Leonard-Barton, 1985; Richins, 1984).

However, Watts and Dodds (2007) state that the process defined by the S shaped diffusion curve presented by Rogers (2003) does not need opinion leaders. Further, Van den Bulte and Joshi (2007) studied how the social structure can influence the diffusion of innovation at a macro-level, concluding that high-technology innovations are "complex or risky", and therefore, opinion leaders do not play a significant role in the diffusion process.

3. Methodology and Data Collection

In this chapter, it is established the methodological approach to accomplish the objective and answer the study's research questions. Furthermore, the procedures used in the selection of online communities and how to obtain consumer insights from them are described.

3.1. Introduction to Netnography

The main qualitative research method approached in this dissertation is netnography. This method allows the researcher to study the interactions, in an online community, between its members. Generically, the term *community* represents interpersonal interactions between individuals with the same set of values and in the same territory (Muñiz and O'Guinn 2001). Further, Schau et al., (2009) consider that online communities should be interpreted as an online social space, where members perceive a sense of belonging, engaging in social activity.

The term netnography was defined by Kozinets (2002) as a qualitative research method based on online research techniques to collect relevant consumer insights, from computer-based communications. As stated by Koznets (2002), this research method can provide to marketeers, knowledge regarding relevant symbol-systems, meanings, and decision-making influences of the studied online consumer groups. Netnography is the adaptation of ethnographic qualitative research methods with online based communities, insomuch that Konizets (2002) refers to it as "etnography on the internet" (Kozinets, 2002). The need to adapt research methods arises from the advent of network computing interactions, with share of experiences and beliefs from the younger generations (Heinonen & Medberg, 2018; Kozinets, 2002). In this era of digitalization, online environments proliferate and inherently connect communion, through the offered online computer-networking possibilities (Rokka, 2010). Altogether, from a marketing point of view, consumers active role on the online realm can provide marketeers opportunities to get consumers insights, contributing to costumer learning and the construction of relationships (Simmons, 2008; Tikkanen, Hietanen, Henttonen, & Rokka, 2009). Correspondingly, the internet is providing marketeers precipitating and significant opportunities to entice experiences, engaging with consumers that take brand's meaning as a self-expression of themselves within homogenous groups (Simmons, 2008).

Heinonen and Medberg (2018) conducted a study to illustrate the use of netnography as a method and to conceptualize possible avenues for further researchers that use the method to collect and analyse online data. The findings of the study revealed netnography as a research method increasingly augmenting its recognition among the literature. The arguably incrementation of technology mediated communications in the daily life of consumers (Garcia et al., 2009) can be studied by qualitative researchers through netnography – this method conveys a useful tool to analyse such data (Heinonen and Medberg, 2018; Kozinets, 2006; Rokka, 2010).

Furthermore, the literature suggests that netnography contrasts with more traditional research methods given its more naturalistic and unobtrusive approach - that accounts on observation of naturally occurring discussions between members of a community, instead of fabricated marketing research contexts (e.g. focus groups, personal interviews or surveys) (Giesler & Pohlmann, 2003; Kozinets 2002; Pollok et al., 2014). Moreover, the method offers advantages of being less time consuming, simpler to perform, less costly than traditional ethnography (Kozinets, 2002) and by taking into consideration inherent cultural aspects of the researched community (Kozinets, 2010).

As stated by Costello et al. (2017), netnography continues to distinguish itself from many existing online etnography methods "by offering a more systematic, step-by-step approach to addressing the ethical, procedural, and methodological issues specific to online research" (p.2). Furthermore, the adaptability and flexibility of netnography (Kozinets, 2015) can become valuable in the process of product innovation, considering the easiness of garnering rich communications (Costello et al., 2014).

Under the abovementioned assumptions, netnography is the research method chosen to approach EVs enthusiasts' interactions and to "gain practical insights into their usage behaviour" (Pollok et al., 2014). The six steps proposed by Kozinets (2010) were followed to conduct this study and henceforth, the following sub-sections of this chapter will address each step.

3.2. Research planning

As an initial step to research planning, relevant research questions must be identified. Equally important is to identify computer-based communications (e.g. online platforms, social networks) suitable to answering those queries.

As per the scope of this study, online platforms such as Google, Reddit, Facebook and Youtube were analysed to address the research questions identified in chapter 1.2. Whilst searching for terms as "electric vehicles", "electric vehicles adopters", "electric vehicles online communities", numerous online communities were identified such as Forums, Facebook Groups, Corporate and Personal blogs.

Nowadays, EV's are an emerging technology with implications for climate change and urban air quality (Hawkins, Singh, Majeau-Bettez and Stromman, 2012). Thus, this technology attributes and specifications (e.g. environmental benefits (Cherubini, Iasevoli, Michelini, 2015)) are widely discussed within transnational online communities.

According to Kozinets (2015), the selected online communities should be "relevant, active, interactive, substantial, heterogeneous, data-rich and experientially satisfying" (p.175). Therefore, as suggested by the author, online communities were preferred based on the following evaluations:

- Subject-*focused* discussions, containing consumer to consumer exchange of insights and holding market-oriented discussions.
- *Active* groups, i.e. online communities with a higher posts traffic.
- *Interactive* communities with larger numbers of message posters, preferably comprising *heterogeneous* and diverse interactions.
- *Substantial* interactions, entailing detailed, descriptive, and *data-rich* posts.
- E*xperientially satisfying,* i.e. with between-member interactions of the type required by the research questions.

Considering the above, an online forum of EV's enthusiasts - *SpeakEV,* entirely focused on EVs, was deemed to comply with all seven evaluations, as proposed by Kozinets, to define an online community as suitable for research. Additionally, a Reddit forum <EV news and products> were included in this study, considering the increased amount of subject related discussions, among active and interactive members of those communities.

3.3. Entreé

Researchers "must learn as much as possible about the forums, the groups, and the individual participants they seek to understand", (Kozinets, 2002).

The first online space selected to conduct the research, was the forum *Speak EV*. The forum was founded in 2011 and, as of the date of this research, had approximately 24,200 members. Over the past years, *Speak Ev,* that was started by a group of enthusiasts who shared common interest on EV's, has had considerable developments - and is now owned by VerticalScope Inc. – who operates multi-platform media companies. Hence, the forum accounts with a team of 1 administrator and 9 moderators to actively control spam, user behavioural issues, content and to assure the right allocation of threads. The aim of this online community is to bring EVs enthusiasts to share common thoughts and insights in a peer-vetted information format. The forum approximately accounts 961,500 posts as of the end of the research period.

Additionally, an online community, <EV news and products>, hosted on reddit.com discussion website, was selected. The community accounts 64,932 members and 13 moderators, at the time of the conducted research. <EV new and products> was created in 2010, and accounts with a variety of social networking communications about EVs.

Moreover, considering the evaluations proposed by Kozinets (2002), the abovementioned online communities chosen by the researcher predispose all the characteristics to be an eligible community to study. Likewise, "group memberships, market-oriented behaviours, interests, and language" (Kozinets, 2002) – characteristics that must be familiar to the researcher prior to data collection - fulfil the author suggestion of making a cultural entrée.

3.4. Data Collection

In netnography, according to Kozinets (2002), there are two important elements a researcher can collect during its study:

- Data produced by community members and directly copied.

- Data inscribed by the researcher accounting personal observations of the content created and considering the community members, interactions, and meanings.

Using the enumerated inputs, the following paragraphs describes the collection of archival data process of this study.

3.4.1. Collection of archival data

Over the course of three months, from February to May 2020, 48 postings were selected for the purpose of this study. The amount of data selected for the research was limited to a manageable scale and comprehended computer-mediated communications during the period of 2018 to 2020, which permitted obtaining more up-to date inputs. Further, a total number of 312 comments were chosen to analyse. For collecting data, the researcher gave priority to communications with topics of the research questions' interest and to available resources including, availability of members to be interviewed, members capability of expressing themselves, time and predictably, researcher skill (Kozinets, 2002).

The abovementioned prerequisites were considered when choosing postings such as "Attitudes of people towards EVs - a weird experience", "Surely we could of had an affordable EV by now?"[8], and "Any frustrations as an EV user?" from the online communities mentioned on chapter 3.2 and subsequently, were analysed.

3.4.2. Ensuring ethical standards

To assure ethical procedures during Internet research, Kozinets (2002) proposes four practices:

- The disclosure of the researcher about its presence, affiliations, and intentions to the online community.
- Guarantee of confidentiality and anonymity.
- Attempt to incorporate community members feedback on research findings.

[8] Please take into consideration this research uses the vernacular version of the collected information.

- Permission to use one's quote (or idiosyncratic story) from the online community.

Under these recommendations, the researcher formalized an introduction with the communities under study and clarified the objective and the methodology used. Additionally, the administrators of the forums were contacted to obtain permission to use direct quotes from the community. Notwithstanding all the communities were either open to public or semi-closed and online nicknames of all forms were kept anonymous.

3.4.3. Member checks

Member checks refers to a final stage of the conducted study, where the researcher collects feedback from the online community members by sharing its final research findings (Arnould & Wallendorf, 1994; Guba & Lincoln, 1985; Kozinets, 2002). Furthermore, the described procedure accentuates differences between netnography and conventional qualitative research. This method prompts more specific insights about the research and consumer meanings. Additionally, member checks emphasize the abovementioned chapter, reinforcing ethical standards of the research. Finally, the procedure gives marketing researchers the opportunity of establishing an ongoing flow of information with consumer groups - these bidirectional communications can have a significant impact on relationship marketing (Kozinets, 2002).

Henceforth, complying with the detailed procedure above, the researcher conducted 2 member checks. Both participants were members of the *SpeakEV* forum and online semi-structured interviews were conducted. Members were presented with a set of questions related to the most debateable collected insight and then were presented with some of the research findings. Henceforth, this process enabled the researcher to perform error checking of its findings, to validate information trustworthiness and to consolidate final conclusions by confronting the interviewees with the observations made during the study. The researcher asked the interviewed members about authenticity and perspective of the observations made during the study, as suggested by Kozinets (2002).

3.5. Research representation and analysis

Grounded theory was the selected inductive research method to analyse the collected data from the online communities. As stated by the two developers of grounded theory, Glaser and Strauss (1967), it consists in a "general method of comparative analysis" (p.1). Hence, the theory proposed by the two sociologists allows to retrieve theory from data (Glaser and Strauss, 1967). Considering the mentioned theory, the researcher systematically obtained data from social research in online communities and then, derived hypotheses from such data.

Initially, the researcher downloaded computer-based comments, notes and posts to be able to translate such data into codes, categories and ultimately, themes (Spiggle, 1994). In order to facilitate the coding of data, the used methodology – netnography, consent the use of computer-aided systems as NVivo or ATLAS.ti. However, the researcher of this study opted to incur into manual coding, as per Kozinets (2015), this technique makes the researcher closer to data and entices creativity and inspiration. Moreover, manual coding can benefit from previous gained cultural experience that may be obscured by data mining software's and induces the researcher to ground in the essence of an inductive and reflexive analysis (Kozinets, Dolbec & Earley, 2014; Kozinets, 2015).

Under the abovementioned notions, the researcher coded the downloaded discussion threads – "interrelated bulletin board postings" (Kozinets, 2002) - and began to relate the codes according to their similarities and phenomena, within categories. Ultimately, these categories were organized into broader themes to generate theory. Reference to appendix 8.1. for overview of developed thematic network.

4. Research Analysis

The subsequent chapter encompasses the analysis of the selected EVs communities, comprising how EVs engagement is shaped by the interdependent themes of adoption and influence. The data was gathered as part of a netnographic approach, involving a thematic network analysis (please refer to appendix 8.1.) that covered the developments of grounded theory.

4.1. Adoption

EVs adoption was a recurring theme amongst the collected data. In this particular case, the adoption process is more complex than what it would be when assessing purchasing intentions for a regular (i.e. ICEV) vehicle. Specifically, the adoption process is characterized by a complex structure of interchangeable factors that vary from technical aspects related to the vehicles to socio-economic factors and consumers' perceived self-image. In fact, consumers are not purchasing an EV *per se* but instead adopting a multitude of other factors that reveal their identity. The present research unveiled that a great part of the discussions surrounded motivations, barriers, and perceived self-image for adopting an EV by community members.

Community members express different barriers that influence EVs adoption. Firstly, the high upfront costs of EVs (i.e., purchase price) is commonly perceived as a great barrier to adoption. Consumers state that the *"upfront cost is a concern"*, prices are *"high"* and that they spent *"more than ever before on a car"*. Moreover, in a thread started as *"Surely we could of had an affordable EV by now?"*, members emphasize their astonishment to the fact say that high front costs are still a concern - the lowest starting price for an EV is around 20.000 Euros, in spite the battery prices[9] decrease. In this regard member 1 criticizes *"So most of the R&D has been done. Batteries price is still dropping, yet the EV's price is still at 20 something thousand for a basic small hatchback? I fail to understand how manufacturers still justify EVs cost? when the batteries are substantially cheaper (I would suggest that a 40kwh pack, costs them less than 5k?)"*. Also, member 2 states, *"I don't want to take a personal risk 'investing' £20K plus into rapidly changing, warranty-dependent tech"*. The idea that the vehicles are not yet affordable to all seems a recurring

[9] In the studied communities, it is commonly accepted that the batteries represent one of the main reasons for the increased priced of EVs due to the raw materials used in their production as well as the expensive production process.

and important concern to members. Notwithstanding, it is also frequently discussed in the threads that EVs still have a high front cost since manufacturers are still developing the EVs technology to fit mass market needs. In this regard, members (being the majority EV owners) state that even though battery costs are diminishing, manufacturers prefer to keep the vehicles in the development stage to improve overall performance (e.g. *"get EVs to the point where people think it's a usable range"*), so that when mass market needs are accomplished, mass production can start – mass production (scale economies) contribute for price reduction[10]. As stated by member 3, *"Mass production reduces the cost of goods to virtually the raw material cost. While things are low volume and developmental, the costs are in trying to put together something that works which are unfamiliar in their construction and performance represent a considerable fraction of the sale price"*. In fact, insights collected through member checks also substantiated that EVs price is "*still far to high to reach the critical masses*". Thus, members considerations of price as a main barrier are in accordance with Graham-Rowe, et al. (2012) conclusions of their grounded theory analysis, where price also placed a major barrier to adoption.

Also, the community discursive actions reflect a deep concern about EVs range[11]. The community reinforces that the current market offer is limited to vehicles with inadequate range capacities which are not as attractive as current IECV range capacities. Notwithstanding, it seems that two views on the subject are addressed by members. Whilst most users argue that the range capacity is a barrier to adoption, as member 4 states, *"in reality, even "half way" decent range isn't good enough"*, other seem to point that the range capacity in most EVs should suffice and that consumers want more than what they actually need, as member 5 suggests *"I think we need to realise that we generally don't need as much range as we think we do and it is not humanly possible (or safe) to drive 300 miles in one go anyway and we will need to stop at least once, so you may as well be charging your car during that break"*. The consideration that the current range capacity of EVs is comparatively lower than ICEVs and therefore, places a barrier to adoption, is in accordance with the findings of Skippon and Garwood (2011). Notwithstanding, some members view is in accordance with the suggestion of Rezvani, Jansson, and Bodin (2015), that range is more of a

[10] Please refer to Imkamp (2018).

[11] Range refers to "the distance that a vehicle or aircraft can travel without having to stop for more fuel" (Cambridge dictionary, 2020).

perceived barrier, since the current offer can fulfil the market needs. Others seem to sill prefer greater range as suggested by Jensen et al. (2013).

In addition, the discussion threads focus on concerns related to the distance the vehicle will be able to travel before needing charge, encompassing range anxiety. In fact, some EV owners argue that they have experienced range anxiety for either unexpected route changes or miscalculations of times they needed to stop for charging. However, a common observation from various community members is that that owners of EVs will eventually surpass such anxiety once they *"get to know the car"*, gain experience with the technology and can "*predict how far they will go".* As stated by member 6, *"drivers get to know their own miles per % from their own driving style"*. These means the community members understand that experience with an EV would mitigate or eliminate any range anxiety. Such findings are in accordance with what is suggested by Degirmenci and Breitner (2017), i.e., driving experience can improve consumers' confidence in the range and diminish their anxiety.

Despite the above, there is some contradiction amongst the subject of range anxiety. Several members have a different perspective on range anxiety – some highlighted that range anxiety related to the remaining distance to travel is very similar to what an IECV owner would feel, and that the difference relies not on the range capacity of the vehicle but in the trust on the charging infrastructure. Some members even named it *"charger anxiety"* or *"charger network anxiety"*. In this regard, members appropriate the so-called term range anxiety to the anxiety of knowing if the so needed charger will be working or available: *"The anxiety is predominately in the charging infrastructure. Will it work when I get to the charger?"*. Thus, as argued by member 7: *"Although I'll be honest - I don't get range anxiety, I get "will the charger be broken or blocked" anxiety - which is a different thing. I plan every journey and never push past 4.5miles/kWh in my planning, which is achievable in all my journeys if I'm driving sensibly. However, you can't predict whether a charger is going to be available in advance, and even having a backup can fail. It's charging network anxiety"* - as discussed, members seem to place greater emphasis on the infrastructure network. These finding are in accordance with the findings of Egbue and Long (2012), suggesting that range anxiety influences adoption. This research also indicates that members place infrastructure as greater barrier to adoption.

Another frequent thread around barriers is the design of EVs. The collected data conveys that members perceive the design of EVs as *"ugly"* and that it influences consumer adoption. As member 8 inquires, *"So why are so many EVs ugly?"*; member 9 agrees, *"Yes, it's time to get really creative with car designs. At the moment they are ugly and boring and all look the same"*. Further, members suggest that manufacturers are following the *"same evolutionary design path for decades"*. Additionally, members also perceive that the lack of a modular design[12] negatively influences EVs adoption decision. Members state that a modular design would be a benefit in the long term since its interchangeability spares maintenance costs. As member 10 states, *"A modular design would be much more affordable because both the manufacturer and the buyer could start with the cheapest option and then do the upgrades. It is also much cheaper in the long run because the modules would be reusable, resellable and DIY fittable"*. In fact, members perceive the design of EVs as current downfall on the market and suggest more *"futuristic"* designs. As member 11 proposes, *"When approaching design for this new era, automakers must introduce revolutionary cars, not evolutionary cars"*. Member checks further confirmed these insights, accounting design as a detriment for EV adoption.

As per motivations, members reveal different reasons that lead to the adoption of an EV. Performance seems to be one of the main drivers of EV adoption in the threads. Many members perceive EVs to have *"better performance"* then regular ICEVs. Further, they are perceived as *"better cars"* and to give a better driving experience, in terms of acceleration and other performance indicators. Members that had the opportunity to test-drive *"got hooked"* to the driving experience and performance of EVs. As member 12 discloses, *"I agree that EVs can help the environment, but they're also cars - cars with quite often exceptional acceleration"*. This technology performance is commonly described for having characteristics as *"Smooth, immediate power and acceleration"*, conveying an improved driving experience. In fact, member checks confirmed these insights, ensuring that EVs have superior overall performance and mentioning performance as a detrimental driver for EV adoption.

Moreover, lower operational costs represent a major advantage to own an EV. The proposition that EVs have low charging and maintenance costs compelled most of the members to

[12] Modular design refers to the subdivision of the vehicle components into smaller ones. This feature allows the interchangeability of components.

adopt such technology. As member 13 confesses, *"it's the total cost of ownership that really counts"*. Members recurrently refer that they prefer to undertake the initial high front cost of an EV, but then reduce the subsequent ongoing costs of owning a vehicle, as member 14 confesses: *"I want to live at cheaply as possible, my salary is not the greatest but I am good at saving and I like to pay more and then reduce my monthly outlay"*, and which member 15 agrees with *"You're right, being immediately aware of your energy consumption when driving does change one's thinking".* In fact, it seems to be consensual that EVs have lower running costs and that consumer education on how to properly calculate an EV lifetime cost will positively influence adoption.

Also, sustainability seems to be a main topic in the threads of what motivates members. Many referred to an EV as "less polluting", "environmental", "green" and that *"reduces CO2 emissions"*. Despite the perceived idea that EVs contribute for a *"greener"* and more sustainable transportation to be consensual amongst members, many discuss that *"EVs are essentially just cars that also happen to offer a better choice to drivers who are interested in new technology, or the future in general, as well as quite liking the idea of breathing clean air"* and *"EVs are not a silver bullet to the world's climate problems and the car you drive is only part of your overall impact on the environment."*. The main idea is that EVs adopters prioritize other attributes before the environmental benefits. Members suggest that EVs real impact on environment can only be accomplished when EVs are mass adopted – encompassing the aforementioned idea that mass market will only adopt EVs when prices drop significantly. Further, members 16 and 17 admit, *"Any future growth of EV ownership will certainly not be due to everyone suddenly becoming born again environmentalists"* and "*these benefits will only come from affordable EVs for a mass market and not from the world developing and proclaiming newly found green credentials".* Some members strongly advocate that adopting an EV is not the first answer to significant environmental changes and suggest that reducing unnecessary travel, using public transportation, or installing solar panels, would be a better option. Notwithstanding, members do perceive environmental benefits. Indeed, for some members, adoption was exclusively driven by sustainability factors, as member 18 stated, *"For me it is about the environment. 100%"*. However, the majority placed lower operational costs and performance as greater influential factors in the decision-making process, in detriment of environmental benefits. As member 19 advocates, *"(...) primary reason for buying an EV was never the green issue"*. In fact, the findings are congruent with the statement of Junquera et al. (2016), i.e., consumers perceived value increases with eco-innovations. In this

case, members perceive the additional value of EV being a more sustainable and ecological innovation than ICEVs. However, findings do not go in accordance with Degirmenci and Breitner's (2017) conclusion, since members seem to place more value in cost and performance, detrimental to environmental performance. In this regard, the prediction that lower operational costs and performance have more weight on consumer adoption than environmental advantages are congruent with the findings of Egbue and Long (2012).

Members also mention that the "quieter" driving experience feels *"comforting"* and *"pleasant"*, enhancing their adoption. Moreover, member refer to ICEV as *"unpleasantly noisy"* and that after adopting an EV, it would be difficult to change the experience. Member 20 even added that *"I have tinnitus & petrol cars are now unpleasantly noisy".* Member checks further confirmed these insights, even referring to EVs as – *"the silent power".*

The present research also unveiled the perceived self-image of adopting an EV by members. After adopting an EV, members seem to possess a sense of *"status"* for owning it. In fact, members convey that vehicles are a status symbol for most adopters. As member 21 suggests, *"A significant proportion of car buyers see the car a status symbol, not just a means of transport"*. Further, members 22 adds, *"EVs are a positive. They are, it seems almost without exception, great to own and drive"*. For members, the meaning of owning an EV intrinsically represents a sense of status, and in some way the feeling of being *"superior"* than ICEV owners. As member 23 advocates, *"I also feel less of a psychological burden now I drive electric and will never go back to an ICE"*. By advocating the *"burden"* of owning ICEVs, members enhance the message on how differently and special they feel for owning an EV. The conclusions of Noppers, Keizer, Bolderdijk, and Steg (2014) that adopting a sustainable innovation may undertake social status and thus, increase adoption, are aligned with members perceptions.

Further, members discursive action along the threads suggest that adopting an EV means they are more *"tech savvy", "futuristic"* and "innovative". Also, many members refer to themselves as an *"early adopter"*. The premises enacted in the threads are that adopting an EV means to be an early adopter, someone who values technology (e.g. *"For me, it was the technology at first"*) and therefore, is prepared to decrease the uncertainty of adopting an EV. Indeed, members feel that adopting and EV can impose a sense of role model in them. As member 24 stated, *"It's also important to remember that most people on this forum are early adopters by definition, and*

are both more comfortable with risk, more comfortable with research, and better with technology". Many members advocate that adopting an EV means to adopt a technology that is still uncertain and improving. Notwithstanding, this meaning places a great influence in their adoption – they want to be the first ones to adopt the technology. They want to be role models and not followers – *"That's the good thing about being an early adopter, you can influence"*, stated member 25. In fact, early adopters have the greatest degree of influence in the social system (Rogers, 2003). Moreover, the findings go in accordance with Rogers' (2003) conclusions, i.e., although early adopters are not the first ones to adopt a technology (innovators are), they play a crucial role in diffusing the technology in the social system and to decrease uncertainty. Insights collected through member checks further demonstrated that perceived self-image plays a major role in influencing members purchase intentions and that paying extra is worth it in detriment of owning and experiencing such innovative technology.

4.2. Influence

The second theme identified through the collected data was influence. In the EVs community's context, social influence not only incorporates the meaning of taking responsibility to spread and share information about EVs technology, but also to seek support and validation to such high-involvement purchase. The theme of influence seems to reflect one of the major reasons for members to join EV communities and these social influence affects their EV purchase intentions. In fact, according to Barth, Jugert and, Fritsche (2016) a consumer does not only perceive himself as independent individual but also as a part of a community.

The search of support is commonly observed within the community's threads. Members often participate in the community to seek support from other members, e.g., advices on what EV to adopt, help to choose between different models, doubts on vehicles attributes, dilemmas about EVs range or any EV related subject. In fact, a great majority of threads initiate with members requesting support or advice from other members. For instance, *"What's the minimum DC voltage you can charge an EV at?"*, *"Wanting to go EV. Skeptical, nervous, not sure. Help?"*, *"Jaguar I-PACE - with which EV car should I compare it?"*, or *"If you own a full BEV, do you have a way of charging it at home?"*. Thus, members sense they belong to a community with other members that share the same interests, that might be more experienced and therefore, assist in an efficient

and trusting way. As an illustration, member 26 wanted to start his own EV project and introduced himself, *"Hello SpeakEV community, I'm new here and appreciate being a member of this community. I think up to this point i have read so much on EV conversions and have come up with a few questions (...)".* Other members further replied with friendly acknowledgment and constructive insights (e.g. *"Firstly I must congratulate you on joining this forum"* or "*Wow from scratch! Kudos"*). Notably, members perceive to be a part of a great social network, where the feeling of responsibility for supporting others is interchangeable – that is, all members feel accountable for helping each other. As member 27 advocates, *"Just wanted to say what a great community this forum is. I know I've tried to help other forum members where possible, (...)"*. In this regard, members perceptions are in accordance with the conclusions suggest by Schau et al. (2009), that members perceive a sense of belonging in online communities and engage in social activity.

The overall data illustrates members engagement with EVs relies in a complex process influenced by community consciousness and members own perceptions and experiences. Indeed, advices from other members are valued amongst consumers. As member 28 and 29 stated, they wanted other members' advices on their decision-making process - "*Hi all, I would like some advice please. I really want an ev, but not sure if the numbers stack up for us (...) Can anyone convince me it's a good idea to finance a car? Or other ideas? Thanks!!"* and *"Hi all , this is my first post and I confess I dont actually own a EV, just yet - but this seemed an excellent place to ask for buying advice".* According to the members, advices from others account an important role in influencing their engagement with EVs. In fact, when inquiring other members for support, an individual is relying on the answers obtained and is, therefore, influenced by them – in this regard, interpersonal influence (or WoM), plays a dominant stimulus for diffusion of innovation (Greenhalgh, Robert, MacFarlane, Bate, & Kyriakidou, 2004).

As searching for support, members further seek encouragement from others. Many threads evolve around specific "problems" or "issues" they have with their vehicle and more than looking for help, they are also seeking encouragement. As member 30 expressed his recent problem with venting and button to open a flap, others urged to encourage him with supportive interventions as, *"(...) feel your pain but it's a quick fix and no more trouble (...)"* or *"It's a real pain I know but don't let it spoil your plans!"*, to which member 31 replied *"Thanks for the encouragement".*

Communities seem to support individuals overcoming problems and giving them encouragement. In this respect, the insights collected are in accordance with the idea that social influence plays an important role in the engagement of an individual with EVs (Barth, Jugert, & Fritsche, 2016).

Another category of influence identified is the act of sharing information. Members share a wide variety of information in the communities - experiences they had, thoughts on EVs releases, news or they engage in debates. Members commonly use the threads to share their perceived idea and understanding of EVs in the market, based on their experience. For instance, member 32 conveyed in a thread intituled "*Kia e-Niro or Hyundai Kona?",* what were, on his perspective, the main benefits of each vehicle. In fact, member checks further uncovered the effects that influence plays in consumers purchase intentions. EV communities have always been a source of information where *"nervous potential adopters"* seek validation and members freely engage with them to persuade them into purchasing an EV. Considering Rogers' (2003) distribution of individuals, based on innovativeness characteristics, amongst categories, members act as early adopters. In fact, active members share information and act as opinion leaders, i.e., they are experienced and potential adopters engage in threads to know their views. These findings are in accordance with Van Eck et al. (2011) conclusions, that state opinion leaders are likely early adopters, in accordance with their desire to share their opinions and influence. Further, the findings go in accordance with von Hippel (2017) suggestions that online communities diffuse and ease the exchange of innovative ideas and solutions. In this sense, as strongly contended by the author, users' solutions are of great value for the development of new improved innovations. Moreover, integrating contributions from community members can increase company performance (Bradonjica, Frankea, & Lüthjeb, 2019; von Hippel, 2005).

5. Conclusions and Implications

This chapter presents the conclusions of the netnographic analysis, answering the research questions presented in the introductory chapter. Subsequently, theoretical, and managerial implications derived from the main findings of the research conducted will be presented.

Literature on consumer EV adoption has explored the different factors influencing adoption behaviours. This netnographic research aims to contribute to the literature by conducting a comprehensive overview, within online communities, of consumers' attitude towards EVs purchase intentions. This study collects and explores insightful and topic-related discussions from online communities, that offered a broader overview of consumers opinions, behaviours, and experiences towards EVs. As discussed throughout this research, by employing a netnographic approach, these communities are analysed in a less obstructive method and data is derived from more naturally occurring interactions.

Adopting an EV is a high involvement purchase, i.e., potential adopters engage in a process of measuring a multitude of variables that affect their purchasing decision. On one hand, these intentions are influenced by individual-specific factors (e.g., perceived self-image, drivers, barriers), and on the other hand by contextual factors where social influence plays a determinant role (information sharing, support seeking and other non-individual-specific factors that influence and/or validate consumers' individual-specific intentions).

RQ1: What does it mean to the online community members to own an EV?

For most members, adopting an EV means that they are technology enthusiasts, innovative, tech savvy, and modern. In fact, members tend to perceive a self-image of themselves of being more innovative than others in the social system for adopting an EV.

Adopting an EV means that they are an individual that early-adopted a new technology and thus have more experience, knowledge, and a highly-valuable opinion – inherently, they perceive themselves as role model in their social system. Ultimately, for community members adopting an EV conveys them a sense of status and represents a concept, which influences their decision-making process. In this regard, the sense of self-image perceived by members for adopting an EV places great influence in their adoption process.

RQ2: What are consumers' main drivers and barriers to buy an EV?

Concurrent to the above, community members also place weight on adoption barriers and drivers. On one hand, it appears to be clear that high performance and low operational costs are a determinant driver for adoption:

- EVs represent a greater and improved technology with better performance;
- The EV driving experience is perceived as superior;
- EVs have lower operational cost of EVs, with members suggesting that the initial investment cost is offset by the long-term operational costs.

On the other hand, factors like high front cost, perceived short drive ranges and an insufficient recharging infrastructure are substantial barriers for adoption.

For most users, after experiencing an EV they would not consider driving an ICEVs. Surprisingly, however, the present research shows that sustainability plays an ambiguous role for community members. Whilst it appears to be as an important driver for some members, for a larger part of members it is not more than a "happy coincidence" – for the technology enthusiasts that adopt EVs for their innovative characteristics, environmental benefits only come as an extra. These members suggest that only mass-market adoption will considerably impact the environment.

RQ3: Is the social system influencing consumers' purchasing decisions? How are consumers weighting online interactions and validation?

Another central factor affecting consumers' purchasing intentions is the social system they belong to, as members tend to validate their decisions with more experienced and trustworthy consumers. Within the online community, the validation process comes from different community members – potential adopters use the threads to understand their opinions and seek support from their peers. Conspicuously, the high involvement process of adopting an EV is greatly influenced by the "tech enthusiasts" that portray the early adopter characteristics of adopting a new technology and advocate their opinion in the social system.

RQ4: Is sustainability influencing the adoption process? How are consumers factoring sustainability concerns in their individual purchasing intentions?

As discussed above, the study shows that sustainability plays an ambiguous role for community members. For a larger part of members, it is not more than a "happy coincidence", an extra.

Even tough sustainability has been for the last couple of decades a notable topic when it comes to mobility, the research indicates that consumers do not place a significant weight on it when deciding to adopt an EV. In fact, the study seems to point in the opposite direction: consumers place a significant weight on performance, design, and status-quo factor and little to no significance in sustainability as a driver to adoption.

Even from a status-quo standpoint, what seems to drive consumers appears to be the technologic and futuristic qualities of EVs as opposed to their green characteristics. Notwithstanding, there is an implicit correlation between greenness and futuristic technology perceived by consumers. Community members tend to associate the vehicles' green characteristics with those of futuristic vehicles – a new combustion system, a new way of driving, a new technology. As discussed in the sections below, marketers have an opportunity to capitalize on such perceives and engage in marketing strategies that stand out those characteristics that only EV possess.

5.1. Theoretical Implications

Many empirical studies have been published about EV adoption. Rezvani, Jansson, and Bodin (2015) conducted a comprehensive overview of EV adoption literature which identified several theoretical frameworks that explain individual-specific psychological factors on EV adoption behaviour. As opposed to theoretical studies focusing on the adoption process for consumers who have not had prior experiences with EVs, the authors suggest that a study focusing on individuals that have already adopted an EVs or for which adoption is imminent, would provide more valuable insights. Henceforth, the present study aims to expand the body of academic literature on consumers attitudes towards EVs that entice purchase intentions, through the observation and analysis of digital social communities.

Liao, Molin, and Wee (2017) also conducted a comprehensive overview of the current literature on consumers preferences for EVs and conclude that future research could explore consumers preferences as a dynamic process, that varies according to social influence and is influenced by public debates around sustainability concerns or innovation adoption. Thus, this qualitative research fills a gap in the academic literature by exploring the perceived attitudes

towards adoption, considering the effects social influence place on their decision-making process. In fact, the present study findings suggest that members' purchase intentions are influenced on one hand by individual-specific considerations, and on the other hand by contextual factors where social influence plays a determinant role, influencing and validating the high involvement process of purchasing an EV. The findings are in accordance with the suggestions of Barth, Jugert, and Fritsche (2016) and Rasouli and Timmermans (2013) that social influence affects consumers EVs purchasing intentions.

Moreover, the study contributes to the academic distinction by investigating how environmental concerns influence consumers purchasing intentions. The research findings contradict the suggestions of Hsieh, Pan, and Setiono (2004) and Cherubini, Iasevoli, and Michelini (2015), suggesting instead that green marketing strategies should not be the focus when advertising EVs.

5.2. Managerial Implications

Considering the presented findings and conclusions of this research, managerial implications arise for governments and companies. These implications cannot be seen in isolation as they are mutually reinforced by one another, i.e., on one hand governments ought to increase policies and marketing strategies that reinforce the countries' standpoint on the global sustainability agenda (particularly on mobility-related issues), whereas on the other companies should be able to pursue their own marketing agenda, leveraged on governments' actions and policies.

Surprisingly, the research suggests that EV potential adopters desire to acquire new and improved technology and that sustainability factors do not play an important role in their decision-making process[13]. However, the research also shows that consumers do in fact associate EVs to environmental conscious behaviours, even if such factors do not greatly influence purchasing intentions, as members consider that adopting an EV would only imply a small and probable futile

[13] As discussed in further detail below, the study indicates that while consumers do not view sustainability, *per se*, as an adoption factor, they implicitly value it as being a characteristic of a new, innovative and disruptive technology.

action towards sustainability, and that only mass-market adoption would in fact significantly shift the mobility paradigm towards a more sustainable outlook.

Further, considering climate changes, global resources storage and the upcoming worldwide sustainability agenda, companies and governments marketing strategies should endorse these sustainable behaviours and educate consumers through social marketing, which consists in the application of traditional marketing tools and principles to achieve specific behaviours relevant for society common good (French & Blair-Stevens, 2005). Further, McKenzie-Mohr (2011) added that social marketing that merely provides information is not sufficiently enough to entice sustainable behaviours. To achieve those attitudinal and behavioural changes it is crucial to understand the barriers that hinder the adoption and then provide the *right* information (Bennett, Kottasz, & Shaw, 2016). As opposed to emphasizing and appeal to performance and pleasurable driving (and giving little focus on perceived barriers such as range anxiety), McKenzie-Mohr (2011) suggests that an effective social marketing strategy is created when the marketeer knows the barriers that hinder individual's behaviour and motivations that would entice those behaviours.

5.2.1. Governments

As an illustration of successful government policies in the environmental-mobility landscape, Norway is seen as a successful case of EVs diffusion. Surpassing any other country, with EVs representing 44% of vehicles market share (Solsvik, 2020), the Norwegian government focused on GHG mitigation, increasing incentives and officially supporting the expansion of charging stations. With the largest EV fleet and yearly sales per capita, Norway represents the triumph between a long-lasting relation between public authorities, with politician enticing a positive attitude towards EVs and private enterprises in the diffusion of EVs innovation.

Thus, improvements in the companies' communication strategies may possibly be achieved with messages that educate consumers on the increasing availability of recharging infrastructure. This information could be portrayed in an app with a map with all the charging infrastructure points and different journey planning options that one could choose from. Further, governments could support educational programs to educate consumers on how EVs range suffices in the vast majority of city journeys and that recharging would not be necessary along the day. Finally, social marketing

could be used through campaigns that enhance environmental benefits of owning an EV. These campaigns could reinforce the importance of circulation in vehicles with zero tailpipe emissions as it is the case of EVs, that do not utilize fossil fuels as a supplement for their engine.

Ultimately, governments incentives in credit and tax treatments (i.e., financial incentives) – e.g. subsidies to lower the upfront purchase cost of EVs, have proven to be a successful measure for EVs market widespread diffusion. Further, stricter emission standards and regulations (i.e., non-financial incentives) should positively-influence the hasten of EVs widespread penetration.

5.2.2. Companies

While consumers do not perceive sustainability as a driver for adoption, they do perceive it as a component of "new". Notably, while some brands advertisement focuses mainly on environmental causes or green credentials (e.g., the cases of Toyota Prius or Nissan Leaf), which does not seem to be catching up amongst the EV support basis, that has not been the case with other (more successful) marketing approaches, as it is the prominent and successful case of Tesla, which focuses on performance and high-technology appeal ("The Secret Of Tesla's Success Is Not Selling Cars: It's Being Able To Anticipate The Future", 2019). The path to a successful advertisement arises, from the author's standpoint, from a combination of the two current predominant marketeer approaches. Allied with a growing government increase in public policies towards the progress in sustainability agenda, if marketers can successfully manage the consumers expectations in what regards to both technology and futuristic views of an EV while progressing on the environmental front (as government will progress), they will be able to have the upper hand in the EV landscape. That can be achieved through marketing campaigns targeting young, technology-savvy adults, using key words as future, progress, and technology, at the same time providing a picture of the green future being constructed by growing government public policy.

Further, this research suggests that the spread of innovation is also a communication process and its success is dependent upon the knowledge on the innovation that is being distributed in appropriate channels and to individuals that want to be early adopters and influence potential adopters with their knowledge (Rogers, 1995). In fact, using the Norwegian case, lack of knowledge was a barrier to the diffusion of EVs, which was overcome as more consumers adopted

EVs and their experience and knowledge spread within social networks (Figenbaum, Assum, & Kolbenstvedt, 2015). Considering that early adopters favour innovative technology, manufacturers should promote test drives of EVs to increase consumers engagement and awareness of the improved overall engine power, acceleration time and maximum speed of EVs. Additionally, manufacturers could endorse activities such as sports racing (e.g., Formula E[14]) and competitions that are associated with power and performance. Further, technology-based factors can also be associated with environmental-based factors.

Moreover, the lack of knowledge of consumers on EVs and the subsequent seek of information from potential adopters in social networks, embodies an area of improvement in EVs marketing strategy. As the findings suggest, potential adopters are highly influenced and seek validation from the considering early adopters – that are characterized for wanting to own new technology and accepting its uncertainty to communicate their experiences to the social system, conveying that their knowledge on the technology is higher than members that need to be influenced by the social system. In this case, manufacturers want early adopters to act as opinion leaders in their favour. Thus, a marketing strategy would be to endorse ambassadors with credibility in the sustainable awareness battle but that also portray a sense of innovativeness and disruption.

As adopting an EV is a high involvement process for consumers, also marketers must address a multitude of complex factors. Firstly, the marketer must be aware that (at least for now), that environmental causes *per se* do not explain or greatly influence EV adoption. Short-term social marketing strategies should focus on embracing barriers and educating consumers, informing them as per the misapprehensions formed over EV high purchase price, and presenting EVs distinguishing and unique factors, and educating consumers about the lifetime cost saving EVs present.

Secondly, the marketer role should be in line with governments' actions and policies. A dissonance between the marketer actions and current public policy will create a gap between the consumers' view of future and the brands' positions. As thoroughly discussed, EV adoption is imminently connected with technology and self-image – a marketing strategy that is not aligned

[14] Formula E is a single seater motorsport championship that uses only electric cars.

with predominant futuristic thinking will not prevail in the current fast-changing trend of innovative technology with environmental benefits.

Finally, the marketer should be able to combine the two points above in a long-term marketing approach to EV, enabling a marketing strategy that builds on informing and appealing to unique characteristics on the short term without entirely disregarding environmental benefits, as these will be of upmost importance as public environmental policy progress and the future approximates the futuristic views projected by governments and public agencies to consumers.

6. Limitations and future research

Although the insightful and valuable findings this research provides, some limitations need to be addressed. The online communities selected to conduct the study may not be fully representative of the existent and growing number of cyber communities, and all their members. In fact, Kozinets (2002) further suggests that the amount of information available in the online sphere can become overwhelming and thus, the marketeer must "keep the amount of data to a manageable level".

In addition, this qualitative study relies on the analysis and interpretation of data collected by the researcher, and that will ultimately be subjective to its own interpretive skills. Further, the researcher is susceptible to be biased by previous knowledge or experience around the subject in study. Moreover, a netnographic study implies a narrow focus on online communities. In this regard, the researcher is more limited than with other methodologies in generalizing its findings to other groups than the studied ones.

Lastly, the innate anonymity of members in the online context, deters the researcher from knowing demographic information of the subjects under study. In this regard, further research of quantitative nature should be conducted to complement the present study with demographic data (e.g. age, educational level, income, nationality) as an influential factor in EV purchase intentions. Additionally, a quantitative study could further validate the present research findings or contribute for better understanding and hierarchization of the influential factors on EVs purchase intentions.

Since this study revealed social influence to be a major determinant factor in EVs purchase intentions, it would be interesting to conduct a quantitative study, as a regression analysis, to explore how different countries social-systems impact consumers purchase intentions and to infer which country variables (e.g. socio-economic, democratization, urban population) have more weight on perceived social system influence by consumers.

Moreover, while some members claim that range anxiety is only perceived by those who do not have experience with the vehicle, others ascertain that range anxiety is a major concern, mainly on bigger journeys. In light of such divergent views, more research on perceived range anxiety as a determinant barrier for EV adoption and the impact of test driving in such perceiving's would be encouraged. Further, if other online social communities were analysed through a

netnographic approach, other analysis results could be identified. In this sense, it would be interesting to explore other communities that for instance, use other communication language than English and compare findings among the different language communities.

In conclusion, increasing concerns over climate change and the urgency in changing the transportation paradigm accordingly, are crucial factors for the uptake of EVs. Ultimately, future consumer insights are expected to provide innovative solutions on how to diffuse EV technology and reach the common goal in reducing the carbon footprint.

7. References

Aggeri, F., Elmquist, M., & Pohl, H. (2009). Managing learning in the automotive industry – the. *Int. J. Automotive Technology and Management, 9*(2), 123-147.

Bansal, P. (2005). Evolving sustainably: a longitudinal study of corporate sustainable development. *Strategic Management Journal, 26*(3), 197-218.

Barth, M., Jugert, P., & Fritsche, I. (2016). Still underdetected - Social norms and collective efficacy predict the acceptance of electric vehicles in Germany. *Transportation Research Part F: Traffic Psychology and Behaviour, 37*, 64-77.

Bennett, R., Kottasz, R., & Shaw, S. (2016). Factors potentially affecting the successful promotion of electric vehicles. *Journal of Social Marketing, 6*(1), 62-82.

Berens, G., Riel, C. B., & Bruggen, G. H. (2005). Corporate Associations and Consumer Product Responses:The Moderating Role of Corporate Brand Dominance. *Journal of Marketing, 69*, 35-48.

Berns, M., Townend, A., Khayat, Z., Balagopal, B., Reeves, M., Hopkins, M. S., & Kruschwitz, N. (2009, 10 01). *MIT Sloan Management Review*. Retrieved 04 07, 2020, from MIT Sloan Management Review: https://sloanreview.mit.edu/article/the-business-of-sustainability-what-it-means-to-managers-now/

BloombergNEF. (2019). *Electric Vehicle Outlook 2019.* BloombergNEF.

Bonges, H. A., & Lusk, A. C. (2016). Addressing electric vehicle (EV) sales and range anxiety through parking layout, policy and regulation. *Transportation Research Part A: Policy and Practice, 83*, 63-73.

Bradonjica, P., Frankea, N., & Lüthjeb, C. (2019). Decision-makers' underestimation of user innovation. *Research Policy, 48*(6), 1354-1361.

Bühler, F., Cocron, P., Neumann, I., Franke, T., & Krems, J. F. (2014). Is EV experience related to EV acceptance? Results from a German field study. *Transportation Research Part F: Traffic Psychology and Behaviour, 25*, 34-49.

Cambridge dictionary. (2020). *Range*. Retrieved from Cambridge dictionay : https://dictionary.cambridge.org/pt/dicionario/ingles/range

Campbell, M., & Tian, Y. (2020, April 5). *The World's Biggest Electric Vehicle Company Looks Nothing Like Tesla.* Retrieved from Bloomberg Businessweek: https://www.bloomberg.com/news/features/2019-04-16/the-world-s-biggest-electric-vehicle-company-looks-nothing-like-tesla

Carrington, M. J., Neville, B. A., & Whitwell, G. J. (2010). Why Ethical Consumers Don't Walk Their Talk: Towards a Framework for Understanding the Gap Between the Ethical Purchase Intentions and Actual Buying Behaviour of Ethically Minded Consumers. *Journal of Business Ethics, 97*(1), 139–158.

Cherubini, S., Iasevoli, G., & Michelini, L. (2015). Product-Service Systems in the electric car industry: Critical success factors in marketing. *Journal of Cleaner Production, 97*, 40-9.

Coffman, M., Bernstein, P., & Wee, S. (2016). Electric vehicles revisited: a review of factors that affect adoption. *Transport Reviews, 37*(1), 79-93.

Cronin, J. J., Smith, J. S., Gleim, M. R., Ramirez, E., & Martinez, J. D. (2011). Green marketing strategies: an examination of stakeholders and the opportunities they present. *Journal of the Academy of Marketing Science, 39*, 158–174.

Dans, E. (2019, September 9). "The Secret Of Tesla's Success Is Not Selling Cars: It's Being Able To Anticipate The Future".

Degirmenci, K., & Breitner, M. H. (2017). Consumer purchase intentions for electric vehicles: Is green more important than price and range? *Transportation Research Part D: Transport and Environment, 51*, 250–260.

Dell'Era, C., & Verganti, R. (2011). Diffusion Processes of Product Meanings in Design-Intensive Industries: Determinants and Dynamics. *Journal of Product Innovation Management, 28*, 881-895.

Egbue, O., & Long, S. (2012). Barriers to widespread adoption of electric vehicles: An analysis of consumer attitudes and perceptions. *Energy Policy, 48*, 717-729.

Figenbaum, E., Assum, T., & Kolbenstvedt, M. (2015). Electromobility in Norway e Experiences and opportunities. *Research in Transportation Economics, 50*, 29-38.

French, J., & Blair-Stevens, C. (2005). *Jeff French, Clive Blair-Stevens.* London: NSMC.

Gallagher, K., & Muehlegger, E. (2011). Giving green to get green? incentives and consumer adoption of hybrid vehicle technology. *Journal of Environmental Economics and Management, 61*(1), 1–15.

Garling, A., & Thøgersen, J. (2001). Marketing of Electric Vehicles. *Business Strategy and the Environment, 10*, 53-65.

Graham-Rowe, E., Gardner, B., Abraham, C., Skippon, S., Dittmar, H., Hutchins, R., & Stannard, J. (2012). Mainstream consumers driving plug-in battery-electric and plug-in hybrid electric cars: a qualitative analysis of responses and evaluations. *Transportation Reasearch A: Policy Practices, 46*(1), 140–153.

Greenhalgh, T., Robert, G., MacFarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of Innovations in Service Organisations: Systematic Review and Recommendations. *The Milbank Quarterly, 82*(4), 581-629.

Harvard Business Review. (2019, June). The Investor Revolution. *Harvard Business Review*(May-June 2019), pp. 106-116.

Hassel, L., Henrik, N., & Nykist, S. (2005). The value relevance of environmental performance. *European Accounting Review, 14*(1), 41-61.

Hauser, J., Tellis, G. J., & Griffin, A. (2006). Research on Innovation: A Review and Agenda for Marketing Science. *Marketing Science, 25*(6), 878-717.

Hawkins, T. R., Singh, B., Majeau-Bettez, G., & HammerStrømman, A. (2012). Comparative Environmental Life Cycle Assessment of Conventional and Electric Vehicles. *Journal of Industrial Ecology, 17*(1), 53-64.

Hsieh, M.-H., Pan, S.-L., & Setiono, R. (2004). Product-, corporate-, and country-image dimensions and purchase behavior: A multicountry analysis. *Journal of the Academy of Marketing Science, 32*(3), 251-270.

Huang, P.-C., Hou, C.-C., & Chen, J.-S. (2017). Analyzing the Trust Mechanism of the Sharing Economy Based on Innovation Diffusion Theory and Innovation Resistance Theory. *Management Review, 36*, 123-137.

Imkamp, H. (2018). Should Prices of Consumer Goods Be Better Indicators of Product Quality? *Journal of Consumer Policy, 41*, 77-81.

International Council on Clean Transportation. (2017). *Light-duty vehicle greenhouse gas and fuel economy standards.* Washington DC: International Council on Clean Transportation.

Jensen, A., Cherchi, E., & Mabit, S. (2013). On the stability of preferences and attitudes before and after experiencing an electric vehicle. *Transportation Research D: Transp. Environ., 25*, 24-32.

Junquera, B., Moreno, B., & Álvarez, R. (2016). Analyzing consumer attitudes towards electric vehicle purchasing intentions in Spain: Technological limitations and vehicle confidence. *Technological Forecasting and Social Change, 109*, 6–14.

Kang, M., & Yang, S. U. (2010). Comparing effects of country reputation and the overall corporate reputations of a country on international consumers' product attitudes and purchase intentions. *Corporate Reputation Review, 13*(1), 52-62.

Kates, R., Clark, W., Corell, R., Hall, J., Jaeger, C., Lowe, I., . . . O'Riordan, T. (2001). Sustainability Science. *Science, 292*(5517), 641-642.

Kennedy, D., & Philbin, S. P. (2019). Techno-economic analysis of the adoption of electric vehicles. *Frontiers of Engineering Management, 6*, 538-550.

Kilbourne, W. E. (1998). Green Marketing: A Theoretical. *Journal of Marketing Management, 14*(6), 641-655.

Ko, E., Hwang, Y. K., & Kim, E. Y. (2012). Green marketing' functions in building corporate image in the retail setting. *Journal of Business Research, 66*(10), 1709-1715.

Ko, E., Hwang, Y. K., & Kim, E. Y. (2012). Green marketing' functions in building corporate image in the retail setting. *Journal of Business Research, 66*(10), 1709-1715.

Kozinets, R. V. (2002). The Field Behind the Screen: Using Netnography . *Journal of Marketing Research*.

Kozinets, R. V. (2015). *Netnography: Redefined.* London: SAGE Publications Ltd.

Krupa, J. S., Rizzo, D. M., Eppstein, M. J., Brad Lanute, D., Gaalema, D. E., & Lakkaraju, K. (2014). Analysis of a consumer survey on plug-in hybrid electric vehicles. *Transportation Research Part A: Policy and Practice, 64*, 14-31.

Larry Fink, C. a. (2020). A Fundamental Reshaping of Finance.

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

Leonard-Barton, D. (1985). Experts as negative opinion leaders in the diffusion of a technological innovation. *The journal of consumer research, 11*(4), 914-926.

Leonidou, C. N., Katsikeas, C. S., & Morgan, N. A. (2012). "Greening" the marketing mix: do firms do it and does it pay off? *Journal of the Academy of Marketing Science, 41*, 151-170.

Liao, F., Molin, E., & Wee, B. v. (2017). Consumer preferences for electric vehicles: a literature review. *Transport Reviews, 37*(3), 252-275.

Lieven, T., Mühlmeier, S., Henkel, S., & Waller, J. (2011). Who will buy electric cars? An empirical study in Germany. *Transportation Research D: Transport and Environment, 16*(3), 236–243.

Luo, X., & Bhattacharya, C. (2006). Corporate Social Responsibility, Customer Satisfaction, and Market Value. *Journal of Marketing, 70*(4), 1-18.

Madrigal, R. (2000). The Role of Corporate Associations in New Product Evaluation. *Association for Consumer Research, 27*, 80-86.

Mangram, M. E. (2012). The globalization of Tesla Motors: a strategic marketing plan analysis. *Journal of Strategic Marketing*.

Martin Weiss, A. Z. (2019). Learning rates, user costs, and costs for mitigating CO2 and air pollutant emissions of fully electric and plug-in hybrid cars. *Journal of Cleaner Production, 212*, 1478-1489.

McKenzie-Mohr, D. (2011). *Fostering sustainable behavior: An introduction to community- based social marketing.* New society publishers.

McKinsey & Company. (2009). *Roads toward a low-carbon future: Reducing CO2 emissions from passenger vehicles in the global transportation system.* New York City: McKinsey & Company, Inc.

Menon, A., & Menon, A. (1997). Enviropreneurial Marketing Strategy: The Emergence of Corporate Environmentalism as Market Strategy. *Journal of Marketing, 61*(1), 51-67.

Nilsson, M., & Nykvist, B. (2016). Governing the electric vehicle transition – Near term interventions. *Applied Energy, 179,* 1360–1371.

Noppers, E. H., Keizer, K., Bolderdijk, J. W., & Steg, L. (2014). The adoption of sustainable innovations: Driven by symbolic and environmental motives. *Global Environmental, 25*(1), 52-62.

Oliver, J., & Rosen, D. (2010). Applying the environmental propensity framework: a segmented approach to hybrid electric vehicle marketing strategies. *The Journal of Marketing Theory and Practice, 18*(4), 377–393.

Olsen, M. C., Slotegraaf, R. J., & Chandukala, S. R. (2014). Green Claims and Message Frames: How Green New Products Change Brand Attitude. *Journal of Marketing, 78*(5), 119-137.

Paço, A. M., Raposo, M. L., & Filho, W. L. (2009). Identifying the green consumer: A segmentation study. *Journal of Targeting Measurement and Analysis for Marketing, 17*(1), 17-25.

Palmera, T., & Stevensb, B. (2019). The scientific challenge of understanding and estimating climate change. *Proceedings of the National Academy of Sciences of the United States of America, 116*(49), 24390-24395.

Peattie, K., & Charter, M. (1997). Green Marketing . In M. J. Baker, *The Marketing Book* (pp. 726-756).

Peattie, K., & Crane, A. (2005). Green marketing: legend, myth, farce or prophesy? *Qualitative Market Research, 8*(4), 357-370.

Peloza, J., & Shang, J. (2011). How can corporate social responsibility activities create value for stakeholders? A systematic review. *Journal of the Academy of Marketing Science, 39*(1), 117–135.

Polonsky, M. J. (1994). An Introduction To Green Marketing. *Electronic Green Journal*.

Pritchard, M., & Wilson, T. (2017). Building corporate reputation through consumer responses. *Journal of Brand Management, 25*(1), 38-52.

Rasouli, S., & Timmermans, H. (2013). Influence of Social Networks on Latent Choice of Electric Cars: A Mixed Logit Specification Using Experimental Design Data. *Networks and Spacial Economics, 16*(1), 99-130.

République Française: Le Ministère de la Transition Écologique et Solidaire. (2017, July 6). *Plan Climat: 1 planète, 1 plan*. Retrieved from République Française: Le Ministère de la Transition Écologique et Solidaire: http://www.diplomatie.gouv.fr/IMG/pdf/2017.07.06_-_plan_climat_cle8919c8.pdf

Rezvani, Z., Jansson, J., & Bodin, J. (2015). Advances in consumer electric vehicle adoption research: A review and research agenda. *Transportation Research Part D: Transport and Environment, 34*, 122-136.

Richins, M. (1984). Word of mouth communication as negative information. *Advances in consumer research, 11*, 697-702.

Rios, F., Martinez, T., Moreno, F., & Soriano, P. (2006). Improving attitudes toward brands with environmental associations: An experimental approach. *Journal of Consumer Marketing, 23*(1), 26-34.

Rogers, E. M. (1962). *Diffusion of innovations.* New York: The Free Press of Glencoe.

Rogers, E. M. (2003). *Diffusion of Innovations.* New York: The Free Press.

Sahin, I. (2006). Detailed Review of Rogers' Diffusion of Innovations Theory and Educational Technology: Related Studies Based on Rogers' Theory. *The Turkish Online Journal of Educational Technology, 5*(2), 14-23.

Santos, G., & Davies, H. (2019). Incentives for quick penetration of electric vehicles in five European countries: Perceptions from experts and stakeholders. *Transportation Research Part A: Policy and Practice*, 1-17.

Sen, S., & Bhattacharya, C. (2001). Does Doing Good Always Lead to Doing Better? Consumer Reactions to Corporate Social Responsibility. *Journal of Marketing Research, 38*(2), 225-243.

Shaw, T. N. (2007). Studying the ethical consumer: a review of research. *Journal of Consumer Behavior, 6*(5), 253-270.

Shepherd, S., Bonsall, P., & Harrison, G. (2012). Factors affecting future demand for electric vehicles: A model based study. *Transport Policy, 20*, 62–74.

Sierzchula, W., Bakker, S., Maat, K., & Van Wee, B. (2014). The influence of financial incentives and other socio-economic factors on electric vehicle adoption. *Energy Policy, 68*, 183–194.

Skippon, S., & Garwood, M. (2011). Responses to battery electric vehicles: UK consumer attitudes and attributions of symbolic meaning following direct experience to reduce psychological distance. *Transportation Research Part D: Transport and Environment, 16*(7), 525-531.

Solsvik, T. (2020, February 3). Electric cars grab 44% market share in Norway in January. *Technology news* .

Sovacool, B. (2009). Rejecting renewables: the socio-technical impediments to renewable electricity in the United States. *Energy Policy, 37*(11), 4500–4513.

Sovacool, B., & Hirsh, R. (2009). Beyond batteries: an examination of the benefits and barriers to plug-in hybrid electric vehicles (PHEVs) and a vehicle-to-grid (V2G) transition. *Energy Policy, 37*, 1095–1103.

U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy's - Vehicle Technologies Office. (2020, April 4). *Alternative Fuels Data Center*. Retrieved from U.S.

Department of Energy's Office of Energy Efficiency and Renewable Energy's: https://afdc.energy.gov/vehicles/electric_emissions.html

UK Department for Environment, Food and Rural Affairs and Department for Transport. (2019 , January 14). *Clean Air Strategy 2019.* Retrieved from UK Department for Environment, Food and Rural Affairs and Department for Transport: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf

Ullmann, A. A. (1985). Data in Search of a Theory: A Critical Examination of the Relationships Among Social Performance, Social Disclosure, and Economic Performance of U.S. Firms. *Academy of Management Review, 10*(3).

United Nations. (2015). *Paris Agreement.* Paris: United Nations.

United Nations Environment Program. (2012). *The 10 Year Framework of Programmes on Sustainable Consumption and Production Patterns (10YFP).* Rio de Janeiro: UNEP Secretariat. Retrieved from https://sustainabledevelopment.un.org/content/documents/1444HLPF_10YFP2.pdf

Van den Bulte, C., & Joshi, Y. V. (2007). New Product Diffusion with Influentials and Imitators. *Marketing, 00*(0), 1-23.

Van Eck, P. S., Jager, W., & Leeflang, P. S. (2011). Opinion Leaders' Role in Innovation Diffusion: A Simulation Study. *Journal of Product Innovation Management, 28*(2), 187-203.

von Hippel, E. (2005). *Democratizing Innovation.* Cambridge: MIT Press.

von Hippel, E. (2017). *Free Innovation.* Cambridge: MIT Press.

Watts, D. J., & Dodds., P. S. (2007). Influentials, networks and public opinion formation. *Journal of Consumer Research, 34*(4), 441-458.

White, K., Habib, R., & Hardisty, D. J. (2019). How to SHIFT Consumer Behaviors to be More Sustainable: A Literature Review and Guiding Framework. *Journal of Marketing, 83*(3), 22-49.

Wind, J., & Mahajan, V. (1987). Marketing Hype: A New Perspective for New Product Reseach and Introduction. *Journal of Product Innovation Management, 4*(1), 43-49.

World Economic Forum; Business Insider. (2020, April 6). *The number of cars worldwide is set to double by 2040*. Retrieved from World Economic Forum: https://www.weforum.org/agenda/2016/04/the-number-of-cars-worldwide-is-set-to-double-by-2040

8. Appendix

8.1. Appendix 8.1. – Thematic network