Ukrainische Freie Universität

Faculty of State and Economic Studies

On the rights of a manuscript

FUTURE OF AUTOMOTIVE MOBILITY: SHIFT IN CONSUMER PREFERENCES TOWARDS ELECTRIC VEHICLES IN GERMANY, USA AND UKRAINE FRAMED BY SOCIODEMOGRAPHIC BACKGROUND

DISSERTATION

to obtain the scientific degree of Doctor of Political Economy

PhD candidate:

Bohdana Sendziuk

Academic supervisor:

Dr. Artem Boltyenkov

Munich – 2025

Acknowledgements

This doctoral dissertation was completed as a part of my PhD program in “Management and business administration” at Ukrainische Freie Universität in Munich, Germany. Looking back on when it all started, I can only say that it’s been a rewarding, though sometimes challenging, journey. The successful completion of my dissertation was made possible by the immense support I received along the way. Therefore, I would like to express my gratitude to everyone who contributed in so many different but valuable ways.

First and foremost, I would like to thank my supervisor, Dr. Artem Boltyenkov, for his clear and thoughtful guidance as well as his valuable comments and suggestions, which made the research and writing process as smooth as possible.

I would also like to acknowledge the Ukrainische Freie Universität, along with its great professors, faculty leaders, administration and rector, for all the opportunities the university provided: from the chance to undertake the PhD program with insightful courses in Management, Marketing, Accounting, Psychology and Methodology, to participating in extracurricular activities and forming long-lasting friendships during these years.

This research would not have been possible without the invaluable contributions of all the interview and survey participants, who provided crucial insights and findings on the topic. Thank you for dedicating your time and assisting me in collecting the necessary data.

And last but not least, my PhD journey would not have even started without the support of my parents, who believed in me and have always been a great source of inspiration, and would also not have been possible to complete without my partner, Dr. Matthias Ehlert, as well as his family, who stood by my side throughout the entire process.

Table of contents

List of Abbreviations

Abbreviation	Explanation
ACEA	l'Association des Constructeurs Européens d'Automobiles (European Automobile Manufacturers Association)
BEV	Battery electric vehicle
BMW	Bayerische Motoren Werke AG
CEM EVI	Clean Energy Ministerial's Electric Vehicles Initiative
CSR	Corporate social responsibility
CTF	Climate and Transformation Fund
EKB	Engel Kollat Blackwell
EV	Electric vehicle
HEV	Hybrid electric vehicle
ICE	Internal combustion engine
IEA	International Energy Agency
MAAM	Multi-Attribute Attitude Model
MR	Motivational research
NLL	National Charging Infrastructure Coordination Center
PHEV	Plug-in hybrid electric vehicle
SAR	Schmidt Automotive Research
TCO	Total cost of ownership
TEAV	Thought-Emotion-Activity-Value Model
TPB	Theory of Planned Behavior
US	United States
USA	United States of America
VR	Virtual reality
WOM	Word-of-mouth

Chapter 1: Introduction

The goal of Chapter 1 is to explain the scientific value of this research and the reasons behind choosing and gathering a specific type of data.

In particular, Section 1.1 explains why this research covers the electric vehicle (EV) industry and consumer choices towards EVs, regardless of the existing studies. The explanation covers the changes in the EV industry, both in terms of the demand and supply constraints. Such changes, in turn, influence consumer behavior. Considering all these factors, Section 1.1.1 provides a central question of the research and explains why studying the proposed research question will help learn more about the current challenges and opportunities in the EV industry across Germany, United States (US) and Ukraine markets, compare them and provide suggestions on whether or not the EV consumers' behavior might change in the coming years and if it does - then how.

Section 1.2 explains the structure of the dissertation, providing a short overview of each chapter of and how they all contribute to the work.

1.1 Background

A few different studies and surveys aimed at identifying consumers' preferences regarding electric vehicles have already been conducted. They studied the influence of a variety of different factors on the EVs consumer behavior and motivation to become an EV user or owner. Also, recent results show an increase in the consumers' interest and sales of EVs. By the end of 2021, the latter has reached 16.5 million worldwide, which is triple the amount sold in 2018, with a 65% increase to 2.3 million in Europe and more than doubling to 630,000 in the US (IEA, 2022). Moreover, in 2022 there were more than 10 million electric cars sold worldwide, with China, Europe and the United States being among the largest EV markets. Also, a shift in the consumers' initial motivations has been tracked. For instance, some authors distinguish early EV adopters as the first wave of EV buyers, and the second wave of EV buyers. The former are known to be mainly concerned about environmental issues. On the contrary, the latter tend to consider the financial benefits of buying EVs. However, there are also certain obstacles preventing car enthusiasts from buying EVs. For instance, availability of charging infrastructure and high initial purchasing costs remain a big barrier for many consumers when considering the first EV purchase. This leads to thinking that on the one hand, consumers' perception trends tend to further develop

supporting EV sales growth, while on the other hand, certain factors influence the EV industry negatively. Moreover, recent events have also shaken different industries, including the EV industry, worldwide.

The automotive industry and EV market in particular have been severely influenced by recent developments in the world. The first shake-up - a COVID-19 outbreak - acted as a catalyst for higher demand for EVs, with an increased number of consumers willing to own their own car instead of using shared-mobility services. On the contrary, the recent geopolitical fallout of Russia's ongoing war against Ukraine has led to uncertainty for the automotive market players by causing delays and shortages in the global auto supply chains, economic and logistical disruptions (Batra et al., 2022). Supply side of the EV market was further constrained by rising prices of lithium, nickel, and other materials which threatened to slow the long term trend of falling costs of batteries. This development is causing harm to further technology adoptions since the batteries are the most expensive part of EVs, often keeping potential consumers of electric cars from buying the corresponding vehicles. Such developments may slow EV adoptions and cause changes in the consumers' preferences towards electric cars usage and buying behavior (Charm et al., 2020).

1.1.1 Finding and describing the scientific gap

While the changes mentioned above can be generally relevant for the German and the US markets, the Ukrainian market requires separate attention and studies for a few reasons. First of all, Ukrainian automobile users have started adapting to electric vehicles quite recently, with a main transition being visible during the last 5-10 years, featuring many promises and opportunities for further development. To add, Ukrainian legislation has also been in the initial stage for many further incentives and projects to be implemented. From this point of view, the Ukrainian EV market is quite young with a lot of consumers' buying potential to study. Secondly, the recent war outbreak in the country caused many big life changes for many Ukrainians, including changes in their buying behavior and habits.

German and the US automotive industries have deep roots in automotive manufacture and today are playing a pivotal role in the global transition to electric mobility solutions. Meanwhile, Ukraine is an example of a developing country offering a variety of innovations and having many customers interested in innovative technologies, including electrification. Therefore, studying consumers' buying choices

towards electric cars in the US, German and Ukrainian markets will provide comparable data explaining future electric car consumer behavior patterns.

Therefore, based on the current situation, this work is aimed at studying the following central question:

> What are current and future EV consumer behavior developments in Germany, the USA and Ukraine and how different or similar are they across these 3 countries?

1.2 Structure of the dissertation

To study and provide the learnings on the central question, the work is structured in four main parts. Chapter 2 and Chapter 3 constitute *the first background* part, providing a theoretical overview on the topic of consumer behavior and its developments from the first fundamental principles and theories to the modern approaches explaining differences in consumer choices as well as an overview on the consumer behavior studies with a focus on the automotive industry. Chapter 4 is the *second part, explaining the qualitative and quantitative methodological approaches* to the research as the best way to collect and analyze the data. Chapter 5 creates the *third part of the research with a detailed overview and analysis of the collected data* on consumer behavior and its future developments regarding battery electric vehicles (BEVs), hybrid electric vehicles (HEVs) and plug-in hybrid electric vehicles (PHEVs) across Germany, the USA and Ukraine. Chapter 6 is the *fourth part of this work, which leads to the main conclusions and interpretations* of the results while also comparing them with the results of other research works and providing recommendations. And Chapter 7 is the *final, fifth, part* of the work, summarizing the whole research and its main findings.

Chapter 2: Theoretical overview

This chapter provides a general theoretical overview on the topic of consumer behavior and its development from the first fundamental principles and theories to the modern approaches explaining differences in consumer choices.

In particular, Section 2.1 gives a historical and theoretical background of the consumer behavior studies. It provides the definitions of a consumer and consumer behavior founded by different scientists and the way the consumer behavior concept has transformed into a separate scientific field with further influences of other scientific studies. Furthermore, this section explains the nature of consumer choice which is based on a number of varied disciplines and the approaches which prevailed in the late 1960s and highlighted mainly the buyer's economic rationality. Such approaches included the learning theory, the Veblenian social and psychological model, the utility theory, Herbert Simon's behavioral model of rational choice, Maslow's Need Hierarchy Theory of Motivation, Hawkins Stern's impulse buying approach, Ernest Dichter's motivation of research, the Engel Kollat Blackwell (EKB) model, "The Theory of Buyer Behavior" by John Howard and Jagadish Sheth, just to mention a few.

Section 2.2 explains the development of marketing behavior approaches and transformation of consumer behavior into the marketing field, bringing an innovative view on the decision-making processes, with an emotional and social part of the behavior. The theories that influenced this scientific phase are the Behavioral Decision Theory, Hirschman and Holbrook in their Thought-Emotion-Activity-Value (TEAV) Model as well as research works conducted by Schiffman and Kanuk; Solomon, Bamosy, Askegaard and Hogg; Levy and others. To add, the section introduces the evolution of two different types of schools of marketing thought explaining the activities "involving the exchange of value" and the "external and internal factors' balance of power, as well as classical schools of marketing from the Marketing Functions School and Marketing Commodities School to the schools of Marketing Institutions, Marketing Management, Marketing Systems, Consumer Behaviour, Macromarketing, Exchange and Marketing History. In this field many researchers define consumer behavior through psychological reactions and emotions in particular.

Today's life is impossible to imagine without innovations. And as behavior theories continue to evolve, the influence of innovative technologies on them is inevitable. Thus, Section 2.3 provides an overview of such influence and explains how such technological shifts are altering the psychological and social

processes of the customer journey. These processes are also accompanied by development of the regulatory focus, goal systems, construal level and self-construal theories which study new behavior trends and consumer goals, affecting such factors as self-control, motivations, desires, needs, wants, identity, status and others.

And as different technologies influence the nature of consumption, consumer research is also affected. And such methodological change from late 1960 until nowadays is described in Section 2.4. In particular, it focuses on two main directions of the traditional methodological content, which are the behavioral economics focused on consumer information processing and decision making and the experiential approach questioning consumer rationality and product evaluation, and describes the newly evolved aspects, also known as 3 Is: irrationality, interpretation and intrinsic motivation.

2.1 Theoretical contribution

This section focuses on the historical and theoretical origins of consumer behavior studies. As consumers are at the heart of this area of study, it is essential to first clarify the term "consumer." For instance, Walters describes a consumer as an individual who makes purchases or possesses the ability to buy goods and services, with the aim of meeting personal or household needs, wants, or desires (Walters, 1979). In this sense, the definition pertains to human behavior, which includes any thought, emotion, or action. Belch connects human and consumer behavior, framing the latter as the analysis of how people behave when acting as consumers (Belch, 1998). Similarly, Walters links consumer behavior to the actions people take when acquiring goods and services from marketing organizations (Walters, 1979).

Various scholars have proposed different definitions of consumer behavior. One example is Mowen, who approaches it from the angle of group purchasing, defining consumer behavior as the investigation of buying patterns and the related processes of obtaining, using, and disposing of ideas, products, experiences, and services (Mowen & Minor, 1998). On the other hand, Schiffmann and Kanuk characterize it as the study of how individuals manage their resources, such as money, time, and energy, in relation to consumption (Schifmann & Kanuk, 2007). They explain that consumers exhibit purchasing behavior when they search for, assess, acquire, utilize and discard products, services, or ideas. Belch, however, emphasizes that consumer behavior is the series of activities and processes individuals undertake in searching for, selecting, buying, using, evaluating, and ultimately disposing of goods and

services to fulfil their needs and desires (Belch, 1998). While these definitions provide a broad view of consumer behavior, the complexity of consumer decision-making goes much deeper.

In contemporary times, consumer behavior research has become increasingly influenced by psychological insights. While some modern decision-making models, such as expectancy-value theory, assume consumers are largely rational, other models recognize that consumers may not always aim to make the most of available resources (Allen & Ng, 2004). For instance, they may compare brands based on just one feature. The neoclassical economic view also assumes that consumer preferences are fixed, but it does not address how these preferences are formed. As a result, areas like consumer socialization and the influence of social factors are key topics for economic psychologists. Psychological perspectives also explore motivations, lifestyles, and emotions, which the neoclassical model often overlooks.

With the growth of behavioral science, researchers have sought out more sophisticated methods and frameworks to enhance their understanding of consumer behavior, as well as to manage and predict it more effectively. Over time, a broad range of disciplines - including economics, sociology, social psychology, and psychology - have joined this course, contributing to the establishment of behavioral science as a robust and distinct academic field.

Development of consumer behavior as a distinct scientific field began in the late 1940s to early 1950s (Fullerton, 2013). George J. Stilger, in his 1954 article titled "The Early History of Empirical Studies of Consumer Behaviors" published in the Journal of Political Economy, referenced the work of economists who had already been studying consumer behavior at the time (Stigler, 1954). Stilger discussed early empirical research on consumer behavior and noted that quantitative methods for analyzing the influence of income on consumer behavior had been established around seventy years earlier. Initially, the "rational consumer" model was predominantly used, viewing consumers through the lens of logic and utility. However, over time, the emphasis shifted from rational consumption to understanding consumer behavior and desires, with a focus on improving sales strategies based on this understanding (Aragone, 2020).

Consumer behavior studies have evolved alongside the development of the broader field of consumer research and have been shaped by various paradigms. The focus of the discipline has expanded from merely understanding why and what consumers purchase to exploring how marketers influence consumer choices and how consumers utilize the products and services they buy (Kumar, 2016). As a result, this

market evolution has led to the emergence of an independent field of study that examines how individuals make decisions to allocate their resources (time, money, and effort) on consumption-related matters, including what, when, and how they buy (Rabontu & Boncea, 2007). Over the years, numerous consumer thoughts, behaviors, and patterns have been analyzed, leading to the development of various consumer behavior theories and models.

Generally, these theories are categorized into traditional, or older, theories and modern, or contemporary, ones (Hansen et al., 2012). Traditional theorists believed that consumers act in an automatic, almost instinctual manner, reflecting what early economic philosophers proposed. Economists developed several principles to explain consumer behavior. One such principle asserts that when demand increases, consumers will purchase more of a particular item, especially when its supply diminishes. Economists viewed consumers as rational decision-makers, whose actions were calculated, logical, and deliberate.

In contrast, modern or contemporary theories are rooted in the findings of behavioral and social sciences (Hansen et al., 2012). These theories describe consumers as complex and unpredictable beings who engage with different social groups and are influenced by cultural factors. Consumers are viewed as having multidimensional identities, meaning their behavior can be rational at times, while at other times it can be highly irrational. Modern theories seek to explain these unpredictable and irrational behaviors. Since consumer behavior is inherently multidisciplinary, these theories are based on insights from various fields. When building consumer behavior theories, researchers make extensive use of sociology, social psychology, individual psychology, anthropology, marketing research, and even economics (Hansen et al., 2012). Figure 1 illustrates the multidisciplinary nature of this field.

Figure 1. Consumer Behavior is Interdisciplinary

Source: Hansen, H., Kanuk, L. L., Schiffman, L. G., 2012

There are more than 10 traditional theories that primarily describe consumer behavior from a rational perspective (Bray, 2008). The most prominent of these include: learning theory, the Marshallian economic model, the Veblenian social-psychological model, the Freudian psychoanalytical model, utility theory, Herbert Simon's behavioral model of rational choice, Maslow's hierarchy of needs theory of motivation, Hawkins Stern's impulse buying model, John Howard's buying behavior model, the EKB model, the Howard Sheth model, and the theory of reasoned action by Martin Fishbein and Icek Ajzen, along with the Multi-Attribute Attitude Model (MAAM), which is a form of the theory of reasoned action. These theories are explained in Table 1.

Theory name	Explanation
Learning theory	Consumers' purchase behavior results in a more favorable outcome based on the acquired knowledge by means of trial-and-error method (Watson, 1913).
Marshallian economic model	There is the relationship between the quantity demanded of the good and the price of a good; the demand function can also explain how consumers respond to changes in price (Marshall, 1890).
Veblenian social-psychological model	Consumer purchases are influenced by social groups and norms and are driven primarily by the consumers' need to maintain a social class and prestige rather than their intrinsic needs (Veblen, 1899).
Freudian psychoanalytical model	Groups influence and shape human behavior by acquiring and embracing the diverse views of the members (Freud, 1960).
Utility theory	Consumers choose the product that has the greatest utility by evaluating the product's information in comprehensive way (Marshall, 1890).
Herbert Simon's behavioral model of rational choice	Individuals behave purposefully, driven by the decision-making process (Simon, 1957).
Maslow's need hierarchy theory of motivation	There is a hierarchy of five needs within each individual: physiological needs; safety needs; social needs; esteem needs; and a self-actualization need (Maslow, 1943).
Hawkins Sterns' impulse buying behavior model	External forces affect consumers and make them indulge in impulsive buying behaviors (Stern, 1962).
John Howard's buying behavior model	Consumers actively seek information from various sources to make well-informed decisions (Howard & Sheth, 1969).
Ernest Dichter' motivation of research	Consumers' behavior is explained from the perspective of the reasons behind purchase decisions (Dichter, 1960).

Engel Kollat Blackwell (EKB) model	The purchasing decisions are explained with a four-phase process: input, processing information, decision stages, and variables (Engel, Kollat, & Blackwell, 1968).
Howard Sheth model	Purchasing behavior is explained as reliably repetitive and prone to establishing a familiar purchasing routine which saves time and simplifies the decision-making process (Howard & Sheth, 1969).
Martin Fishbein' and Icek Ajzen' theory of reasoned action	An individual's actions are guided by the intention to carry out that behavior, and this intention is, in turn, a function of the personal attitude towards the behavior and the prevailing societal norms (Fishbein & Ajzen, 1975).
Multi-attribute attitude model (MAAM) / theory of reasoned action	The selection of a brand or the intention to buy a particular brand is determined by perceptions regarding brand features and their significance (Fishbein, 1967).

Table 1. Traditional theories

According to learning theory, also known as the Pavlovian learning model, consumers undergo a learning process (Watson, 1913). Through trial and error, they acquire knowledge, and this learning helps shape their purchasing behavior, leading to more favorable outcomes. B. F. Skinner further suggested that past experiences are translated into consumer attitudes (Skinner, 1938). Economic theory, also known as a Marshallian economic model (e.g., a value theory of Jevons, Manger, Walras and Marshall) examines consumer behavior from a rational standpoint (Marshall, 1890). This model, framed as a mathematical function, explores the relationship between the quantity demanded of a good and its price. Named after economist John Marshall, who first introduced it in 1884, the demand function also explains how consumers react to price fluctuations.

On the other hand, social and psychological theories, particularly the Veblenian social-psychological model (developed by T. Veblen), argue that consumers are not always conscious of the motivations behind their actions (Veblen, 1899). This model suggests that consumer purchases are largely driven by the desire to maintain social status and prestige, rather than fulfilling personal needs. It outlines six influencing factors: social class, income level, culture, subculture, family, and reference groups.

Another early and widely recognized concept is the theory developed by Thorstein Veblen. He is regarded as the first theorist in consumer behavior and marketing. Veblen analyzed both human and consumer behavior through a multidimensional lens that incorporates economic, social, and psychological theories. From his research, the Veblenian social-psychological theory emerged in the 1960s. This theory posits that individuals' needs and desires are shaped and influenced by their social groups and societal norms and that consumer purchases are largely driven by the desire to maintain social status and prestige, rather than fulfilling personal needs. It outlines six influencing factors: social class, income level, culture, subculture, family, and reference groups.

Veblen asserted that individual economic decisions, particularly regarding consumption, are largely affected by a variety of external factors. He believed that human behavior - and consequently consumer behavior - is continually evolving and contingent upon external socio-economic and socio-cultural contexts. He argued that the entire human environment significantly impacts the emergence of new behavior patterns, including those related to consumption. Therefore, consumer purchases often reflect their desire to uphold a specific social class or status.

Using American society as an example, Veblen sought to elucidate why individuals engage in conspicuous behavior. He contended that instinctual habits, such as the instinct for workmanship, play a critical role in consumer decision-making. This instinct aims for satisfaction derived from the possession of material goods. Consequently, the satisfaction and dissatisfaction experienced by conspicuous consumers result from the presence of the leisure class and the consumer's ability to adhere to the norms and expectations of that class, seeFigure 2 (Almeida, 2015). Today, the concept of "Veblen effects" - derived from Veblen's theory - refers to the tendency of consumers to be willing to pay a premium for a product that offers similar functionality (Bagwell & Bernheim, 1996).

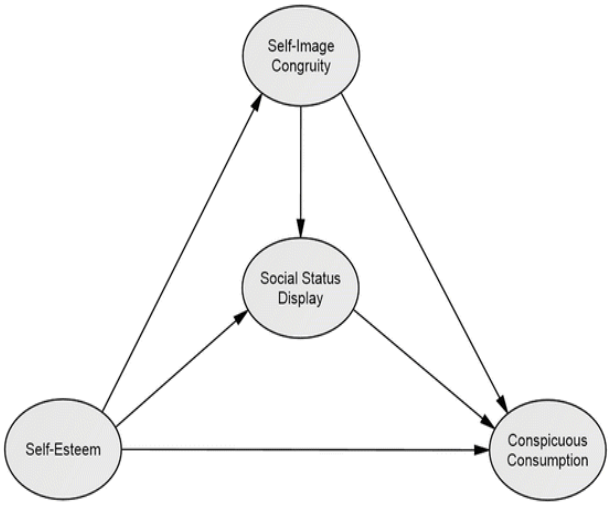

Figure 2. Conspicuous Consumption in Relation to Self-Esteem, Self-Image and Social Status

Source: Topçu, U.C., 2018

Another key theory, the Freudian psychoanalytical model (inspired by Freud), suggests that group dynamics shape individual behavior by embracing and valuing the differing views within those groups (Freud, 1960).

One of the earliest and most essential approaches in consumer behavior research is utility theory (Marshall, 1890). This theory posits that consumers possess complete information about each product. As a result, they assess the available information comprehensively and select the product that offers the highest utility. However, critics contend that it is unrealistic to assume that consumers always opt for the brand with the greatest utility. This scepticism arises from the understanding that individuals have limited capacities for information processing and are prone to errors in judgment. Additionally, consumers are unlikely to have access to all the information about every brand, and the information they do possess is influenced by various perceptual and motivational biases. For example, one well-documented effect indicates that consumers tend to assign greater value to products perceived as scarce. In 1966, Brehm explained this phenomenon as a psychological response to the perceived loss of freedom (Brehm, 1966). Likewise, consumers determine whether a price is fair or not just by the absolute cost, as suggested by neoclassical economics, but also by considering price changes and their frame of reference, as outlined in prospect theory.

Another instance of a traditional economic theory that views consumers through the lens of the "rational economic man" is Herbert Simon's behavioral model of rational choice (Simon, 1957). Simon argues

that the gap between rationality and behavior is connected through the concept of decision. Each behavior entails making a choice from among various potential alternatives. Additionally, a decision is a process that facilitates this selection. A key criterion applied during this decision-making process is rationality. Simon describes rationality as the relationship between established goals and the means used to achieve them. However, the connection between means and ends is a factual question that necessitates further assessment. Evaluating this relationship involves three steps: 1) identifying all potential behavioral options; 2) determining the outcomes that would result from each option; and 3) comparing the alternatives based on the sets of consequences associated with each one of them (Barros, 2010).

A theory that provided a new perspective on consumer purchasing behavior during that period and has since become a foundational framework for understanding human motivation, needs, and consumer behavior is Maslow's need hierarchy theory of motivation, see

Figure 3. Introduced in 1943, this theory posits that individuals possess a hierarchy of five needs: physiological needs, which include air, water, food, clothing, and shelter; safety needs, encompassing physical, environmental, and emotional security; social needs, which involve the desire for love, affection, care, belonging, and friendship; esteem needs, categorized into two types: internal esteem needs (such as achievement, confidence, self-respect, competence, and freedom) and external esteem needs (often referred to as ego needs) that include status, attention, power, recognition, and admiration; and self-actualization needs, which encompass the desire for personal growth, self-fulfilment, and the aspiration to achieve one's potential (Maslow, 1943). However, this theory has its drawbacks, including a lack of empirical support, as well as the reality that individuals may be motivated by multiple needs simultaneously.

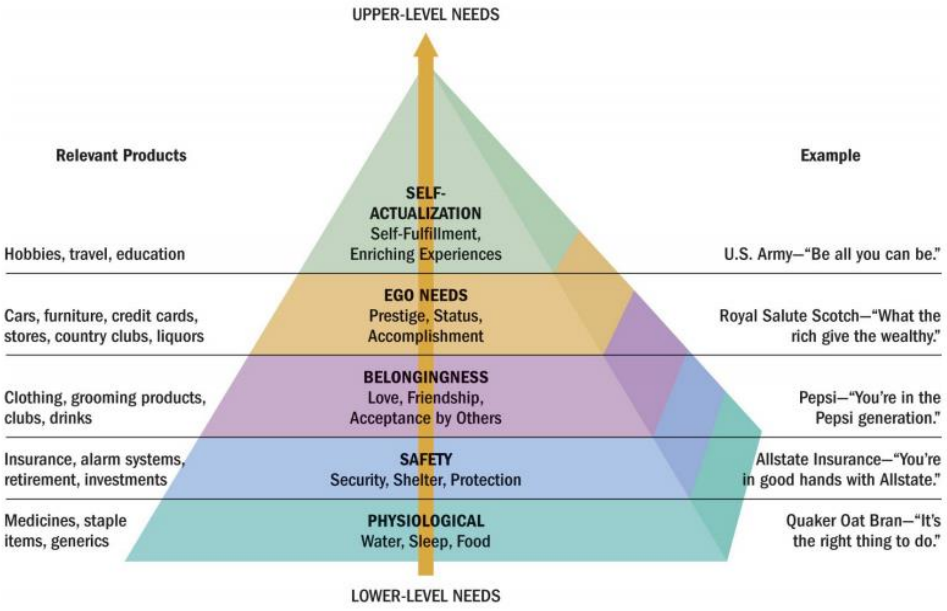

Figure 3. Maslow's Hierarchy of Needs

Source: Solomon, M. R., 2004

The consumer purchasing process is closely tied to the tendency of consumers to make impulsive purchases. A well-known explanation for this phenomenon was proposed by Hawkins Stern in 1962 through his impulse buying model (Stern, 1962). This framework outlines various factors that contribute to consumers exhibiting impulsive buying behaviors. Stern posited that external influences can sway consumers, prompting them to engage in unplanned purchases. Consequently, he asserted that it is feasible to persuade consumers to buy more than they originally intended. Recent research supports the effectiveness of this theory in the context of online shopping, which digital marketers currently leverage to stimulate impulse buying among their target audiences.

The Hawkins Stern model (see Figure 4) identifies four categories of impulse buying: pure impulse buying (when customers purchase items not included in their shopping lists); reminder impulse buying (when a buyer is aware of a product but had no prior intention to purchase it); suggested impulse buying (which occurs when a customer encounters a product for the first time and feels an immediate urge to buy it); and planned impulse buying (when the buyer recognizes a need for an item but is uncertain about its specifications) (Stern, 1962).

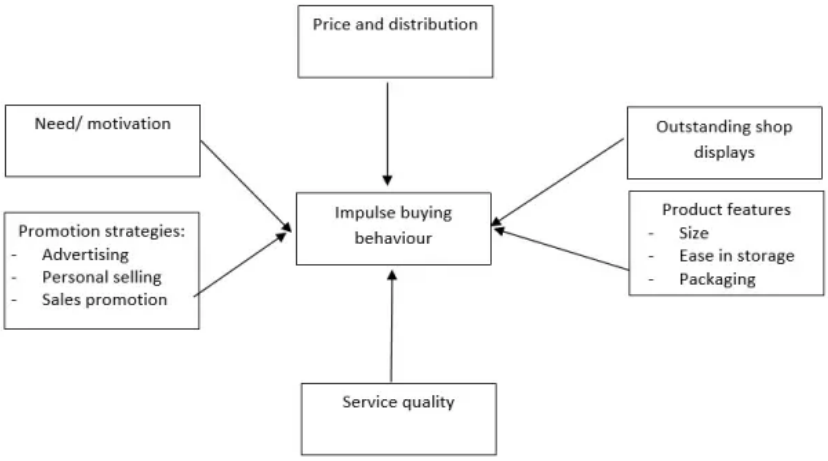

Figure 4. Hawkins Sterns' Impulse Buying Behavior Model

Source: Stern, 1962

Marketers employ several strategies to stimulate impulsive buying behavior among consumers. According to Stern, pricing strategies serve as the most significant trigger for impulsive purchases; however, this is less applicable to high-cost items, such as automobiles. Impulsive buying behaviors are most prevalent for products that have a short shelf life, marginal necessity for the consumer, smaller size, and ease of storage (Agarwal & Chetty, 2019).

Another buyer behavior model was introduced by John Howard (Howard & Sheth, 1969). This model first appeared in the second edition of his marketing textbook and was quickly embraced by many theorists in the field, including Engel, Kollat, and Blackwell; Franco Nicosia; Alan Andreasen; Jim Bettman; and Joel Cohen. The fundamental concept of this model is that inputs take the form of stimuli, while the outputs represent reactions that range from attention to a specific stimulus to the final purchase decision. The outputs primarily reflect consumer reactions, which are influenced by how consumers respond to learning and perceptual variables. These variables, affecting perception and learning, lie between the inputs and outputs and come into play when consumers are making decisions. Additionally, the model acknowledges a separate category of variables, known as exogenous variables, which, while not directly part of the model, can also influence consumer behavior. These include factors such as personality traits, time constraints, and religious beliefs.

Ernest Dichter is recognized as the pioneer of motivation research in marketing. He developed the concept of motivation research (MR), which significantly influenced advertising studies and practices in

the twentieth century. His groundbreaking contributions included redirecting attention to the consumer, modifying psychoanalytic concepts for research applications, and utilizing therapeutic methods to examine behavior in the marketplace (Dichter, 1960). As a prominent interpreter of Freud's theories, he asserted that many human motivations are often irrational, operate at an unconscious level, and are unknown to the individuals themselves (Gonzalez, 2020). To gain a deeper understanding of the underlying meanings behind consumer goods and experiences, Dichter actively sought out hidden, irrational, and often sexualized motivations for consumer behavior, particularly those explainable through formative experiences, not exclusively from childhood (Horowitz, 1986).

Other approaches include the EKB model (see

Figure 5), which was developed in 1968 (Engel, Kollat, & Blackwell, 1968). This model explains purchasing decisions through a four-phase process: input, information processing, decision-making stages, and influencing variables (Francis, n.d.).

During the initial input stage, consumers gather information from various sources, encompassing both marketing and non-marketing channels. The search for external information continues until the individual reaches a specific decision or chooses an option that meets their expectations.

The next phase involves processing the information. This stage includes several processes, such as the consumer's perception, attention, retention, and acceptance of incoming information.

The decision-making process encompasses five fundamental decision-related processes. These processes include recognizing a problem, searching for alternatives, evaluating those alternatives (which may lead to the formation of attitudes influenced by existing beliefs, ultimately resulting in a purchase intention), making the purchase, and assessing the outcomes.

The final phase involves various variables that influence decisions, categorized into individual and environmental influences. These factors impact all five stages of the decision-making process. Individual characteristics encompass lifestyle, values, motives, and personality traits, while social influences include family, culture, and reference groups. Depending on their type of behavior, individuals may navigate through different stages of this decision-making process. Additionally, situational influences, such as a consumer's financial status, also affect the decision-making process (Engel, Kollat, & Blackwell, 1968).

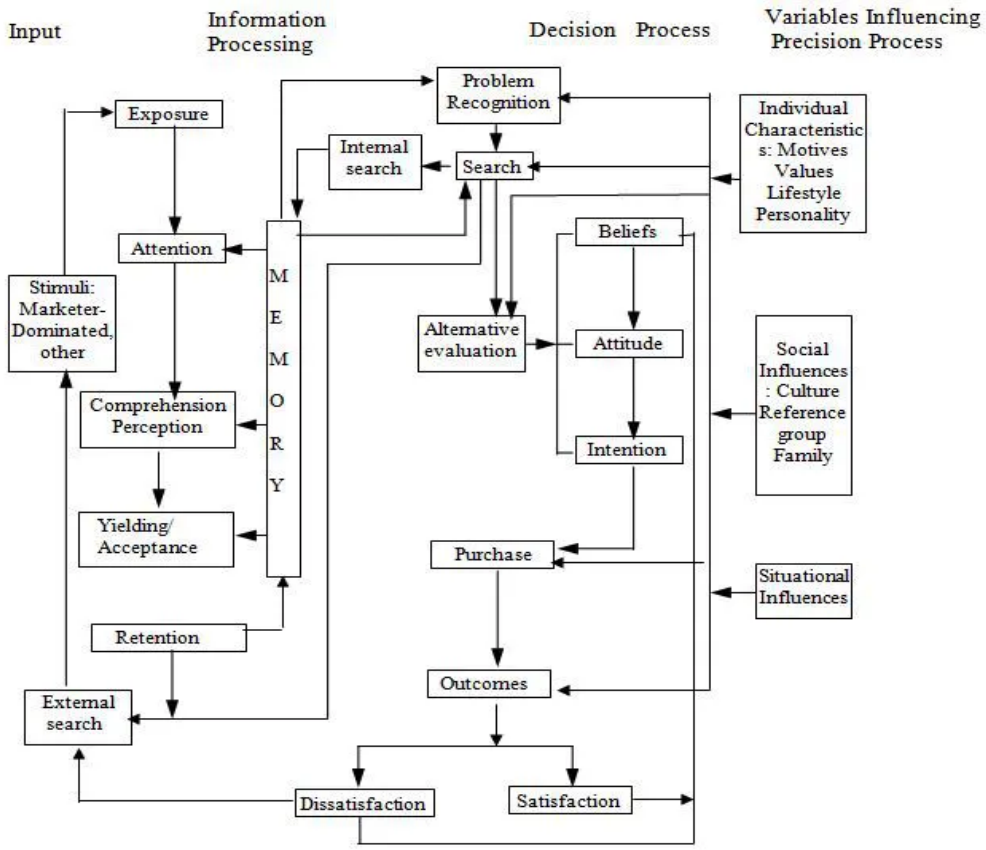

Figure 5. The Engel Kollat Blackwell Model of Consumer Behavior

Source: Engel, Kollat, & Blackwell, 1968

Another model of consumer behavior that is similar to the EKB model is the Theory of Buyer Behavior, also known as the Howard Sheth Model, which was developed by John Howard and Jagadish Sheth in 1969, see Figure 6 (Howard & Sheth, 1969).

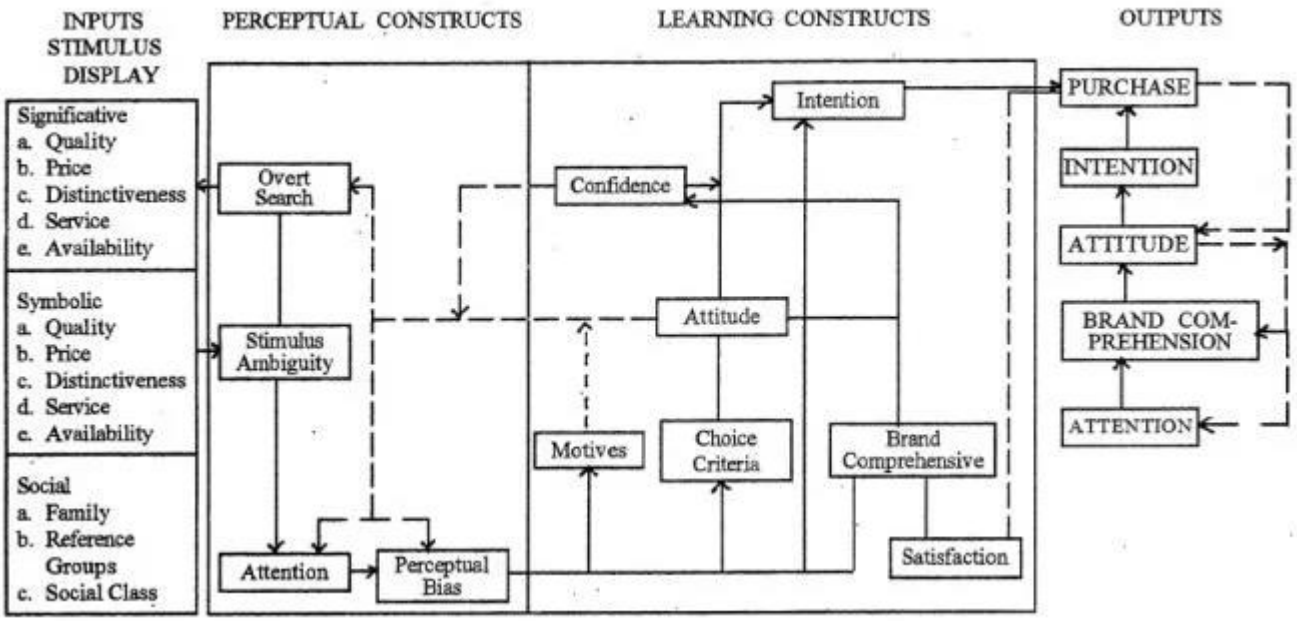

Figure 6: The Howard Sheth Model

Source: Sangarathas, Shanmugathas, 2017

This model integrates various psychological, social, and marketing influences on consumer choices into a coherent sequence of information processing. It posits that purchasing behavior tends to be reliably repetitive, often leading to the establishment of familiar buying routines that save time and streamline the decision-making process (Howard & Sheth, 1969).

The model comprises four sets of factors: inputs, which include three distinct types of stimuli (or information sources); perceptual and learning constructs, which involve psychological variables in the decision-making process; outputs, which represent the results of the perceptual and learning variables and how consumers respond to them (such as attitudes, brand comprehension, attention, and intention); and exogenous (or external) variables, which, while not directly involved in the decision-making process, encompass factors such as the importance of the purchase, religion, consumer personality traits, and time pressure.

According to this theory, a buyer's brand preference is shaped by motives, courses of action or alternative choices, and specific decision mediators that align the motives with available alternatives. Understanding these mediators can help alternative brands in the market identify gaps and create offerings that fill those gaps for consumers. When a new buyer enters the market to purchase a product type for which they lack

knowledge or experience, they will seek out or inadvertently receive information from a third party. Subsequently, the consumer processes this information through the lens of how well the product may fulfil their needs. The buyer might also compare the new product to previous items they have purchased and use a similar approach in their decision-making. In the purchasing process, the consumer develops specific decision mediators necessary to consistently select a particular product or brand in the future based on what appears to best meet the purchaser's motives (Salgues, 2016).

In addition to analyzing consumer behavior in terms of cognitive processes, this theory also offers a depiction of purchasing behavior and its results that can be empirically tested (Salgues, 2016). It suggests that there are inputs in the form of stimuli, outputs that start with attention to a given stimulus and culminate in a purchase, and variables that affect perception and learning, which lie between the inputs and outputs. The model identifies three levels of decision-making. The first level, extensive problem-solving, occurs when the consumer lacks basic information or knowledge about a brand and therefore seeks information about various brands available in the market before making a purchase. The second level, limited problem-solving, involves consumers who have minimal or partial knowledge about the market. In this case, they look for and utilize comparative brand information to form a specific brand preference. The third level pertains to habitual response behavior, where the consumer has acquired substantial knowledge about different brands, can distinguish between the characteristics of each product, and is able to make informed decisions about purchasing a specific product.

Martin Fishbein and Icek Ajzen are the creators of a significant theory known as the theory of reasoned action, see Figure 7 (Fishbein & Ajzen, 1975). Established in 1975, this theory examines the connection between marketing and the preexisting attitudes that consumers hold when making purchasing decisions. It posits that a person's behavior is influenced by their intention to engage in that behavior, which, in turn, is shaped by their attitude towards the behavior and the subjective norms surrounding it (Salgues, 2016). This theory emphasizes that rational decision-making is a crucial factor motivating consumers to make purchases. Additionally, it suggests that a consumer is likely to take a particular action only if there is a reason to believe that it will lead to a desired outcome, or what is referred to as instrumentality.

Instrumentality is characterized by three components: subjective norms, the consumer's attitude towards the specific behavior, and the perceived behavioral control. The stronger the perceived control and the more positive the attitude and subjective norms, the greater the individual's intention to carry out the

behavior. However, it is important to note that a consumer may change his or her mind or choose an alternative action between the moment they decide to proceed with a decision and the point at which the action is completed.

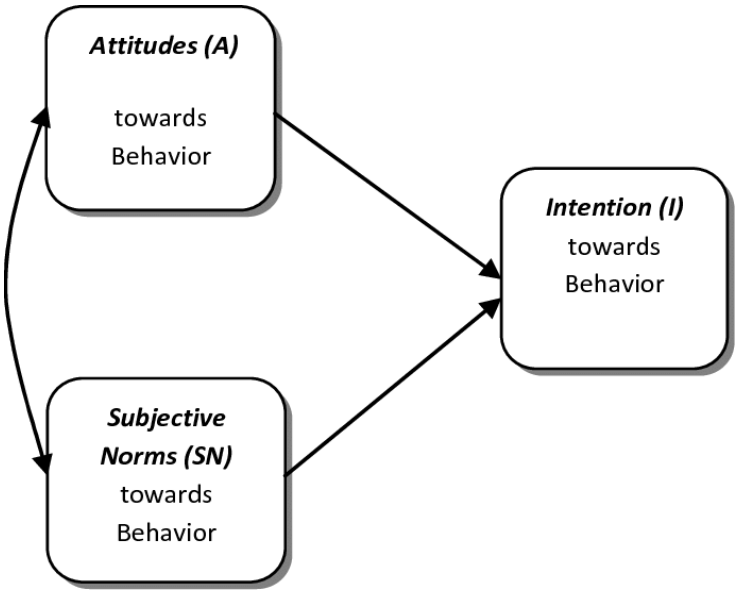

Figure 7. Theory of Reasoned Action

Source: Özer & Yilmaz, 2010

The connection between cognitions and affect was initially introduced by psychologists Fishbein, Rosenberg and Hovland (Fishbein, 1967; Rosenberg & Hovland, 1960). To explore this connection, the researchers employed various forms of MAAM, which is also referred to as the theory of reasoned action (Fishbein, 1967). Within the framework of MAAM, perceptions regarding brand attributes are evaluated based on their importance and then combined to create an explanation or prediction of affect (such as preference for a brand or the tendency to favor one brand over another). This, in turn, influences behavior (such as the choice of a brand or the intention to purchase a specific brand) (Jakhar, 2020).

Overall, the concepts that prevailed in the late-1960s were mainly highlighting the buyer economic rationality and considered consumers as computer-like information-processing machines when making purchase decisions (Holbrook et al., 2020).

The theoretical overview above shows that the study of consumer behavior has evolved over time, with various theories contributing to our understanding of how consumers make purchasing decisions. Utility

theory, an early approach, suggested that consumers possess complete information about products and make decisions based on maximizing utility. However, critics pointed out the limitations of this perspective, noting that consumers often operate with incomplete information and are influenced by psychological biases.

Another significant model is the EKB model, introduced in 1968, which describes the purchasing process as a four-phase cycle involving input, information processing, decision-making stages, and influencing variables (Engel, Kollat, & Blackwell, 1968). This model emphasizes the role of stimuli in shaping consumer reactions and the importance of learning and perceptual variables in the decision-making process.

The Theory of Buyer Behavior, or Howard Sheth Model, proposed by John Howard and Jagadish Sheth in 1969, further explores consumer choice by integrating psychological, social, and marketing influences (Howard & Sheth, 1969). This theory posits that purchasing decisions are influenced by intentions driven by attitudes and subjective norms. It also highlights that consumers may change their decisions between the intention and the final action.

Ernest Dichter is known as the father of motivation research in marketing (Dichter, 1960). His work emphasized the hidden, often irrational motivations behind consumer behavior, integrating psychoanalytic concepts into marketing strategies. Dichter's approach remains influential today, particularly in understanding impulse buying, where consumers are prompted to make unplanned purchases.

Finally, Martin Fishbein and Icek Ajzen's theory of reasoned action focuses on the interplay between consumer attitudes, subjective norms, and behavioral intentions (Fishbein & Ajzen, 1975). It outlines how consumers evaluate brands based on their perceptions, leading to specific purchase decisions. This theory contributes to understanding consumer behavior by examining the cognitive processes behind buying decisions and the factors that influence them.

2.2 Marketing contribution

Overall, the theories and models discussed have significantly contributed to the evolution of marketing and approaches to marketing behavior. As a result, the field of consumer behavior predominantly relies

on psychological insights. While some consumer decision-making models allow for extended rationality (such as expectancy-value theory), others acknowledge that consumers do not always seek to maximize expected utility (Allen & Ng, 2004). Consequently, they may evaluate brands based on a single attribute (for instance, the lexicographic model). Additionally, the neoclassical economic perspective assumes that consumer preferences remain stable; however, it fails to explain the origins of these preferences. Another drawback of this neoclassical viewpoint is its neglect of the roles that emotions, motivations, lifestyles, and self-concept play in consumer choice (Allen & Ng, 2004). There can be distinguished 10 main marketing behavior approaches that are explained in Table 2.

Theory name	**Explanation**
Behavioral economics	It took its origins from the Behavioral Decision Theory and was further developed in economics by Thaler and in psychology by Kahneman and Tversky; it covers consumer decision making and information processing (Kahneman & Tversky, 1979; Thaler, 2015).
Experiential approach	The researchers have analyzed consumers as emotional and social actors considering their hedonic desires and needs (Schmitt & Zarantonello, 2013).
Economic viewpoint of marketing	The first axiom to distinguish consumer behavior in marketing; marketing falls under the umbrella of economic activities (Tadajewski, 2009).
Marketer's viewpoint of marketing	The second axiom to distinguish consumer behavior in marketing; the marketer rather than the consumer is considered to be the originator of marketing programs and undertakings (Schiffman & Kanuk, 2006).
Marketing behavioral schools	More attention has been drawn to the psychological side of the consumers' buying behavior (Skinner, 1938; Watson, 1913).
Consumer perception approach	Inclinations toward particular brands, products, or companies lead consumers to react positively or negatively to them; a company's ethical behavior is viewed as an important factor which influences consumer buying decisions; such factors as consumer loyalty, the word-of-mouth,

	consumer self-values and a consumer-company identity are studied (Bagozzi et al., 2006; Romani et al., 2013).
Consumer behavior studies	Companies look for understanding of different aspects of consumer behavior to influence consumers through marketing strategies and include elements such as consumer attitude, loyalty, perception, word-of-mouth/recommendation, evaluation, emotions, motivation, purchase intention, actual purchase and repurchase, as well as consumer-company identity (Engel et al., 1968; Fishbein & Ajzen, 1975; Howard & Sheth, 1969).
Experience marketing	Experience is the key element in understanding consumer behavior and marketing management (Pine & Gilmore, 1999).

Table 2. Marketing behavior approaches

Considering the ongoing advancements in buyer behavior research and their integration into the marketing field, two main trajectories have emerged in the development of studies.

The first perspective is behavioral economics, which originated from Behavioral Decision Theory and has since been expanded across various disciplines:

- in economics by Thaler (Thaler, 2015);
- and in psychology by Kahneman and Tversky (Kahneman & Tversky, 1979).

This field has also found applications in marketing through the contributions of theorists such as Jim Bettman, Itamar Simonson, Joel Huber, Eric Johnson, John Payne, Jay Russo, and more recently, Dan Ariely (Simonson, 2016). For example, Bettman has concentrated his research on consumer decision-making and information processing, specifically examining how preferences are constructed, how decision-makers adapt to various situations, and the effects of emotion and stress on decision-making (Bettman, 1979). In contrast, Huber and Shiv noted that consumer preferences shift when individuals concentrate on the anticipated satisfaction from a purchase, which is influenced by the degree to which this expected pleasure is activated (Huber & Shiv, 2000). Collectively, these researchers have introduced innovative perspectives on the decision-making processes of consumers and the rationality behind them.

This approach has also provided new insights into consumer financial decision-making and has contributed to the development of "nudge" theories (Holbrook et al., 2020).

The second perspective was experiential. This approach was questioning two foundational elements of the consumer behavior framework: product assessment and consumer rationality (John-Mariadoss et al., 2022). Its main founders and followers have considered consumers as real human beings in comparison to the previous view of the information-processing computer-like machines. The researchers have analyzed consumers as emotional and social actors considering their hedonic desires and needs. For instance, this experiential approach indicates 6 primary elements of consumption: setting, sensation, evaluation, activity, thought and feeling. These elements are similar to the elements developed by Hirschman and Holbrook in their TEAV Model (Holbrook & Hirschman, 1982). The latter suggests the hedonic type of consumption. It mainly involves the emotional processing, more evaluation and activity and less cognitive analysis and sensory engagement (Lofman, 1991). Considering the model's elements, they are the following:

- thought, which includes dreaming and imagining;
- emotion, which covers various kinds of physiological responses, feelings and expressive behaviors;
- activity, which includes mental and physical events relating to both action and reaction;
- and value, which relates to evaluations and judgments in consumption.

According to Hirschman and Holbrook, consumers are oriented towards both instrumental and hedonic aspects (Holbrook & Hirschman, 1982). This implies that experiential consumption can be primarily hedonic, primarily instrumental, or a combination of the two. Other researchers, such as Alderson, have described consumers as seeking unique and enjoyable experiences while also fulfilling their functional needs (Alderson, 1957). Kotler and Levy have also made significant contributions to marketing and consumer behavior by expanding the concepts of social marketing (Kotler & Levy, 1969a). He posited that individuals consume in ways that reflect their self-perception. This perspective has further advanced consumption theory and prompted researchers to examine the impacts of self-related goals and self-identity on consumer behavior (Argo et al., 2013).

Another approach to defining the role of consumer behavior in marketing is grounded in two axioms that dominated the early 21st century. The first axiom, proposed by Howard, Sheth, and Tadajewski, is rooted in the economic perspective of marketing and asserts that marketing is a subset of economic activities or

a branch of economics (Howard & Sheth, 1969; Tadajewski, 2009). The second axiom emphasizes the belief that marketing initiatives originate from the marketer rather than the consumer.

This view has been contested by several scholars, including Schiffman, Kanuk, Solomon, Bamossy, and Askegaard, who argue that marketers must comprehend consumer behavior through market research (Schiffman & Kanuk, 2007; Solomon et al., 2002). These scholars challenge the notion that marketers are the sole experts in marketing strategies and underscore that understanding consumers is crucial for developing effective marketing programs. They contend that consumer behavior serves as an input factor that influences, manipulates, and controls various forms of market behavior. To achieve this understanding, marketers must be well-versed in consumer psychology (Chufama, 2021).

Based on these two axioms, two distinct schools of marketing thought have emerged (Chufama, 2021).

The first group, which posits that marketing arises from activities related to the exchange of value, encompasses three distinct yet interconnected schools:

- Macro-Marketing School: This perspective examines marketing programs from a macro viewpoint, where management is expected to control variables within their influence while also managing those that are beyond their control (Alderson, 1957).
- Consumerism School: This school emphasizes the importance of consumer protection and the rights of consumers, with its principles grounded in concepts of welfare economics (Kotler & Keller, 2006).
- Systems Approach: This approach views the act of providing a product to a consumer as a continuous process (von Bertalanffy, 1968).

The second axiom is based on the external and internal factors balance of power. And this second axiom also has three main schools of marketing thought, which are:

- Buyer Behavior Theory: This theory is focused on predicting consumer behavior in both research and practice. It also emphasizes the application of psychological concepts to gain insights into consumer behavior (Howard & Sheth, 1969).
- Behavioral Organizations: This perspective primarily centers on distribution channels and logistics. According to this school of thought, elements such as power, conflict, and interdependence significantly influence buying behavior (Pfeffer, 1981).

- Strategic Planning: This approach is grounded in the belief that a firm must create a strategic fit. This fit refers to a beneficial company strategy that aligns with the corporate vision, mission, and values while considering the company's micro- and macro-environment (Porter, 1980).

When discussing consumer behavior, it is essential to consider the related field of marketing. Over time, various approaches to marketing have emerged to explain consumer behavior. For instance, classical schools of marketing provide foundational insights.

In general, there are several distinct divisions within marketing schools of thought. One of the earliest, known as the Marketing Functions School, dates back to the early 1900s (Jones & Shaw, 2005). Subsequently, in the following decades, different schools developed based on the questions addressed and the levels or focus of analysis. These include the Marketing Commodities, Marketing Institutions, Marketing Management, Marketing Systems, Consumer Behavior, Macromarketing, Exchange, and Marketing History schools (Jones & Shaw, 2005). As illustrated by this structure, behavioral sciences and marketing are closely interconnected. Furthermore, as marketing increasingly borrows concepts from behavioral sciences, it has established its own behavioral schools. This shift from classical and managerial marketing to behavioral marketing has placed greater emphasis on the psychological aspects of consumers' buying behavior (Sheth, 1985). Today, marketers can apply the theory of reasoned action and analyze consumer actions from a behavioral perspective.

When discussing consumer perception, Schiffman and Wisenblit propose that it involves the selection, organization, and interpretation of marketing communications to create a coherent image that aligns with an individual's understanding of reality (Schiffman & Wisenblit, 2015). They emphasize that consumers do not possess a single reality. Similarly, Kotler and Keller suggest that marketing professionals strive to create a reality for consumers through various marketing communications (Kotler & Keller, 2006). The primary goal of these communications is to generate impressions across different areas, including advertising, public relations, sales promotions, exhibitions, and direct selling.

According to Solomon, consumer attitudes reflect individuals’ positive or negative feelings toward a particular object, such as brands, products, or companies, which subsequently influences their reactions (Solomon, 2018). Therefore, consumer attitudes are shaped by a firm's actions, while simultaneously affecting consumers' evaluations of products and companies. Overall, a company's ethical behavior is regarded as a crucial factor influencing consumer purchasing decisions.

Consumer loyalty refers to a customer's commitment to buying a specific product from a particular company and their intention to continue repurchasing the same or related products in the future. In this context, word-of-mouth (WOM) refers to how consumers share information about goods, companies, and their services. According to Kotler and Keller, WOM can be both positive and negative, with consumers serving as a critical source that can initiate WOM advertising (Kotler & Keller, 2006).

A specific type of measurable consumer attitude is purchase intention, which indicates a person's positive behavioral tendency signifying that they have evaluated all potential brands within their consideration set. The likelihood of consumers exhibiting purchase intentions increases when they hold a favorable attitude toward a brand. Additionally, customers engage in acquisition activities that can be linked to their actual purchasing behavior. These activities typically involve willingness to buy, intention, and the final act of obtaining the product (Engel et al., 1995).

Mollen and Wilson describe customers' current purchasing behavior as encompassing the time and effort invested in the purchase, including the value of the product and the type of service or product acquired (Mollen & Wilson, 2010). Most research studies utilize Blackwell's purchase variables to explain actual and repeat purchasing behavior, which includes purchase category, frequency, and amount (Engel et al., 1995). Meanwhile, repurchase behavior is influenced by a product’s quality, benefits, or perceived value. Additionally, price tolerance is considered a significant factor in repurchase behavior, driving repurchase intentions, buying recommendations, and cross-buying tendencies.

It is also believed that consumers are more likely to buy and repurchase products or services from companies with strong corporate social responsibility (CSR) values and goals, alongside a favorable pricing strategy. Kotler and Lee suggest that consumers base their purchase recommendations on programs that enhance the firm's contributions to societal well-being (Kotler & Lee, 2004). Schiffman and Wisenblit, along with other researchers, define consumer emotions as psychological reactions (Schiffman & Wisenblit, 2015). They explain that emotions and moods are psychological responses to human evaluations, while Foxall and Greenlay argue that emotions manifest as both psychological processes and physical reactions (Foxall & Greenley, 1995). Some researchers also link irrational behavior to emotional responses. The theorists conclude that positive experiences and emotions associated with specific products or interactions with certain companies or brands lead to favorable consumer behavior, and various CSR activities reinforce such positive attitudes.

The study of consumer motivation asserts that consumer needs and wants drive human behavior (Engel et al., 1995). This study explains that the behavior of acquiring something typically begins with recognizing a want or need, which helps maintain or enhance one's status. Lachowetz conducted research on cause-related marketing and identified a specific type of consumer motivated by firms that practice ethical behavior and driven by the desire to support society by purchasing from companies with CSR initiatives (Lachowetz et al., 2002). Lii and other theorists explain that this consumer is willing to buy from firms that support CSR activities, with the expectation that the company's operations contribute to social and environmental good (Lii, & Lee, 2012).

When discussing consumer self-values in relation to a company's values, Sharma and Mehta suggest that the underlying reason for consumer generosity can be observed in cause-related marketing (Sharma, & Mehta, 2012). In this context, consumers are prepared to pay a premium price for products as long as the company engages in CSR activities or allocates a share of its profits to charitable donations. Simultaneously, the researchers conclude that consumers are driven by various factors and aspirations that influence their behavior in the marketplace. Chen, Tai and Chen also examined the concept of consumer-company identity, defining it by how consumers identify with or differentiate themselves from a particular company (Chen et al., 2016). According to Bhattacharya and Sen, for consumers to support a firm, they need to be able to see themselves in that firm (Bhattacharya & Sen, 2003). Therefore, companies must facilitate this identification process. Additionally, Einwiller, Fedorikhin, Johnson and Kamins argue that consumers have values they wish to see reflected in a company (Einwiller et al., 2006). When a firm satisfies one or more of these self-definitional needs or values, consumers are more inclined to associate themselves with the firm.

When examining the development of marketing theory and practice, there is substantial evidence that marketing practices emerged much earlier. Throughout these processes, particularly during periods when marketing sought to understand consumers at the micro level, the study of consumer behavior began to evolve. As a result, it matured into a distinct field of study, tracing its evolution from the times of Dichter and Kotler, and progressing through influential figures such as Howard and Sheth, Schiffman and Kanuk, Solomon, Askegaard and Hogg (Dichter, 1960; Kotler & Keller, 2006; Howard & Sheth, 1969; Schiffman & Kanuk, 2007; Solomon et al., 2002). This evolution of consumer behavior prompted companies to seek a deeper understanding of the concepts, variants, and aspects of consumer behavior that should be influenced through marketing strategies. These include elements such as consumer

attitude, loyalty, perception, word-of-mouth recommendations, evaluation, emotions, motivation, purchase intention, actual purchase and repurchase behavior, as well as consumer-company identity.

Other key figures associated with the marketing foundations of consumer behavior include Schmitt, Pine, and Gilmore, particularly known for their work in experience marketing. According to Pine and Gilmore, consumer experience is a crucial element for understanding consumer behavior and marketing management, serving as a foundation for the overall economy (Pine II, & Gilmore, 1999). They defined four dimensions of the consumption experience: entertainment, education, escapism, and aesthetics. To conceptualize these dimensions, they utilized two axes: absorption / immersion and active / passive participation. They argued that experience marketing has the capacity to evoke emotions in consumers by providing entertainment, enabling an escape from the ordinary, imparting knowledge, and presenting aesthetically pleasing environments or experiences (Pine II, & Gilmore, 1999).

To conclude, the evolution of marketing theory and practice has significantly shaped the field of consumer behavior, which now heavily relies on psychological insights. Various approaches, such as behavioral economics and experiential marketing, have emerged to explain consumer actions, with an emphasis on understanding consumers as emotional and social beings. Key figures like Dichter, Kotler, Howard, Sheth, and others have contributed to this field, highlighting the importance of consumer attitudes, loyalty, and perception.

Consumer attitudes influence purchasing decisions and are also affected by a company's ethical behavior. Loyalty reflects a consumer's commitment to a specific brand and involves factors such as word-of-mouth recommendations. Researchers emphasize the role of purchase intentions, motivations, and emotions in consumer behavior, while CSR is seen as a significant influence on buying decisions.

Various marketing behavior approaches, including the Macro-Marketing School, the Consumerism School, and the Systems Approach, offer unique perspectives on how marketing strategies should align with consumer needs. Additionally, the four dimensions of consumer experience - entertainment, education, escapism, and aesthetics - are highlighted as critical for understanding consumer interactions with brands.

Overall, the integration of behavioral sciences into marketing has led to a more nuanced understanding of consumer behavior, emphasizing the psychological and emotional factors that drive purchasing decisions.

2.3 Present concepts

Today, studies on consumer behavior are greatly influenced by technology. Consumers now have unrestricted access to information, enabling them to demand and acquire the products and services they desire. A diverse array of communication and social media channels empowers customers to express their opinions and provides them with extensive opportunities to interact with various brands and companies in numerous ways. The pace of technological advancement is continually increasing, leading trends to accelerate as well. Consequently, companies must adapt and evolve in the quickest and most efficient manner possible.

Currently, technology has three primary effects on consumers (Lemon & Verhoef, 2016). First, customers are more connected to businesses, allowing them to search for and purchase products and services while also posing sales inquiries or leaving comments and reviews at any time and from any location. For example, a study conducted by Adobe Digital Economy Index indicates that smartphones are becoming the preferred method for online ordering (Adobe, 2021). Additionally, research from DataReportal shows that 75% of Internet users utilize social media for product research (Mohsin, 2022). Furthermore, another study by the Centre for Economics and Business Research in the UK revealed that online shopping expenditures exceed £22.8 billion annually while using public transportation (Jahshan, 2019).

Another significant impact of technology is the increasing number of devices consumers utilize to access the Internet and purchase products. While nearly 60% of global web traffic is reported to originate from mobile devices, a Google report indicates that 90% of consumers use multiple devices to complete a single online task (Statista, 2023). For instance, a shopper's journey may begin with seeing an advertisement on television, then transition to researching products on their smartphone, and ultimately using their laptop to compare prices and finalize the purchase.

The final, third effect of technology on buying behavior is the heightened expectations of consumers. They now anticipate more relevant, responsive, and targeted communication from the companies they

engage with. These developments illustrate that companies have increasing opportunities to connect with customers, both online and in physical locations (The Keenfolks, 2023).

This technological shift is also transforming the psychological and social processes involved in the customer journey. As a result, several concepts have evolved that both influence and are influenced by specific consumption behaviors. These include factors such as self-control, time, information, psychological ownership, identity, creativity, and status, among others. These concepts are deeply integrated with psychology, leading to the adaptation of various influential theories from psychology into the study of consumer behavior. Key social processes in consumer behavior include self-construal, construal-level theory, regulatory focus, and goal systems.

2.3.1 Self-construal theory

The self-construal theory, proposed by Markus and Kitayama in 1991, explores individuals' perceptions of themselves in relation to others (Markus & Kitayama, 1991). The foundation of this theory distinguishes between two types of self-construal: independent and interdependent. In the case of independent self-construal, an individual sees themselves as distinct from others, whereas interdependent self-construal involves perceiving oneself as connected to others or as an extension of them. The initial research on self-construal focused on independent cultures, where individuals are viewed as autonomous, free to express their unique personalities. This contrasts with interdependent self-construal, which prioritizes fundamental connections and relationships between individuals (Gai, 2018).

Subsequent research has concluded that both independent and interdependent self-construals can be both stable and situationally influenced. Brewer suggested that self-construal can be readily affected and activated by specific situations (Brewer, 2003). Therefore, two types of self-construal have been identified based on their stability: situational self-construal and special-type self-construal. Psychologically, self-construals have been utilized to investigate and explain differences in thought processes and behaviors. For example, individuals with a dependent self-construal tend to consider the needs of others more during decision-making, while those with an interdependent self-construal may be more self-centered and focused on their own needs. These insights are gradually being integrated into the study of consumer decision-making and marketing.

For example, self-construal theory aids in understanding actual consumer behaviors, including impulsive and symbolic consumption. The distinctions between these behaviors are attributed to individual differences in selecting consumer goods. Impulsive consumption is considered a form of irrational behavior characterized by sudden, unplanned urges to purchase products, without considering income constraints or utility maximization. Moreover, research by Zhang and Schrum has confirmed cultural differences in impulse buying behavior (Zhang & Schrum, 2009). In contrast, symbolic consumption involves an individual's consideration of the symbolic attributes of goods to construct, express, and reinforce their self-identity. For individuals with an independent self-construal, there is a strong desire for uniqueness and self-expression, often manifested in their pursuit of the latest fashion trends and high-priced items that signal prestige and status. Conversely, individuals with an interdependent self-construal do not significantly value clothing as status symbols; they prioritize relationships within their social group (Gai, 2018).

Across various studies, findings indicate that individuals with an independent self-construal tend to exhibit more enjoyment and impulsivity in their consumption choices to showcase their status. They also utilize identity and self-symbols along with hedonistic resources, being more influenced by the uniqueness of self-expression. In contrast, interdependent self-construal individuals typically display a more modest attitude while valuing the luxury attributes of goods. They tend to be less impulsive and hedonistic in their consumption behaviors, and when purchasing luxury items, their motivation is often to conform to societal norms and harmonize with peers (Gai, 2018).

Furthermore, experiments conducted by Han and Shavitt; Zhang and Gelb explored the persuasive effects of different cultural appeals, leading to the conclusion that advertisements emphasizing personal interests are more effective in persuading American consumers, while those highlighting collective interests resonate more with Chinese consumers (Han & Shavitt, 1994; Zhang & Gelb, 1996). This cultural disparity reflects differences in self-construal influenced by varying cultural backgrounds. Regarding the effects of advertisements on individuals with different types of self-construal, those with an independent self-construal are generally more persuaded by advertisements, while interdependent individuals prefer ads that establish social and emotional connections.

In summary, the self-construal theory highlights the critical role of individual self-perception in shaping consumer behavior. By distinguishing between independent and interdependent self-construals, the theory provides valuable insights into how cultural contexts and personal identities influence purchasing

decisions. Understanding these dynamics allows marketers to tailor their strategies effectively, ensuring that they resonate with diverse consumer motivations and preferences. Overall, self-construals significantly impact how consumers engage with products and brands, underscoring the importance of psychological factors in marketing practices.

2.3.2 Construal-level theory

Another significant theory in consumer behavior is construal-level theory. This theory suggests that as the psychological distance between an individual and an object or event increases, the level of abstraction in perceiving it also rises (Liberman et al., 2007). Conversely, a shorter distance results in a more concrete perception of the person, object, or event. Additionally, this theory addresses different standards influenced by product evaluation, which can lead to purchasing decisions.

According to Trope and Liberman, psychological distance can be measured through several different types of distances beyond just psychological distance (Trope & Liberman, 2010). For instance, informational distance refers to the amount of knowledge or relevant data that a consumer possesses when evaluating various decision options. Experiential distance is determined by whether the information is first-hand, second-hand, or third-hand and the source from which it originates - such as individuals, media, or literature. The third type is related to affective information, which, while associated with social distance, primarily depends on whether consumers learn about something through emotionally "warm" images or "cold" sources. The fourth dimension, known as perspective distance, gauges the influence of commitment and the exclusion of alternatives, which characterize the motivational and cognitive state during the advanced stages of the decision-making process (Fiedler, 2007).

The construal-level approach positions shopping orientation as a precursor to the construals that individuals use to process information when making choices, thereby enhancing understanding of the factors that shape these construals (Scarpi, 2021). The theory explores two shopping orientations: hedonic (or recreational) and utilitarian (or goal-oriented). In the case of hedonic shopping, it is viewed as an enjoyable activity or shopping for fun, whereas utilitarian shopping is motivated by a need, often referred to as shopping as work. This framework, developed by Trope and Liberman, differentiates between two levels of mental representation that individuals may hold regarding their surroundings: low construal and high construal (Trope & Liberman, 2010). Low construal signifies psychological proximity and emphasizes concreteness, intrinsic motivation, prevention, and feasibility. High construal, on the

other hand, represents psychological distance and focuses on desirability, extrinsic motivation, promotion, and abstractness.

Depending on the type of construal adopted, the theory accounts for variations in consumer behavior, including how consumers evaluate products and respond to their features. Additionally, research has demonstrated how construal influences consumers' shopping orientations. For instance, Liberman found that individuals with a task-oriented or functional approach tend to adopt a lower level of abstraction (Liberman et al., 2007). Conversely, Jones identified that hedonism is strongly linked to advanced product attributes as singular sources of satisfaction (Jones, 1999). This indicates that hedonistic (utilitarian) and higher (lower) construal levels - and consequently, individuals' mental representations - are closely connected. This implies that individuals will select different products from the same set of options based on the construal they adopt. For example, individuals motivated by hedonism (utilitarianism) are likely to choose options that emphasize desirability (feasibility).

Moreover, there is highlighted the distinction between hedonism and desirability, noting that while hedonism is associated with pleasure and enjoyment, desirability leans more toward abstractness (Scarpi, 2021). Additionally, consumers with a hedonistic orientation are more inclined to purchase products presented with benefits and are more receptive to advertisements that employ abstract language. The contrast between hedonism and desirability is often framed in terms of "want" versus "should." Can consumers experience regret over their choices? Research suggests that shopping behaviors and preferences can evolve over time, and consumers may indeed regret their decisions. Furthermore, choices can vary based on cultural factors; for example, studies have shown that Chinese consumers tend to be more specific-minded compared to Americans.

To conclude, construal-level theory offers valuable insights into how psychological distance influences consumer behavior, particularly in the context of shopping orientations. By distinguishing between hedonic and utilitarian shopping, the theory reveals how individuals process information and make choices based on their levels of construal. Hedonic shoppers tend to prioritize enjoyment and self-expression, while utilitarian shoppers focus on meeting their needs. Additionally, the various types of distances - informational, experiential, affective, and perspective - play a critical role in shaping consumer decisions. Understanding these dynamics can help marketers tailor their strategies to effectively engage different consumer segments and enhance the shopping experience.

2.3.3 Regulatory focus theory

Regulatory focus theory was initially introduced by Higgins in 1998 (Higgins, 1998). Building on the hedonic principle, this theory posits that a consumer's regulatory focus varies across different situations and can manifest as either a promotion focus or a prevention focus. This focus is influenced by three types of factors: a subject factor, which may include cultural background and self-construal; a stimulus factor, such as construal level, product type, message framing, or nonverbal cues; and a context factor. The promotion focus is aimed at achieving positive outcomes and is associated with hopes and aspirations. In contrast, the prevention focus is connected to a sense of duty and aims to pre-empt negative outcomes (De Bock & Van Kenhove, 2010).

According to Higgins, regulatory focus can be influenced by various factors, including situational elements, emotional experiences, and human motivation (Higgins, 1998). Based on this premise, Werth and Förster demonstrated that these combined factors shape regulatory focus, which in turn affects consumers' attitudes toward different information processes and products (Werth & Förster, 2007). For example, consumers with a stronger promotion focus are more likely to take risks when purchasing products, making decisions based on positive attributes and achievements. Opting for new products involves accepting various risks and uncertainties compared to established options. Consequently, consumers with a strong promotion focus often end up owning more innovative, high-tech items. Conversely, consumers with a prevention focus tend to prioritize safety features when making selections. However, no significant differences were observed between these two regulatory focus types concerning everyday products, such as necessities (Lee & Lee, 2015).

Regarding other distinctions, regulatory focus pertains to motivational differences. Various studies indicate that individuals with a promotion focus tend to set higher achievement standards, exhibit a greater ability to recover and perform after experiencing failure instead of giving up, display increased persistence in pursuing goals, and possess a greater capacity to adapt plans and utilize alternative strategies during goal attainment (Bagozzi et al., 2006).

In conclusion, the regulatory focus theory, introduced by Higgins, highlights the dynamic nature of consumer motivation, distinguishing between promotion and prevention focuses (Higgins, 1998). These differing focuses influence how consumers make decisions, with promotion-focused individuals seeking positive outcomes and demonstrating greater risk-taking behaviors, while prevention-focused consumers

prioritize safety and risk avoidance. The theory's implications extend into consumer behavior research, shedding light on purchasing patterns such as impulsive and symbolic consumption. Additionally, understanding the impact of self-construal and cultural differences on regulatory focus provides valuable insights for marketers aiming to tailor their strategies effectively to resonate with diverse consumer motivations.

2.3.4 Goal systems approach

Shopping can also be linked to establishing, pursuing, and achieving objectives, which is explained by the goal systems approach. Ratneshwar, Mick and Huffman assert that consumer behavior is oriented toward achieving goals aimed at satisfying what customers desire, require, value, or seek (Ratneshwar et al., 2000). This indicates that consumers possess needs, motives, wants, desires, and values.

Numerous studies investigate various aspects of consumer behavior and corresponding goals. These perspectives are diverse and encompass motivation, personality, cognition, and social psychology. Examples of such goals include situational and personal goals, the significance of goals in the purchase of durable goods versus nondurable goods, evaluations of store reputation, perceptions of salesperson influence strategies, consumer experiences, product assessments, and more.

When considering the goal-setting and goal-pursuit processes, several factors impact how goal-driven actions are initiated and evaluated, along with their consequences, outcomes, and benefits. Goal-setting involves a decision-making process in which the consumer must select the goal content and ask themselves questions such as: “What goals am I pursuing, and why?”, “What do I aim to achieve with my goal?”, “How can I accomplish my goal?”, “Is this goal still significant to me?”, and “To what extent have I succeeded or failed in achieving my goal?” (Hidayat, 2009). These questions relate to various stages, such as goal setting, goal intention, action planning, action control, and goal attainment or failure stages. The goal-setting process may be activated by external stimuli, which represent opportunities. For example, changes in income can act as an external stimulus. Individuals tend to be more willing to spend when they perceive an increase in income and may be more cautious with their spending when they notice a decrease. Internal factors also play a role in goal setting, particularly the hierarchy of needs and the deprivation of certain needs that impact the goal-setting process.

Goal pursuits can be activated in three ways. The first perspective posits that goals may be activated automatically or lie dormant, waiting for activation. The second perspective emphasizes impulsive actions, where a need or desire quickly transforms into a goal, requiring minimal goal-directed activities. Such goals arise from biological, moral, ethical, or emotional forces, rather than being merely habitual responses to the environment. The third perspective encompasses volitional acts shaped by goal intention. Consumer goals are also analyzed through the lens of hierarchical structure. Consequently, consumption of product attributes yields the benefits that consumers gain from their purchases. Thus, consumption is represented by a hierarchical structure comprising Attributes, Consequences, and Values. Goals can interact with each other in terms of their forms and strengths. Forms include “multifinality” (where one goal serves as the origin for two or more end goals) and “equifinality” (where two or more goals are connected as origins leading to a single end goal) (Hidayat, 2009). The strength of the interconnection between goals depends on the uniqueness of their interactions.

The entire goal system can be categorized into needs, wants and desires as one group, and values and motives as another. While motives, needs, values, and goals are often discussed, wants and desires have received comparatively less attention. Needs are typically distinguished from other motivational factors and are understood as biological drives such as hunger, sex, and aggression. Schiffman and Kanuk categorize needs into innate and acquired types (Schiffman & Kanuk, 2007). Innate needs relate to biological and psychological drives, including necessities like food, water, air, sex, shelter, and clothing. Acquired needs are associated with prestige, power, self-esteem, affection, and learning. These needs are primarily psychological, arising from an individual's personal condition and interactions with others, and are referred to as secondary needs.

Wants are generally differentiated from needs and other motivational factors by the desire to satisfy psychological drives (Hidayat, 2009). The Webster’s New World Dictionary defines "want" as having a need or desire for something, wishing for it, feeling inclined toward it, or experiencing a deficiency in some aspect (Merriam-Webster, n.d.).

Desires in consumer behavior illustrate the emotional dimension of motivation (Hidayat, 2009). Desires are often described as overpowering, dominating an individual's thoughts, feelings, and actions. In contrast to needs and wants, which are driven by biological and psychological factors, motives are considered socially or cognitively driven behaviors. According to Gollwitzer, Delius and Oettingen, motives can be categorized into three distinct groups: those related to choosing a specific path, those that

drive related actions, and those that manage or control these actions (Gollwitzer et al., 1995). However, motives can sometimes refer to biological drives as well.

The most notable motives are associated with saving and spending behaviors. Various authors have classified saving motives differently. For instance, Keynes identified eight distinct saving motives (Keynes, 1936):

1) the precautionary motive, which involves building a reserve for unforeseen contingencies,
2) the foresight motive, aimed at preparing for anticipated future needs,
3) the calculation motive, related to enjoying interest earnings,
4) the improvement motive, focused on achieving a gradually improving expenditure,
5) the independence motive, which fosters a sense of autonomy and power,
6) the enterprise motive, which seeks to secure resources for speculative business endeavors,
7) the pride motive, associated with accumulating wealth,
8) the avarice motive, driven by extreme frugality.

Keynes was among the first to differentiate saving motives, and subsequent typologies have emerged, such as down-payment, social-oriented, or precautionary types.

Another significant theory regarding spending motives is the life-cycle theory by Modigliani and Brumberg (Modigliani & Brumberg, 1954). They propose that individuals prefer a stable standard of living and consumption throughout their lives. Given that income levels fluctuate during various life-cycle stages, savings are utilized to maintain consistent consumption across these periods. These perspectives underscore that saving motives are inherent to an individual's mental framework and encompass an intrinsic orientation toward the future, as well as self-control in contrast to the temptation of immediate gratification (Hidayat, 2009).

Spending motives encompass social, economic, and cultural influences and can be classified into various types. Several theoretical frameworks, developed by Dhar and Wertenbroch, distinguish spending motives based on consumption motivation dimensions: preference concerning time inconsistency and preference related to trade-offs with functional goals (Dhar & Wertenbroch, 2000).

The first type is categorized into hedonic motives, associated with fun, pleasure, and excitement, focusing on products or services consumed primarily for their experiential attributes, and utilitarian motives,

which pertain to acquiring essential items needed for maintaining a basic standard of living (Hidayat, 2009). Examples of hedonic consumption include designer clothing, luxury cars, flowers, music, sports, and gourmet chocolate. Conversely, utilitarian consumption encompasses medical care, food, clothing, personal computers, microwaves, home security systems, and family vehicles. Hedonic products and services are typically chosen based on instinct, while utilitarian goods are selected through more deliberate decision-making processes. Essentially, these two types of motivations can be categorized as affect-rich and affect-poor or experiential and instrumental.

The second preference type, related to time inconsistency, contrasts the “shoulds” and “wants” of consumers, representing immediate pleasures against long-term benefits. The first type aligns with needs that include duties, necessities, or obligations, while the second is associated with desires. "Shoulds" (or needs) are perceived as originating internally, while "wants" (or desires) are seen as originating externally.

Another relevant construct related to goals is values. Rokeach defines values as enduring beliefs that a particular behavior or outcome in life is more favorable personally or socially than alternative behaviors or outcomes. Schwartz describes values as what individuals regard as good or bad, desirable or undesirable, and what they believe should or should not occur (Schwartz, 1992). Regarding consumer values, Holbrook suggests they can be analyzed from three dimensions: active (manipulating, operating) or reactive (appreciating, admiring, apprehending); extrinsic (consumption aimed at achieving other goals) or intrinsic (consumption providing intrinsic benefits); and self-oriented or other-oriented (Holbrook, 1999).

Values are often examined from a cultural perspective. According to Schwartz, culture is shaped by values (Schwartz, 1992). People within a society share similar experiences regarding what is considered desirable or undesirable, are exposed to similar situations, and encounter comparable opportunities. As a result, Schwartz proposes several cultural value dimensions, including hierarchy vs. egalitarianism, conservatism vs. autonomy, and mastery vs. harmony. Similarly, Hofstede identifies dimensions such as individualism vs. collectivism, uncertainty avoidance, power distance, and masculinity vs. femininity (Hofstede, 1980).

In general, needs, wants, motives, values, and desires represent distinct units of the motivational factors that drive consumer behavior. According to Kruglanski and Webster, goal-pursuit behavior often

comprises several motivational units, integrating multiple needs, wants, motives, values, and desires (Kruglanski & Webster, 1996). Huffman, Ratneshwar, and Mick refer to these as mid-level goals, which are also described as current concerns, personal striving, life tasks, and personal projects (Huffman et al., 2000). These researchers have organized consumer goals hierarchically, defining higher-level goals as more inclusive, abstract, and less mutable.

Overall, this hierarchical structure encompasses six discrete goals:

- life projects (involving the construction and maintenance of key life roles and identities),
- feature preferences (related to specific values in financial or physical terms),
- life themes and values (representing personal ideals that consumers aim to preserve or achieve),
- current concerns (involving activities, tasks, or quests individuals engage in short-term),
- consumption intentions (defining individual aims and desires for specific income use),
- benefits sought (referring to the consequences of consumption).

A recent approach to goal constructs views goals in terms of motivational orientation rather than content or hierarchical organization (Gonçalves et al., 2017).

Technological advancements have resulted in new sources of data and enhanced analytical tools. Consequently, they have transformed not only the nature of consumption but also the methodology employed in consumer research.

In conclusion, the interplay between needs, wants, motives, values, and desires forms the foundation of consumer behavior. The concepts explored, including goal-setting and goal-pursuit processes, highlight the complexity of consumer motivations and how they influence purchasing decisions. The goal systems approach elucidates how consumers engage with their goals, shaped by both internal and external factors. Furthermore, understanding the distinctions between hedonic and utilitarian motives provides deeper insights into consumer preferences. As technology continues to evolve, it reshapes consumer behavior and the methodologies employed in research, emphasizing the need for marketers to adapt their strategies to align with these changing dynamics.

2.4 Methodological contribution

Over the years, a variety of methodological approaches have been utilized in consumer behavior research. In the late 1960s, the methods employed were predominantly neo-positivistic, aligning closely with the physical sciences and relying on hypothetico-deductive approaches (Holbrook et al., 2020). This means that the methods primarily involved either experiments or surveys. For example, some studies employed questionnaires to assess beliefs and the ways in which they are weighted and combined. In the context of marketing, buyer behavior research was regarded as a subset of marketing research, providing insights that were beneficial for marketing managers in making strategic decisions.

From the late 1960s to the early 1980s, researchers began to widely adopt traditional approaches concerning the concepts, methods, and objectives of consumer behavior research. These are often referred to as the three R's: rigor, relevance, and reach (Balazs & Morello-Frosch, 2013). The first concept, rigor, pertains to the phases of data collection and interpretation in research. The second, relevance, assists in determining whether the research is posing the appropriate questions. The third concept, reach, evaluates the extent to which the knowledge gained from the research can be applied across different disciplines and transformed into practical tools. Initially, buyer behavior was analyzed through the lens of rationality, focusing on decision-oriented, rational-economic information processing for making choices. However, during the 1980s, this traditional concept evolved into two major directions.

The first direction is behavioral economics, which originated from Behavioral Decision Theory and has been developed across several disciplines, such as economics by Thaler and psychology by Kahneman and Tversky (Thaler, 2015; Kahneman, & Tversky, 1979). This approach has also found applications in marketing through the work of theorists such as Jim Bettman, Itamar Simonson, Joel Huber, Eric Johnson, John Payne, Jay Russo, and more recently, Dan Ariely. For instance, Bettman has focused his research on decision-making, particularly examining how decision-makers adapt to varying situations, the impact of stress on decision-making, and the influence of emotions (Bettman et al., 1998). In contrast, Huber indicated that consumer preferences change when their attention is directed toward the anticipated satisfaction linked to a purchase, with these changes depending on how activated this expected satisfaction is (Huber & Shiv, 2000). Collectively, these researchers have introduced innovative perspectives on consumer decision-making processes and their rationality. This approach has also

provided new insights into consumer financial decision-making and has contributed to the development of “nudge” theories (Holbrook et al., 2020).

The second perspective is experiential. This approach questions two foundational aspects of the consumer behavior model: product evaluation and consumer rationality (John-Mariadoss et al., 2022). Its primary founders and proponents view consumers as real human beings, contrasting with the earlier perspective of information-processing machines. Researchers have analyzed consumers as emotional and social actors, taking into account their hedonic desires and needs, and have developed concepts embodied by ICABS. For instance, this experiential approach identifies six primary elements of consumption: setting, sensation, evaluation, activity, thought, and feeling. These elements align with those outlined by Hirschman and Holbrook in their TEAV Model (Holbrook & Hirschman, 1982). This model posits a hedonic type of consumption that predominantly involves emotional processes, with increased evaluation and activity and reduced cognitive processing and sensory engagement (Lofman, 1991). Considering the elements of this model, they include the following:

- thought, which includes dreaming and imagining;
- emotion, which covers various kinds of feelings, expressive behaviors and physiological responses;
- activity, which includes physical and mental events relating to both action and reaction;
- value, which relates to evaluative judgments in consumption.

According to Hirschman and Holbrook, consumers exhibit both instrumental and hedonic orientations, suggesting that experiential consumption can be categorized as primarily hedonic, primarily instrumental, or a combination of both (Holbrook & Hirschman, 1982). Other researchers, such as Alderson, have characterized consumers as seeking distinct and enjoyable experiences while simultaneously addressing their functional needs (Alderson, 1957). Kotler and Levy have also expanded the concepts within marketing and consumer behavior by enhancing the understanding of social marketing (Kotler & Levy, 1969a). He argues that individuals make consumption choices that reflect their self-identity. This perspective has further fueled consumption theory and prompted researchers to examine the influence of self-related goals and self-identity on consumer behavior (Escalas, 2013).

The mentioned approaches to consumer behavior - behavioral economics and experiential theories - differ in their methodologies. The former primarily utilizes experiments focused on decision strategies

and behavior analysis, while the latter is shaped by post-positivist philosophies and incorporates qualitative techniques, including interpretive, ethnographic, humanistic, and introspective methods.

Furthermore, based on recent behavioral studies and concepts, three new aspects have emerged from the three R's and have transformed into the three I's: irrationality, interpretation, and intrinsic motivation. The concept of irrationality has expanded to include experiential, illogical, and hedonic dimensions of consumption; interpretation has increasingly incorporated various qualitative and postmodern approaches. Meanwhile, intrinsic motivation has primarily been applied to fulfil personal curiosity, regardless of whether it serves practical purposes (Holbrook et al., 2020).

To summarize, the exploration of consumer behavior has evolved significantly, reflecting a blend of both quantitative and qualitative methodologies. The interplay between instrumental and hedonic motivations, as well as the influence of self-identity, underscores the complexity of consumer choices. The shift from the three R's to the three I's illustrates a growing recognition of the multifaceted nature of consumption, integrating insights from various disciplines and paving the way for future research in consumer behavior.

Chapter 3: Consumer behavior and decision-making processes in the automotive industry

Chapter 3 provides a theoretical overview of the consumer behavior studies with a focus on the automotive industry. It explains the shift in consumer behavior towards innovations among cars and towards electrification and the EVs in particular. To specify, in this work, the term "electric vehicle(s)" or "electric car(s)" is used to generalize the concept of different types of EVs. The specific names of EVs are used when they relate to specific types of EVs, e.g. BEVs, HEVs or PHEVs.

Section 3.1 describes consumer behavior trends in the automotive industry in the early 1960s and the corresponding changes happening from those times until nowadays. It presents the changes occurring in the consumer acceptance of electric vehicles based on the regional and demographic differences in different markets, including Germany, the United States of America (USA) and Ukraine.

In Section 3.2 attention is drawn to the role of the governments and the ways they encourage the widespread adoption of electric vehicles usage and ownership with the help of special policies and campaigns.

Section 3.3 presents specific car consumer theories and approaches. It explains their origin being shaped by both rational behavior and alternative theories from the travel behavior studies. And with a mix of these theories, today the researchers are normally evaluating choices consumers make considering a variety of factors, from basic demographic to social and psychological.

Therefore, to better understand the influence of different factors on consumer preferences for automotive vehicles and EVs, Section 3.4 explains in detail the contribution of demographic, social and psychological factors to the way consumers make their purchases. Further it is explained how sociodemographic characteristics such as age, gender, income, education and marital status shape the shopping and purchasing preferences in one way or another. Variations of the consumer behavior are also described from the point of view of the role of a family and different reference groups playing in the individual's life, from the point view of the social role and social status since they create a certain lifestyle and shape certain values as well. The third type of the influence is considered from the psychological perspective covering consumer's motivation, perception, learning, as well as attitude and belief systems, emotional, instrumental and symbolic motives. However, as already proved by numerous studies, all the mentioned factors often correlate with each other. Thus, studying these factors and their influence both

independently as well as their mutual interrelationship helps achieve the most accurate and objective evaluation of consumer behavior.

3.1 From the past to nowadays

3.1.1 Historical overview

The automotive industry stands as one of the oldest yet most progressive sectors. While the first automobiles produced in the 19th century were primarily functional, modern car manufacturers have expanded their offerings to include a range of innovative solutions. By the 1920s, automotive companies had begun implementing strategies focused on achieving economies of scale. However, due to increasing consumer demand and heightened competition within the industry, there was a significant increase in the variety of car models over the following decades. Meeting consumer demands for new models took precedence over the rationalization of vehicle platforms. This trend shifted in the 1990s (Orsato & Wells, 2007).

Despite the current surge in interest surrounding electric vehicles, the concept of electric cars is not new; it represents a revival. General Motors launched the first electric vehicle for sale in 1966, designed to comply with California's zero-emissions mandate (Chohan, 2019). This model was pioneering in multiple aspects, being the first electric vehicle to utilize low-resistance tires and induction charging technology. However, it faced challenges, including limited range, high production costs, and malfunctioning charging ports, which contributed to its commercial failure. As a result, consumer demand for the vehicle was minimal. In contrast, modern automakers are adapting their production strategies to align with government initiatives aimed at reducing greenhouse gas emissions, improving air quality, and decreasing reliance on oil. Consequently, consumers now have a wide range of electric vehicle options. Furthermore, a study by McKinsey in 2016 identified electrification as one of four disruptive forces shaping the future, alongside diverse mobility, autonomous driving, and connectivity (McKinsey & Company, 2020).

This shift in consumer demand and the popularity of electric vehicles from the 1960s to today reflects a broader transformation in how consumer behavior is understood. Initially, the focus was on answering fundamental questions about what consumers purchase and how to meet their basic needs. This perspective was closely aligned with early consumer behavior theories, such as the Marshallian economic

model and utility theory, which analyzed consumer behavior from a rational standpoint. However, over time, the inquiries became more intricate as companies and marketers aimed to influence consumers' product and service choices. With the emergence of new products driven by disruptive innovation, consumer motivations have also evolved. Research by Badir, Frank and Kamolsook demonstrates that consumers are willing to alter their behavior and invest additional resources when they perceive substantial benefits from such changes (Badir et al., 2018).

The automotive industry exemplifies a sector experiencing significant disruptive technology. This turbulence is largely driven by dramatic shifts in market dynamics, regulatory demands, and technological advancements resulting from the convergence of diverse technologies in vehicle operation, globalization, and evolving government policies. Electric vehicles serve as a prime example of this disruption. According to Pandit, electric vehicles qualify as disruptive technologies, as they are advancing more rapidly than the existing market's needs can accommodate (Pandit, 2016). Moreover, the rise of the automotive industry has also spurred disruptions in other sectors, leading to the establishment of gas stations, highway transportation systems, and various businesses, including shops and restaurants.

In summary, the automotive industry has undergone significant transformations, transitioning from a focus on functional vehicles to embracing innovative technologies such as electric vehicles. This evolution not only reflects changing consumer preferences but also highlights the complexities of consumer behavior, which have shifted from basic needs to more nuanced motivations. As the industry continues to navigate disruptive technologies, understanding these dynamics becomes essential for manufacturers aiming to meet the evolving demands of consumers.

3.1.2 Electric vehicles market nowadays

In recent years, the EV market has significantly strengthened. This growth can be attributed to robust government support for the industry, an increase in climate-conscious consumers, and extensive public-private partnerships focused on EV charging infrastructure. For instance, despite facing significant challenges and disruptions in 2022, Tesla reported a 40% increase in deliveries year-over-year (Tesla, 2023). Additionally, Tesla has partnered with companies like Apple and Google to collaborate with other automotive manufacturers in research and development efforts. Consequently, these partnerships have positioned these companies as major market players, while traditional automotive manufacturers risk becoming niche players.

Tesla has navigated numerous challenges to establish itself within the automotive sector by launching its electric vehicle. The company has also supported and enhanced the expertise and infrastructure of other firms through collaborations and the establishment of high-tech production facilities. Today, Tesla continues to disrupt the EV industry by introducing innovative solutions, opening new research and development centers, expanding its service networks, and inaugurating its first factory in Europe.

According to the International Council on Clean Transportation, global EV sales reached 6.9 million in 2021, marking a record increase following 2020 (Cui & Hall, 2022). Of this total, 2.3 million EVs (34.1%) were sold in Europe, representing a 66% rise from the previous year. Notably, seven of the top ten national markets for EV sales in 2021 were located in Europe, including France, Italy, Norway, Germany, the United Kingdom, Sweden, and the Netherlands. Furthermore, the United States recorded 667,731 electric vehicle sales (9.7%), which constituted a 103% increase from 2020. The mentioned data is shown in Figure 8.

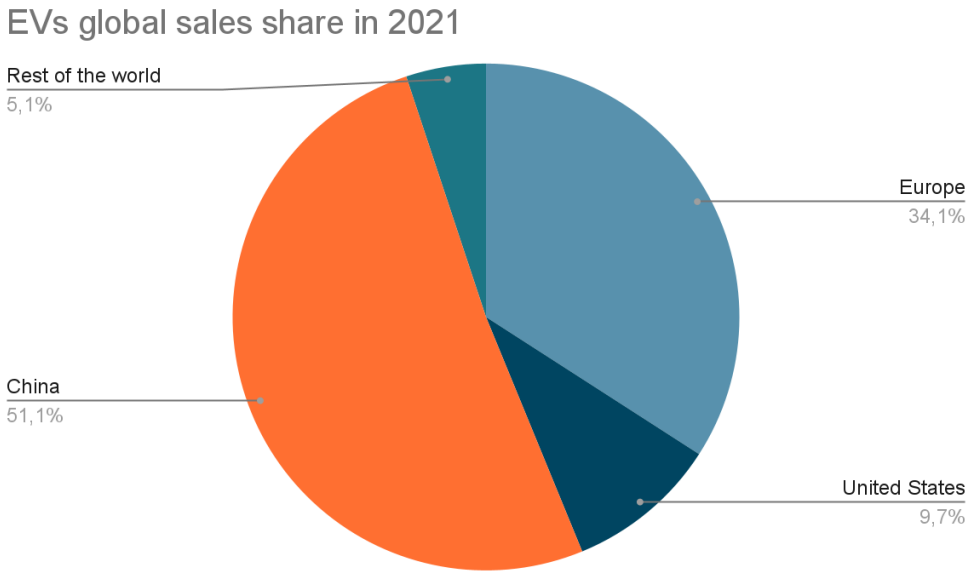

Figure 8. Global EVs sales share in 2021

Data source: Cui & Hall, 2022

While many governments around the world have set targets for vehicle electrification, the progress made by 2021 did not align with these goals. As a result, many governments implemented further measures to tighten vehicle regulations, adjust incentive programs, and enhance charging infrastructure strategies (Cui & Hall, 2022).

In 2022, the industry continued to face challenges, including an overall economic slowdown and a subsequent decline in consumer spending, along with uncertainties regarding electricity supply and an unstable electric grid (World Economic Forum, 2022). The EVs global share has correspondingly changed in 2022, see Figure 9.

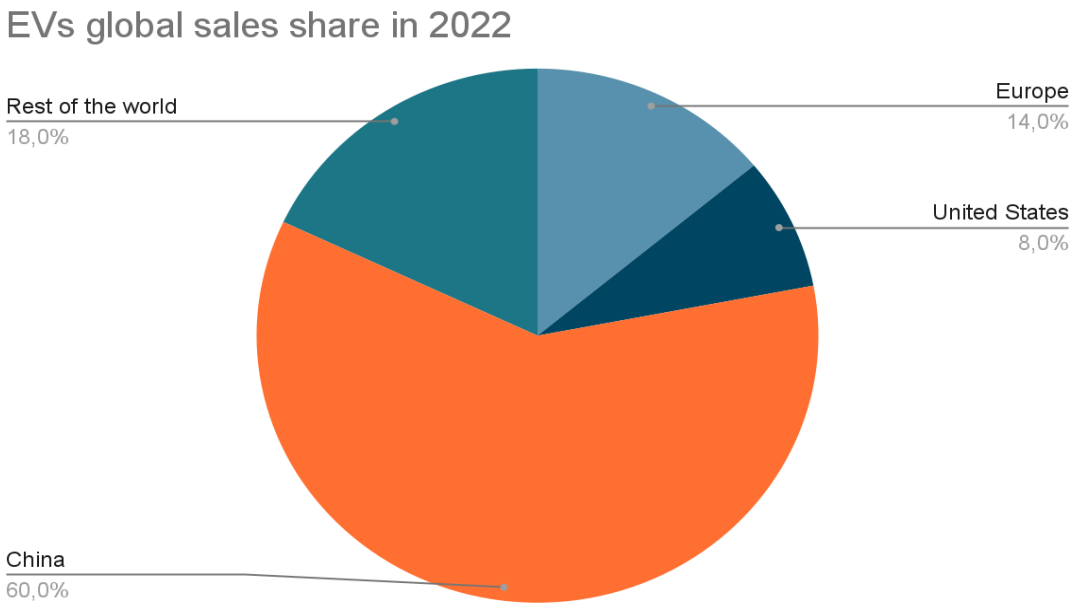

Figure 9. EVs global sales share in 2022

Data source: Cui & Hall, 2022

Despite the general slowdown in EV sales over the past few years, primarily attributed to economic weakness and supply chain disruptions rather than a decline in underlying demand, Schmidt Automotive Research (SAR) anticipated a remarkable recovery in sales, projecting an increase to 2.7 million in 2025 and 9.2 million in 2030. This suggests that consumers will likely be increasingly able to afford electric vehicles (Winton, 2022).

Statistics indicated that in 2022 electric vehicle sales in Europe achieved a 15% year-on-year increase, totalling 2.59 million units. According to the KBA motor transport authority, Germany's overall sales of passenger electric vehicles rose by 22% to 833,500 units, accounting for 22.3% of the market share (Jolley, 2022). Data from the European Automobile Manufacturers Association (ACEA) indicated that Germany registered the highest number of fully electric cars in the EU in 2022, surpassing 350,000

vehicles. In the USA, electric car sales experienced a boost from the launch and initial deliveries of electric pickup trucks in 2022, with sales growing by 55% year-on-year and reaching 928,884 units, as reported by Counterpoint Global Passenger Vehicle Model Sales Tracker (Counterpoint, 2023). In Ukraine, the Ukravtoprom association noted that during 2022, Ukrainians purchased 13,600 zero-emission cars, which is one and a half times more than in 2021 (Vaniyan, 2023). The mentioned data is shown in Figure 10.

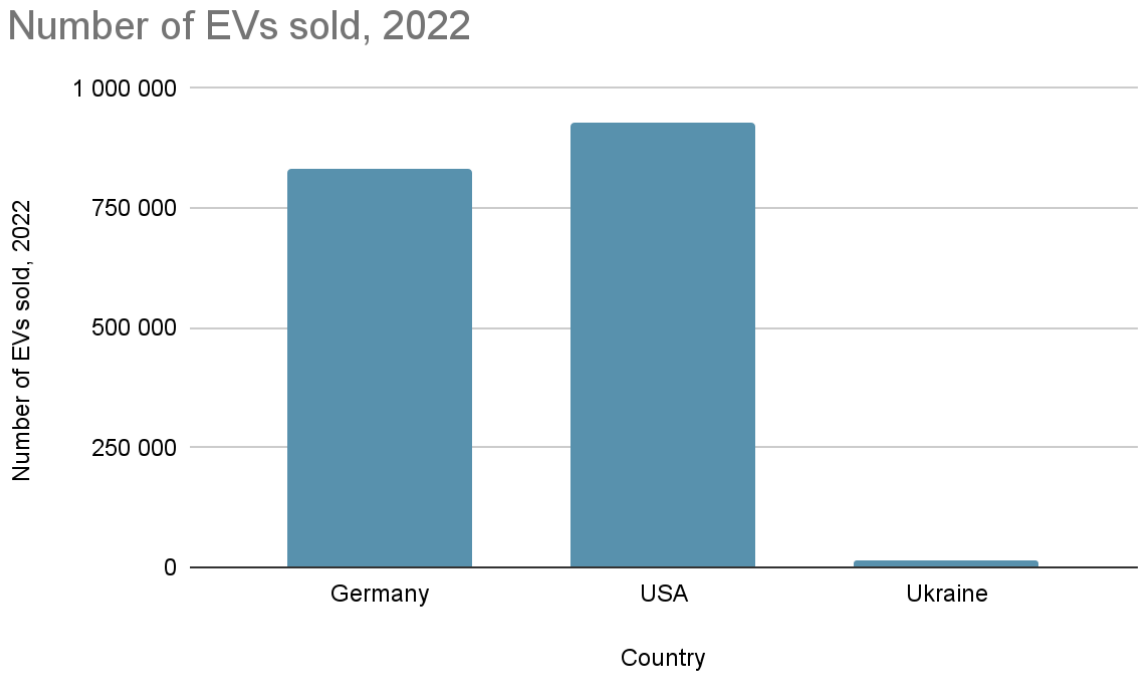

Figure 10. Number of EVs sold in 2022

Data source: Jolley, 2022; Counterpoint, 2023; Vaniyan, 2023

As the electric vehicle market share continues to expand, it is also offering innovative future solutions. Current trends are allowing electrification to align with digitalization and customization, where electric vehicles are enhanced with virtual reality (VR) experiences, virtual reality showrooms, and extensive charging solutions. This also includes finding charging networks along routes or utilizing home charging options through dedicated digital channels. Consequently, discussions now encompass not only electrified mobility but also autonomous vehicles and shared mobility, with increased opportunities for customization, transforming vehicles into on-demand technology platforms (Kovar et al., 2017). However, a critical question arises: Are these advancements genuinely driven by the actual needs and

preferences of consumers? While the introduction of more flexibility and customization appears advantageous, research indicates that an overload of choices can lead to negative outcomes for consumers. Furthermore, despite statistical evidence, many drivers remain hesitant to transition to autonomous vehicles, primarily due to safety concerns (Deloitte, 2022).

The COVID-19 pandemic has also influenced the automotive industry and consumer behavior. During and after the pandemic, preferences shifted toward personal vehicles, with many individuals continuing to avoid public transport. According to data from the Mobility Consumer Index, more than 50% of individuals planning to purchase a vehicle will opt for a hybrid, plug-in hybrid, or fully electric model (Batra et al., 2022). However, the question persists: Why, despite the increasing popularity of electric vehicles, does the proportion of EV users remain relatively low? How do consumers perceive electric vehicles? What factors influence automotive buyers' decisions to switch to electric-powered cars? What are the true motivations and needs of consumers?

In summary, the electric vehicle market has experienced significant growth, supported by government initiatives and changing consumer preferences. However, while interest in EVs is rising, questions remain regarding the actual motivations and behaviors of consumers. Understanding these dynamics is essential for manufacturers and policymakers to effectively address the barriers to broader EV adoption and align product offerings with genuine consumer needs.

3.1.3 Changes in behavior and perception of EV consumers

The topic of EVs has attracted significant attention from researchers and experts in recent years. However, consumer acceptance of electric vehicles has only recently become a focal point in studies. Initially, the theory of reasoned action was utilized to predict consumer behavior toward EVs; however, this approach proved to be somewhat limited due to its reliance on rational variables to explain behavior. When examining the purchase of an EV, the decision-making process resembles the frameworks outlined in models like the EKB model or the Howard Sheth Model. These models suggest that consumers evaluate incoming information based on various personal and social factors before making a final choice. Nonetheless, theories that effectively describe and explain the decision-making process surrounding EV purchases are primarily rooted in marketing behavioral and experiential theories, which view consumers as social and emotional beings influenced by their hedonic needs and desires, while also considering the psychological aspects of their behavior.

Furthermore, while some reports indicate a growing public awareness of electric vehicles and their benefits, other studies reveal a general lack of knowledge about electric cars. For instance, a survey on consumer interest and knowledge of EVs found that 68% of respondents in the United States reported knowing little about electric vehicles. Additionally, consumers face numerous questions when deciding to purchase an electric vehicle. These considerations include the affordability of electric vehicles, their driving range, charging times, and the availability of supporting infrastructure, along with various qualitative factors (Nickel Institute, 2020).

Regional and demographic differences also play a significant role in shaping consumer perceptions of electric vehicles. Research indicates that automobiles carry different meanings in various cultures. In the United States, for example, cars are deeply ingrained in the culture and reflect both individual and collective identities (Kovar et al., 2017). However, many individuals remain concerned about charging infrastructure; nearly 48% of consumers believe there are not enough public charging stations, which deters them from purchasing or leasing a plug-in electric vehicle (Consumer Reports, 2020). Additionally, sales data from key electric vehicle markets show shifting regional dynamics, with both China and the United States losing ground to Europe, where EV sales in the U.S. dropped by 12% in 2019 (McKinsey & Company, 2020).

In Germany, the automotive industry's history dates back to the 1880s with Karl Benz's invention of the first automobile powered by an internal combustion engine (ICE) (Hawkins, 2002). Today, Germany remains a leading automotive market, home to renowned manufacturers such as Bayerische Motoren Werke AG (BMW), Volkswagen, Porsche, Daimler-Benz, and Audi. In 2018, the German market experienced a 55% increase in electric vehicle sales, attributed to the availability of models with larger battery capacities, revised government incentives, and heightened demand for new models (McKinsey & Company, 2020). The opening of the first Tesla Gigafactory in Europe near Berlin further illustrates this trend. Nonetheless, despite the transition to renewable energy, the German market for sustainable mobility remains relatively conservative. According to the Federal Motor Transport Authority, electric vehicles account for only 1.2% of the 48.2 million registered passenger cars in Germany, with about two-thirds operating on petrol and approximately 30% on diesel. This low percentage of electric vehicle ownership can be attributed to several factors, including inadequate charging infrastructure, insufficient charging stations, questionable environmental benefits, and high prices for electric vehicles (*High price and range anxiety stops Germans from buying e-cars*, 2021). A YouGov survey found that even if these

challenges were addressed, one-third of respondents would still not consider purchasing an electric vehicle.

The history of the automotive industry in Ukraine dates back to the early 20th century. Although the first motor vehicle was manufactured in 1961, the first electric vehicle was built even earlier - in 1935 by A. Taubin in Kyiv (*105 years of the first Ukrainian vehicle: photos and interesting facts*, 2024). Since gaining independence, the Ukrainian automotive market has diversified, offering both domestically produced vehicles and models from large international companies. During 2018-2019, car sales steadily increased, reaching 89,400 units in 2019, a 14% rise compared to 2018 (Federation of Employers of Automotive Industry, 2020). The pandemic impacted the market, but not as severely as the 2015 crisis. Sales in 2020 only declined by 8%, according to data from Ukravtoprom and Autoconcern. In terms of electric vehicles, Ukrainian consumers purchased more of these cars from 2015 to 2020; however, compared to global electric vehicle purchase data, Ukraine remained significantly behind (Borysova et al., 2020). The ongoing Russia-Ukraine war has further disrupted global automotive supply chains, with losses stemming not only from diminished demand in Russia and Ukraine but also from a reduction in Ukraine-sourced automotive wiring harnesses and worsening semiconductor shortages. Rising prices for lithium, nickel, and other materials have also hindered the production of more affordable electric vehicles.

In conclusion, while the electric vehicle market has shown substantial growth fueled by government support and shifting consumer preferences, challenges remain, including infrastructure concerns and varying consumer perceptions. Understanding these dynamics is critical for stakeholders in the automotive industry as they navigate the evolving landscape of consumer needs and market demands.

3.2 The role of government in the electric vehicle market development

Initially, government policy aimed to facilitate the widespread adoption and use of car ownership. However, starting in the mid-1990s, various policies have been enacted to manage automobile usage and promote the acquisition of cleaner vehicles in response to increasing congestion and energy scarcity challenges (Clark, 2013).

In the present day, as EVs gain popularity, governments worldwide are accelerating the shift toward sustainable mobility by establishing emissions targets. Among the latest initiatives is Germany’s

comprehensive climate policy, which includes a specific Climate Action Plan 2050 (Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB, 2016). This plan aligns with the Paris Agreement and sets several sectoral targets, aiming to cut emissions from the energy sector by 61 to 62% by 2030 (relative to 1990 levels). It also addresses the transportation sector with goals to achieve a 40-42% reduction by 2030. Meanwhile, the U.S. administration has set a target for 2030 to reduce greenhouse gas pollution, which includes a 50% electric vehicle sales target (The White House, 2021). Ukraine is actively encouraging the use of electric vehicles as well. Currently, there is no dedicated legislation regulating EVs, and various requirements related to electric vehicles are embedded within general legislation, such as the Tax Code of Ukraine and the Law on Customs Tariff. Nonetheless, as part of recent climate action measures, the Ukrainian government updated its Nationally Determined Contribution under the Paris Agreement, raising the emissions reduction target from 40% to 65% by 2030. This new policy aims to promote the adoption of more electric vehicles (United Nations in Ukraine, 2021). Regulatory changes constitute only one aspect of the transformation of the electric vehicle sector.

While electric vehicles appear to offer significant environmental benefits, educating consumers about the value of EVs remains a pressing challenge. Consequently, many governments are launching national and international campaigns to enhance public awareness regarding the advantages of zero-emission and ultra-low-emission vehicles. For example, European governments have partnered with leading EV manufacturers such as BMW, Nissan, and Toyota to implement an educational marketing campaign. Additionally, the Clean Energy Ministerial's Electric Vehicles Initiative (CEM EVI), supported by various governments, including those of Germany and the U.S., promotes policy events aimed at supporting, advancing, and encouraging the introduction and adoption of electric vehicles globally. As part of this initiative, the EV30@30 campaign sets an ambitious goal for all EVI participants to achieve a 30% share of EV sales by 2030. Such governmental initiatives exemplify what Kotler and Keller described as a blend of marketing channels that marketers employ to shape consumer perceptions effectively (Kotler & Keller, 2006).

To conclude, the increasing adoption of electric vehicles is significantly influenced by government policies, which aim to promote sustainability and environmental awareness. While substantial progress has been made, ongoing efforts are needed to educate consumers about the benefits of EVs and to ensure the necessary infrastructure and support are in place for widespread adoption.

3.3 Overview of car consumer behavior theories and approaches

When examining consumer behavior theories within the automotive sector, many have roots in travel behavior studies. Historically, rational choice theory has been the prevailing framework in this area. However, since individuals do not always make choices in fully economically rational ways, recent years have seen travel behavior researchers adapt several alternative behavioral theories from social psychology, such as Triandis' theory of interpersonal behavior and Ajzen's theory of planned behavior (Triandis, 1977; Ajzen, 1991). These theories have enabled researchers to conceptualize travel choices through various social-psychological factors, including attitudes, social norms, perceived behavioral control, and tendencies toward prosocial behavior and habitual actions. This stands in contrast to the traditional view that focuses solely on self-serving economic motivations as explained by utility maximization frameworks. While studies employing social psychological theories have primarily targeted car usage behaviors, they have also provided valuable insights into the domain of car ownership.

For example, Thørgeson previously applied concepts from the Theory of Planned Behavior (TPB), showing that both the perceived ease of using public transport and car ownership are key factors influencing the use of public transportation (Thøgersen, 2006). Bamberg and Schmidt compared three behavioral theories - the theory of planned behavior, the norm activation model, and the theory of interpersonal behavior - to assess their effectiveness in predicting car use (Bamberg & Schmidt, 2003). They found that the perceived ease of travel via cars is a strong predictor of car usage, reinforcing the notion that car use often becomes habitual. Their research also indicates that how suitable one's behavior aligns with their perceived social role significantly influences car use. Steg utilized Dittmar's theoretical model on the psychology of material possessions to argue that cars function not only as practical means of transportation but also as symbolic and emotional representations of self and status (Steg, 2005). Her findings revealed that individuals distinguish between the practical and symbolic-emotional roles that cars fulfill. Notably, younger males and lower-income groups particularly value the symbolic-emotional aspects of cars. Surprisingly, even functional travel, such as commuting, is influenced more by symbolic-emotional motivations than one might expect (Clark, 2013).

In terms of attitudes toward cars, Anable identified six attitudinally uniform population segments, ranging from passionate drivers to hesitant public transport users (Anable et al., 2013). Her research indicated that identical behaviors can stem from different motivations and that similar attitudes (e.g., pro-environment views) can lead to varied behaviors (e.g., whether or not to reduce car usage). The study

also linked discrepancies between attitudes and behaviors to the notion of perceived behavioral control, suggesting that individuals may wish to use buses but believe it is significantly more challenging than using cars (which may or may not be objectively accurate). In a similar vein, Goodwin discussed the intricate concept of car dependence, highlighting that individuals vary widely, and transport policy should not aim to target an average driver (Goodwin, 2012). He pointed out the existence of both car-dependent individuals (who are behaviorally locked into car usage) and car-dependent trips (for which no realistic alternatives exist). Consequently, reducing the number of car trips necessitates changes in spatial distribution and transportation connections between activity hubs. Conversely, initiatives aimed at addressing car-dependent individuals must focus on changing attitudes toward alternative transportation modes (Clark, 2013).

Another behavioral framework, prospect theory, elucidates the phenomenon of loss aversion, where individuals assign greater importance to potential losses than to potential gains. In this context, innovations or technologies that are marketed as environmentally friendly and cost-saving may be perceived as risky options (Kahneman & Tversky, 1979). Another relevant theory concerning consumer intention related to technology is the unified theory of acceptance and use of technology (Abbasi et al., 2021). Additionally, various studies investigate the influence of social, demographic, and financial factors that shape consumer choices.

Currently, behavioral science approaches are integrated at multiple levels. Initially, marketing professionals within the automotive industry utilized behavioral concepts to enhance their understanding of consumer behavior and improve their marketing strategies. Now, they are employing various behavior policies related to individual mobility and are even developing and implementing specific initiatives aimed at nudging people towards more rational car usage (Economides et al., 2012). This is particularly evident in strategies designed to encourage consumers to transition to environmentally friendly vehicles.

Considering all the factors and challenges discussed above, the automotive industry currently faces perhaps even greater obstacles than in the past. Nevertheless, the transformative evolution within the automotive sector continues, increasingly promoting lower emissions. This indicates that electrification is likely to bring further changes in the future, including shifts in consumer behavior. Thus, the choices surrounding personal mobility and automobile purchasing behavior are more complex than they might appear, necessitating further research to uncover unmet needs (Charm et al., 2020).

To conclude, consumer behavior theories in the automotive industry have evolved significantly, drawing from a variety of psychological frameworks and adapting to changing consumer attitudes. While traditional economic models laid the groundwork, contemporary research now incorporates a broader range of social and emotional factors that influence consumer choices regarding electric vehicles. As the industry adapts to new technologies and consumer demands, ongoing research will be essential to understand and meet the needs of modern consumers.

3.4 Demographic, social, and psychological influences on car consumer behavior

Research indicates that consumers' lifestyles, cultural backgrounds, and demographic differences are some of the most significant factors shaping consumer behavior. Additionally, Chen asserts that a consumer's lifestyle can be influenced by beliefs, social classes, experiences, cultural values, and family dynamics (Chen et al., 2016). Various lifestyles subsequently direct consumers' shopping habits and preferences, and they can also foster a readiness to embrace more innovative shopping experiences. Furthermore, Becker and Pizzutti point out that lifestyle factors affect consumer purchasing behaviors, particularly since consumers often face constraints related to location and time, see Figure 11 (Becker & Pizzutti, 2016).

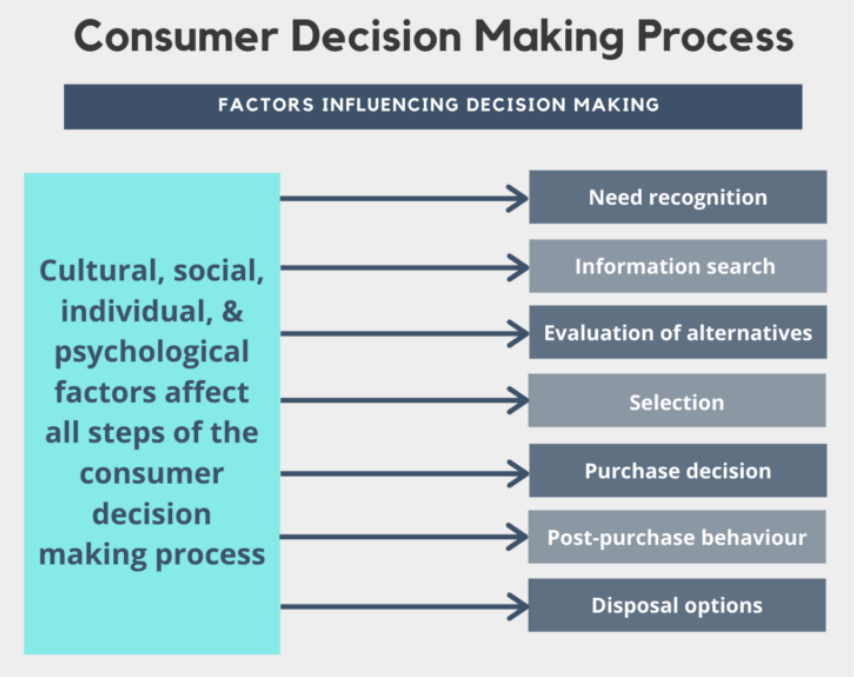

Figure 11. Factors influencing decision making process

Source: Niosi, 2021

A pressing question for organizations today is how to effectively change consumer behavior. Evidence shows that choice and convenience are critical lifestyle and cultural influences on consumers' purchasing patterns, as most consumers' buying decisions are significantly impacted by their limited time and energy.

In summary, understanding the various factors influencing consumer behavior, such as lifestyle, culture, and demographics, is essential for organizations aiming to adapt their strategies. Emphasizing choice and convenience can be key to modifying consumer purchasing habits in a fast-paced environment.

3.4.1 Overview of demographic influences on car consumer behavior

Numerous internal and external factors impact the consumer decision-making process, both individually and in combination. Internal factors include perception, learning, motivation, personality, and attitudes, while external factors encompass demographic, social, situational, and cultural influences. When striving to understand and cater to consumers, demographics play a crucial role.

Consumer behavior is profoundly affected by variables such as age, gender, income, education, and marital status. Different consumer segments categorized by these variables tend to exhibit distinct shopping behaviors and preferences for various types and qualities of products.

Therefore, recognizing the interplay of internal and external factors is vital for understanding consumer decision-making. Demographic variables, in particular, are key indicators of diverse consumer behaviors and preferences, enabling businesses to tailor their strategies effectively.

AGE

Murray's research indicates that while age can be a useful predictor of certain buying behavior trends, it does not operate in isolation. Its effectiveness is heavily influenced by additional factors such as social status, personality traits, lifestyle, and religious beliefs. Nonetheless, the aging process leads to changes that significantly reshape an individual's needs and desires, thereby influencing their purchasing behavior. This shift in buying patterns also reflects changes in the individual's responsibilities. However, the predictive value can be enhanced by analyzing individuals not only within the same age group but also considering other comparable variables or contexts. Furthermore, the limitations of age can be

mitigated through generational analysis, which incorporates aspects of shared experiences. This analysis is heavily informed by other factors such as status, culture, and social beliefs, helping to identify common values and experiences. Researchers have been studying generation-specific behaviors for many years (*Consumer Behavior: Person's Age or Generation*, 2022).

Individuals within the same generation tend to be bonded by similar life experiences, resulting in shared values. According to Torocsik, while the generational connection may be weak, it significantly influences purchasing decisions (Torocsik, 2015). The similarity of values among individuals from the same generation plays a crucial role in uniting various age groups. In contrast, the diversity stemming from conflicting value orientations tends to divide consumers into distinct categories. Generational studies have revealed that shopping behaviors can be classified into groups such as experienced shoppers (primarily young individuals living in large cities), classical shoppers (typically middle-aged or older women with average incomes and children), necessity shoppers (generally older individuals with limited education), occasional shoppers (often young men in big cities without planned shopping needs), and functional shoppers (mainly middle-aged women in urban areas who prefer thoughtful purchasing) (*Consumer Behavior: Person's Age or Generation*, 2022).

When examining car consumption, numerous studies aim to understand consumer preferences and behaviors shaped by age. Some research suggests that younger consumers exhibit a greater intention to purchase a vehicle compared to older consumers. This tendency may stem from the need for transportation as young graduates enter the workforce. Although they may have lower incomes, their desire for a vehicle to commute is high. Conversely, Kotler and Keller suggest that older consumers with substantial incomes may already own a vehicle, and thus their financial resources may be allocated to family responsibilities, such as mortgage payments or children's education (Kotler & Keller, 2006). Additionally, individuals aged 75 to 84 are notably reliant on vehicles, with only those aged 85 and older likely to cease driving altogether (Azhar & Zahari, 2022).

Studies have also explored the connection between age and the adoption of new eco-friendly products. These studies indicate that younger consumers are expected to prefer innovative and / or environmentally friendly products for several reasons: they are more willing to try and embrace new items, exhibit greater risk-taking behavior compared to older consumers, and are more likely to opt for products that significantly alter their daily habits. It has also been concluded that individuals raised in eras of heightened environmental awareness are more sensitive to ecological issues and associated products. In

contrast, older consumers are more likely to consider trying a new product only if it fulfils a specific need rather than simply following trends (Dias & Oliveira, 2019).

However, another research indicates that young adults in their 20s show a lower likelihood of intending to purchase EVs (Jang et al., 2021). This finding may be surprising given that younger individuals generally embrace new technologies more readily than older generations. However, considering the higher price point of EVs compared to traditional vehicles, this result is understandable. It is likely that the income level of younger individuals, particularly those in their 20s, may not be sufficient to afford these more expensive vehicles (Jang et al., 2021).

To conclude, consumer behavior is influenced by a complex interplay of age, socio-economic factors, and generational values. While younger consumers may demonstrate a desire for vehicles and environmentally friendly products, financial constraints often hinder their purchasing intentions. Understanding these dynamics is crucial for companies aiming to target different consumer segments effectively.

GENDER

When discussing masculinity and femininity, researchers assert that gender also plays a crucial role in purchasing behavior. In the literature on consumer behavior from the 1970s to the 1980s, terms such as sex-role self-concept and sex / gender-role identity were predominantly used instead of gender identity. However, over time, the term gender identity has become more frequently employed. This concept was first examined in psychology literature during the 1930s but gained prominence in consumer research in the 1960s. Since then, gender identity, along with its relationship to consumers' product or brand preferences, has been extensively studied in consumer research. For instance, Mackie, Smith, and Worth found connections between consumers' self-perceived feminine or masculine beliefs, experiences, and memories and the corresponding feminine or masculine images of products (Mackie, Smith & Worth, 1992).

In relation to buying behavior influenced by gender differences, studies by Lee and Workman demonstrated notable emotional differences (Lee & Workman, 2004). For example, women are more likely to experience regret regarding their purchase decisions compared to men. This tendency is

attributed to men focusing more on objective (instrumental) performance, while women tend to prioritize subjective (symbolic or affective) performance when evaluating products.

Additionally, numerous studies indicate a correlation between feminine and masculine personality traits and impulse buying behavior. Lee and Workman discovered that women exhibit higher levels of impulse buying compared to men. Women also tend to have more favorable attitudes towards certain trends, such as fashion, which subsequently affects their purchasing behavior. However, as gender personality traits evolve, individuals are increasingly exhibiting traits traditionally associated with the opposite gender. The study by Ozdemir and Akcay revealed that women remained consistent in their behaviors regarding their personality traits, while men who identified with feminine traits were more inclined to engage in impulse buying (Ozdemir & Akcay, 2019). Conversely, men with predominantly masculine traits were less likely to exhibit such behavior.

Maccarrone-Eaglen and Schofield conducted a separate study examining the impact of gender on purchasing behavior (Maccarrone-Eaglen & Schofield, 2017). They concluded that gender influences compulsive buying due to varying cultural perceptions of indulgence and differences in women's roles in society.

When it comes to purchasing a car, gender differences are significant as well. Research indicates that female buyers tend to prioritize the efficiency of a vehicle rather than its specific characteristics (Budiono & Esengalievna, 2013). They typically do not require luxury or mid-range vehicles, focusing instead on economical options. Women often disregard the size or style of a car during the selection process. In contrast, male buyers do not pay much attention to the details of car characteristics but may consider factors like class and are often influenced by the car's style, size, and category. Thus, men are generally more detail-oriented in their purchasing decisions. The findings suggest that car dealers should emphasize the advantages of various efficiency factors, practicality, and safety features to female customers. Meanwhile, when engaging male buyers, salespeople should provide more detailed information regarding technical specifications, characteristics, style, and size (Budiono & Esengalievna, 2013). Furthermore, Boschmann and Brady found that men tend to prefer driving over walking or using public transportation, while women are more likely to rely on others for transportation (Boschmann & Brady, 2013). Consequently, men are more car-dependent, making it more challenging for them to adapt to alternative transportation modes, especially in areas lacking efficient and user-friendly public transit.

Other gender-related trends show that male shoppers are more inclined to make purchase inquiries than female shoppers. They also tend to spend more time shopping for cars and are interested in vehicles that are, on average, priced 10%-15% higher than those favored by women. Men typically show a greater interest in high-performance, premium-brand vehicles, while women are more inclined to inquire about minivans, hatchbacks, and crossovers (*Differences in how men and women car shop*, 2012).

Regarding mobility in general, research over the past four decades has identified four distinct dimensions of gendered mobility, including electric mobility. These dimensions include preferences for specific vehicle features, travel patterns, the transmission of environmental or pro-sustainability values, and gender roles and norms. Studies reveal significant differences between women and men across several mobility dimensions, with the extent of these disparities varying across different contexts (Kester et al., 2018). The first stream of research emphasizes gendered travel patterns, showing that women frequently travel with children and engage in more walking, while men tend to travel longer distances with fewer destinations. The second area of research indicates that women often hold more pro-environmental or pro-sustainability values, which they can impart to others, particularly their children. These overarching environmental values can lead to the third area of research, which reveals gendered transport preferences, such as women favoring fuel-efficient cars or cycling more compared to men. Overall, women are generally more inclined to choose sustainable products due to their stronger environmental values, attitudes, and awareness. However, some studies have found that, on average, male respondents are more likely to purchase electric vehicles. Additionally, gender differences are observed in aspects like mileage, charging time, pricing, charging infrastructure, maintenance ease, and the significance of incentives. For instance, research has indicated that women place more importance on charging time, autonomous driving features, and maintenance, while men prioritize design, fueling infrastructure, and mileage (Kang & Kim, 2022).

Overall, there is also a connection between gender and cultural and social contexts. It has been demonstrated that respondents from urban areas exhibit significantly higher intentions to purchase electric vehicles (Jang et al., 2021). This can be attributed to individuals in developed areas being more aware of the environmental and economic advantages of EVs due to higher levels of air pollution. Additionally, there is a notable positive correlation for individuals living in apartments, suggesting that those in such housing are more likely to buy EVs, potentially due to the availability of parking facilities equipped with chargers (Jang et al., 2021).

In summary, gender significantly influences consumer behavior, shaping attitudes and preferences in various contexts, including automotive purchases. Research indicates that while women often prioritize efficiency and practical considerations, men tend to focus more on style and performance. Additionally, generational differences and cultural factors play crucial roles in shaping purchasing intentions and behaviors. Understanding these dynamics is essential for marketers seeking to effectively engage different consumer segments in the evolving automotive landscape.

INCOME

Foster and Cadogan assert that price, along with income, is one of the most significant factors influencing purchasing decisions and consumer behavior (Foster & Cadogan, 2000). Income plays a crucial role in determining consumer choices. While loyal customers are often willing to pay a premium for products that meet their quality standards - qualities that enhance a product's ability to satisfy consumer needs and wants - different income levels can lead to noticeable variations in product preferences and purchasing habits (Slabá, 2019). For example, low- and middle-income consumers typically allocate a significant portion of their earnings to essential needs like groceries and clothing. Individuals in the middle class often base their purchasing decisions on utility. In contrast, upper-class consumers tend to prioritize style, design, and special features when making purchases. Income directly impacts the ability to buy expensive products, necessitating the allocation of financial resources. Higher income increases purchasing power, allowing consumers to spend more on leisure activities, entertainment, travel, household goods, clothing, health insurance, and imported food. However, although income is frequently used to gauge a person's social class, it rarely results in actual changes to a family's social status (Pradipta, 2019).

Regarding car buying and ownership behaviors, extensive research has confirmed a positive correlation between income and vehicle ownership in the United States, Europe, and other OECD countries (Linn & Shen, 2021). Additionally, studies have shown that income is a more significant factor in determining the type and average price of personal vehicles, while social class influences the types and prices of household and personal electronic devices. Vehicles do not inherently relate to social status but are rather practical purchases. Nonetheless, individuals with higher incomes are likely to enjoy greater mobility. Research indicates that early electric vehicles were predominantly bought and used by relatively affluent households. A person's mobility is often dictated by their vehicle type; hence, higher income typically leads to access to faster and more comfortable vehicles. Higher-income consumers often prefer more expensive vehicles that offer enhanced comfort and security (Pradipta, 2019). In the past, income played

a substantial role in the adoption of EVs since many models available at the time were luxury items. For instance, data from 2019 in the USA indicated that Tesla adoption rates were 15 times higher in the wealthiest 20% of zip codes compared to the poorest 20% (*State EV Registration Data*, 2020). Similar trends were observed for the Nissan Leaf in affluent areas. However, as the market has expanded over time, including the availability of used vehicles, EVs are expected to become increasingly appealing to lower-income households. Research concludes that decreasing EV costs, technological advancements, and increased electric range will make electric vehicles more attractive to a broader audience (Bauer et al., 2021). As both the purchase price and overall ownership costs for EVs continue to decline, the financial benefits of owning an EV will become more significant, emphasizing the importance of ensuring equal access for disadvantaged groups. Improvements in EV technology could also help lower several cost factors, including maintenance, purchase, and fueling expenses, which together comprise over two-thirds of total vehicle ownership costs. Such developments could drastically alter transportation expenses, particularly for low-income households (Bauer et al., 2021).

High income levels are often correlated with higher education levels. Consequently, it is assumed that wealthier consumers are better informed about the benefits of electric vehicles and their environmental impact, making them more likely to prefer these options due to their perceived operational cost savings. However, the findings from various studies are frequently inconsistent, indicating that the relationship between EV pricing and operational cost savings is not universally applicable to all vehicles. Thus far, there has been no discernible trend regarding the impact of income on consumer preferences for electric vehicles (Dias & Oliveira, 2019).

To summarize, income significantly influences consumer behavior, particularly in the context of electric vehicle adoption. While higher income typically correlates with increased purchasing power and a preference for luxury options, the evolving market landscape suggests that electric vehicles are gradually becoming more accessible to lower-income consumers. Understanding these dynamics is essential for manufacturers and policymakers aiming to promote sustainable mobility and meet the diverse needs of all consumer segments.

EDUCATION

In the literature, education is identified as a crucial factor influencing consumer behavior, alongside the social environment, personality, lifestyle, motivations, perceptions, age, income, and family

environment. When discussing consumer education today, two perspectives are recognized: general education, which refers to the knowledge acquired through schooling and university experiences, and consumer education, which involves informing consumers about their rights and enabling them to understand laws that protect these rights (Aceleanu & Burghelea, 2014). The general educational level of consumers is considered as a significant factor impacting purchasing behavior.

Education is frequently viewed as a vital factor that affects consumer behavior. The literacy rate in specific regions can present marketers with opportunities to promote advanced products and services (Creusen et al., 2010). As noted by Chisnall, higher education provides access to various professions, leading to elevated social aspirations and consumption levels (Chisnall, 1975). As a society becomes more educated over time, its buying behavior tends to become more sophisticated. Recent research indicates that individuals with higher education place less importance on the symbolic aspects of products and prioritize quality instead, with this emphasis increasing alongside educational attainment. It is suggested that as more individuals achieve higher education levels, marketers can anticipate changes in product preferences (Kumar, 2014).

Studies demonstrate a strong positive correlation between educational attainment and consumer behavior. For example, research has shown that as education levels rise, consumers utilize information more actively, consider a greater number of alternatives, engage in longer decision-making processes, and exhibit a willingness to explore more complex buying scenarios (Grønhaug, 1974). Kumar & Kumar further emphasize that educational status is often used to define social class and is regarded as an independent socio-economic variable that affects purchasing decisions (Kumar & Kumar, 2019). Educated individuals tend to be more responsive to societal changes, health maintenance, and environmental protection, leading to positive consumer behavior. According to Nwankwo, Hamelin, and Khaled, more educated consumers are also more inclined toward rational purchasing decisions rather than impulse buys (Nwankwo, Hamelin, & Khaled, 2014).

When it comes to car purchases, individuals with higher education levels tend to be more focused on various issues related to vehicle selection (Hasan, 2020). Their knowledge aids in decision-making and enhances their confidence in making successful choices. Educated consumers are more likely to consider multiple factors, ultimately resulting in better vehicle selections. Furthermore, highly educated consumers often prioritize vehicle models. Conversely, post-purchase services tend to dominate the purchasing decisions of individuals with up to secondary-level education (Hasan, 2020). Prieto and

Caemmerer found that consumers with higher educational attainment show a strong preference for new cars in the intermediate and luxury segments (Prieto & Caemmerer, 2013).

The literature also indicates that education levels can affect individuals' understanding and connection to sustainability and electric mobility (Dias & Oliveira, 2019). Tellis, Yin and Bell in their study suggest that education positively influences the adoption of innovative products, as it provides consumers with a broader perspective on new ideas (Tellis, Yin, & Bell, 2009). However, Steenkamp and Gielens in their research have found no significant impact of education on innovative behaviors (Steenkamp & Gielens, 2003). Regarding environmental products, Meyer indicates a positive relationship between higher education and environmental awareness in his study (Meyer, 2015). Among individuals with similar environmental concerns, more educated people may have greater awareness of the external impacts of their consumption habits and a heightened concern for societal welfare (Dias & Oliveira, 2019). Yet, those with higher education may also be more aware of the drawbacks of electric vehicles (EVs), leading to short-term hesitations about purchasing them.

Education also plays a significant role in determining perceptions of technical reliability, purchase price, and environmental impact. Higher education typically correlates with greater concern for technical reliability and environmental effects, while lower educational levels prioritize price. Additionally, factors such as range and charging time have weak correlations with higher education levels. The importance placed on battery life is generally consistent across all educational levels, although undergraduates tend to emphasize the significance of public charging infrastructure. Furthermore, factors like safety and fuel economy do not show significant differences across educational backgrounds (Kester et al., 2018).

Despite positive developments in the adoption of electric vehicles, a comprehensive automotive study conducted by Teads in collaboration with Kantar revealed that nearly 40% of respondents are unaware of the full benefits of owning an electric vehicle, indicating a need for further education *(EV Consumers Still Need Education as 40% Don't Understand Benefits of Buying an Electric Car*, 2022). Therefore, educating consumers about EVs is essential for brands to remain relevant and prepare for an electric future. Additionally, providing adequate information on electric vehicle mileage and improving the user interface design can enhance consumers' perceptions of electric vehicles (Kang & Kim, 2022).

To conclude, education is a pivotal factor influencing consumer behavior, particularly in the context of electric vehicle adoption. While higher education levels correlate with better-informed purchasing

decisions and preferences for quality and sustainability, many consumers still lack awareness of electric vehicle benefits. To effectively promote electric vehicles and foster a more informed consumer base, education initiatives must be prioritized by manufacturers and policymakers alike.

MARITAL STATUS AND HOUSEHOLD SIZE

Marital status offers valuable insights into consumer behavior. Typically, individuals who are married or in long-term partnerships exhibit noticeably different purchasing behaviors compared to single consumers (Bilney, 2021). These purchasing habits can relate to various product and service categories, such as vacations, car purchases, and entertainment choices. Additionally, a person's marital status evolves throughout their life - from single to engaged, married, separated, divorced, or widowed (Kumar & Kumar, 2019). For instance, a single person entering the workforce after graduation will spend their money differently than a newly married couple. In comparison to unmarried individuals, married couples represent a more significant market for purchases like homes, life insurance, durable goods, and children's products. Family structure and decision-making also change throughout different life stages, leading to distinct needs and wants at each phase. Consequently, marketers tailor their strategies to these various life stages with specific marketing mixes - from products to promotions - that resonate with consumers at those points in their lives. Purchasing patterns also shift when individuals have young children, teenagers, or college students. Children impact family spending, from diapers and daycare to tuition and electronics. Once children graduate from college, spending patterns undergo yet another transformation (Niosi, 2021).

When it comes to car consumption, households are more inclined to purchase new vehicles if they are married, more educated, and have higher incomes (Kurz et al., 2016). Furthermore, Oakil discovered that the impact of urbanization on car ownership varies widely based on household structure (Oakil et al., 2016). In densely populated areas, young single individuals are significantly less likely to own a vehicle. Demographic characteristics, including marital status, can also influence the number of cars owned per household, the brand of the vehicle, and specific technical features. Some studies have focused on the influence of demographic variables such as household size, age, and gender on the changing demands for private mobility. For instance, Borgoni in the research indicates larger households (with three or more members) tend to have higher car ownership rates (Borgoni et al., 2002). The increase in car ownership correlated with larger household sizes can be attributed to two factors: larger households often consist of more than one adult, thus increasing the number of potential car owners, and they are also more likely to

include children, which heightens the demand for daily trips (e.g., to kindergarten or school) (Borgoni et al., 2002). Nonetheless, while Clark in his study suggests that an increase in children within a household leads to greater car ownership due to heightened mobility requirements, another study by Bhat and Koppelman indicates that having children may reduce the likelihood of owning a car, as families may prioritize spending on other essential items (Bhat & Koppelman, 1993; Clark et al., 2016).

Demographic characteristics, such as being married or cohabitating, have been positively correlated with electric vehicle adoption. Furthermore, most electric vehicle owners belong to larger households with more children, purchasing electric cars as an addition to their household vehicle fleet (Simsekoglu, 2018). Additionally, married individuals tend to be more environmentally conscious; households with two or more members are more inclined to purchase electric vehicles compared to single-person households (Farkas et al., 2019). However, some research indicates no significant relationship between marital status and electric vehicle usage (Appiah, 2020). The influence of family size on electric vehicle adoption presents a dual perspective (Dias & Oliveira, 2019). On one hand, the adoption of innovative products may be hindered as parents may focus more on immediate family needs than on new innovations. Conversely, families with children are expected to pay more attention to environmentally friendly products due to concerns regarding the negative impacts of a damaged environment on their children's future. However, studies assessing the influence of family size on electric vehicle preferences have reached a consistent conclusion: larger families may experience greater environmental benefits when purchasing electric vehicles (Dias & Oliveira, 2019).

Overall, according to the Theory of Choice and the Constancy of Economic Laws, an individual's preferences evolve based on personal experiences (Shackle, 1951). Consequently, their character at any given moment is shaped by their unique life experiences and income levels. Thus, personal standards significantly influence automobile ownership.

In conclusion, marital status significantly influences consumer behavior, particularly in terms of purchasing decisions related to cars and other goods. Married individuals and those in long-term partnerships tend to have different spending patterns and priorities compared to single consumers. Factors such as family size, education level, and income further shape these behaviors. Understanding these dynamics can help marketers develop targeted strategies that resonate with different consumer segments.

3.4.2 Overview of social influences on car consumer behavior

Social factors play a crucial role in shaping and influencing purchasing decisions. These factors are also considered prevalent within the society where a consumer lives. Society comprises various individuals with diverse preferences and behaviors. These differing behaviors affect the personal preferences of others as they tend to engage in activities deemed acceptable by society. Key social factors that influence an individual's behavior include family, reference groups, social roles, and social status.

Family members significantly shape an individual's behavior and preferences. They create and define an environment where individuals grow, develop their personalities, and acquire values. A child often develops personal buying behaviors and preferences by observing parents, leading them to purchase similar products or services later in life (Management Study Guide, n.d.). Families can influence buying behavior in two primary ways: by shaping beliefs, personality traits, characteristics, and attitudes, or by affecting decision-making regarding specific goods and services. It is believed that during their development, individuals pass through two familial phases: the family of orientation and the family of procreation (Management Study Guide, n.d.). The former refers to the family into which a child is born, where parental influence is significant. In contrast, the family of procreation is formed when an individual marries and has children, resulting in changes to preferences influenced by the spouse.

A family can also be seen as a primary reference group - a group of individuals who regularly interact with one another (Andreazzi, 2024). In addition to family members, this primary group may include friends, relatives, and coworkers. These groups can impact consumers' buying decisions in two main ways: 1) they have prior experience with the product or brand, or 2) they possess knowledge about the product's features and specifications. For instance, a married individual is more likely to buy products that benefit their family members compared to a single person. Once an individual starts a family, all family members tend to influence most purchasing decisions. For example, a consumer with a spouse and child will increase spending on their family, while a newly married person will focus on purchasing a house, car, household items, furniture, etc., more than a single person or someone who has been married for a long time.

Regarding reference groups, these are groups with which an individual wishes to associate, or in other words, groups they desire to be identified as a member. Members of a reference group significantly influence each other's behaviors and tend to share common purchasing patterns. In a reference group, an

individual can influence the behavior of others by taking on the role of an initiator. This person initiates the buying decision, influences others' opinions regarding purchases, and possesses the authority to finalize the purchase (Management Study Guide, n.d.). As previously mentioned, family members and relatives, along with coworkers, neighbors, friends, or colleagues, can form reference groups. While families constitute a primary group, all other influencing individuals create secondary groups, which tend to be more formal and involve less frequent interaction (Management Study Guide, n.d.).

An individual's role and position in society also impact their buying behavior (Management Study Guide, n.d.). For example, a person in a high-ranking organizational position is expected to purchase products that reflect their status. Generally, individuals fulfill dual roles in society based on their group affiliations. Thus, a high-ranking individual in a firm may also serve as a husband, wife, father, or mother at home. A similar situation applies to social status. Individuals from middle to lower income groups are likely to purchase items necessary for their survival, while those from upper-middle-class backgrounds are inclined to spend on luxury items (Management Study Guide, n.d.).

Decisions related to cars, including their purchase and ownership, as well as transport routines, are considered medium-term decisions influenced by family life, residential location, and employment (Clark et al., 2016). A survey by Autolist.com found that personal recommendations from family, friends, or coworkers had the most substantial impact on vehicle purchases, with 52% of respondents indicating that such recommendations influenced their buying choices (Thinking of getting an EV? Your neighbor just might convince you, 2020). This highlights how personal recommendations can function as word-of-mouth, wherein consumers share information about companies and their products, potentially fostering a favorable or unfavorable attitude towards a brand.

According to Lanzendorf's mobility theory, travel behavior is not static and typically experiences changes (Lanzendorf, 2003). These changes may arise from events occurring within one or more of three interrelated life domains:

1. Lifestyle domain (family dynamics, leisure activities, employment type).
2. Accessibility domain (relative spatial arrangement of home, work, and other activity centers).
3. Mobility domain (car availability, public transport subscriptions, daily travel patterns) (Lanzendorf, 2003).

These domains are defined from a dynamic perspective. To comprehend changes in car ownership levels, it is essential to recognize events or decisions that occurred before and after the change. This perspective implies that changes in car ownership should be viewed as part of an ongoing life process. According to Steg, a change in car ownership to a different level can be connected with the instrumental need to access cars and / or the affective desire for cars as material possessions (Steg, 2005). A shift in the instrumental need may result from changes in household circumstances, such as moving homes, having a child, or changing jobs. Such shifts can lead to either greater or lesser access to cars. Regarding the affective desire for cars, Oakil noted that its increased or decreased level may stem from changes in resources, as well as from social influences such as social norms or role beliefs, which may evolve as individuals progress through life (Oakil et al., 2014).

Life changes can also be viewed through the lens of the life course. This approach serves as a well-established theoretical framework within the social sciences, providing premises and methodologies to understand social systems, individual behavior, and individual and social change throughout the life course. Pioneers of life course studies, Giele and Elder, defined it as a series of socially recognized milestones, roles and responsibilities that individuals encounter and manage throughout their lives (Giele & Elder, 1998) Thus, a life course approach enables researchers to explore how the present is connected to past events. For instance, it can aid in investigating how an individual's current car ownership situation has developed over time in relation to prior events, changing circumstances, and broader household decisions (Van Acker, Van Wee, & Witlox, 2010).

When discussing specific life events that influence car purchase and ownership decisions, examples include changes in household roles and behavior patterns (e.g., employee, partner, parent), the relationships among individuals in the household, available resources (e.g., income and cars), the spatial and temporal distribution of visited activity centers (and the available transport links), and individual values and lifestyle preferences. Additionally, interactions between life events can occur. For instance, the birth of a child often leads to changes in employment patterns for one or more parents (Clark et al., 2016). Furthermore, car ownership does not inherently symbolize luxury or status. However, owning an expensive car typically conveys a higher social status compared to owning an inexpensive or older vehicle (Helveston et al., 2015).

The increasing availability of personalized transport and the development of road networks also affect car purchase and ownership patterns. With a privately owned car, individuals can reside further from

work, shops, leisure activities, and other destinations, still able to reach them in a reasonable timeframe. Private cars have not only replaced public transport usage; they have also created new travel opportunities that were previously unavailable. Consequently, this has generated social pressure for individuals to acquire cars to participate in a wider array of activities made accessible through car ownership. Urry argues that without the flexibility and 24-hour accessibility provided by cars, navigating social life would be significantly challenging (Urry, 2004). As car-dependent lifestyles become the norm, social pressure increases for individuals to obtain their own vehicles, offering them a full range of opportunities within a motorized society.

As previously mentioned, word-of-mouth as a social factor is a crucial element in boosting the demand for EVs. According to Kahn, Lane and Potter, the decisions individuals make are influenced by the behaviors of their social networks (Kahn, 2007; Lane & Potter, 2007). Research conducted by Araghi, Kroesen and Molin found that social norms also play a significant role in EV adoption (Araghi, Kroesen & Molin, 2014). Qualitative studies by Axsen, Kurani, Orlebar and Skippon indicate that social influence and an individual's social network positively impact EV adoption (Axsen & Kurani, 2011; Axsen, Orlebar, & Skippon, 2013). Meanwhile, researchers such as Kim, Rasouli and Timmermans have shown that social influence can also alter preferences for electric vehicles (Kim et al., 2014; Rasouli & Timmermans, 2013). Beyond interpersonal communication and neighbourhood effects, social norms represent another form of social influence. Higher market shares of EVs have been associated with increased preferences for EVs, suggesting that the current impact of these social factors is significant, though minor.

Many aspects of consumer behavior are also culturally determined. Inglehart, Baker and Liang suggest that national cultures bind individuals together through enduring systems of shared values and beliefs (Inglehart & Baker, 2000; Liang & He, 2012). Therefore, social influence is transmitted via interpersonal communication, which encompasses social ties and networks, neighborhood effects (the behavior of referent groups in proximity), and social norms (accepted behaviors). Each of these forms of social influence is also shaped by broadly held values and beliefs specific to a given culture. This aligns with cause-related marketing studied by Lachowetz, Sharma and Mehta, which examines consumer behavior driven by societal support and social norms, along with consumers' backing of companies that demonstrate socially responsible behavior, such as supporting CSR initiatives (Lachowetz et al., 2002; Sharma & Mehta, 2012).

A widely adopted approach for measuring national culture initially identified four interrelated dimensions. However, two of these dimensions are closely related and particularly relevant when examining cultural variations in social influence on consumer choice. These dimensions include individualism-collectivism and pragmatic-normative. The individualism-collectivism dimension distinguishes individualist cultures, where individuals strive for unique identities and prioritize personal and immediate family care (Axsen et al., 2017). In contrast, the pragmatic-normative dimension differentiates normative cultures, such as Ireland, which emphasize adherence to existing norms, short-term rewards, and tradition preservation, from pragmatic cultures, like the Netherlands, which are more flexible in adapting traditions to evolving social and economic contexts. National wealth has been reliably associated with variations in vehicle ownership across countries, with monetary influences like personal income strongly correlating with vehicle preferences. As Inglehart, Baker, Kim and Drolet suggest, national cultures connect individuals based on shared value systems, shaping consumer choices and influencing economic and political developments (Inglehart & Baker, 2000; Kim & Drolet, 2003). As nations become wealthier, culture increasingly influences choices as people allocate discretionary income based on their values. For instance, as rapidly developing countries like China and India advance, diversity in vehicle purchasing decisions is expected to grow with rising affluence (Axsen et al., 2017).

Regarding cultural differences in electric vehicle consumption, findings from a report by McKinsey & Company indicate that US and German EV consumers view their vehicles as economical, high-tech, and environmentally friendly (McKinsey & Company, 2020). They also rate EV performance as superior, citing less noise, lower maintenance costs, and driving enjoyment. In contrast, Chinese consumers evaluate their electric vehicles primarily from a functional perspective, while US consumers view them largely in terms of status.

Social factors significantly influence consumer purchasing decisions, with family, reference groups, social roles, and social status playing key roles. Families shape individual preferences and behaviors, often impacting buying habits, especially for significant purchases like cars. Reference groups, which include friends and coworkers, also affect decisions through shared experiences and recommendations. An individual's role in society, including their position and social status, further influences their buying behavior, as those in higher positions may seek products that reflect their status.

In the context of car ownership, marital status and family structure are crucial, with married households generally more inclined to purchase vehicles. Research indicates that personal recommendations

significantly influence car buying decisions, highlighting the importance of word-of-mouth in consumer behavior (Thinking of getting an EV? Your neighbor just might convince you, 2020). Additionally, Lanzendorf's mobility theory emphasizes that travel behavior evolves due to changes in lifestyle, accessibility, and mobility domains (Lanzendorf, 2003).

The life course perspective illustrates how personal experiences shape car ownership over time, with specific life events altering household dynamics and transportation needs. Furthermore, cultural influences are paramount in shaping consumer choices, with national cultures fostering shared values that impact purchasing behavior. In particular, the report highlights differences in how electric vehicle consumers in the US and Germany perceive their vehicles, noting cultural variations in attitudes towards EVs.

3.4.3 Overview of psychological influences on car consumer behavior

Numerous psychological factors impact consumer behavior, with influences ranging from Freud’s theories to Herzberg’s concepts of satisfiers and dissatisfiers (Behling et al., 1968). In marketing, one of the most frequently referenced psychological frameworks is Abraham Maslow's hierarchy of needs. Maslow's model is depicted as a pyramid, with the most basic physiological needs - such as hunger, thirst, and shelter—at the base, and more luxurious, non-essential needs at the top. He posited that individuals prioritize the most urgent needs first, including physiological ones. As lower-level needs are met, attention shifts to higher-level needs, ultimately culminating in self-actualization or personal fulfillment (Manashree, n.d.).

In general, four key psychological factors influence consumer behavior, categorized into systems of motivation, perception, learning, and attitudes and beliefs (Manashree, n.d.).

Motivation relates to the intrinsic needs of a consumer and can be described as an individual's inherent drive to act on a specific need. It is a crucial psychological factor in marketing. Different consumers exhibit varying levels of motivation to fulfill a broad range of needs. Typically, individuals must establish a clear goal to satisfy their needs and take actions to achieve them. For a consumer to decide to make a purchase, the product must address a need they are motivated to fulfill (Indeed, 2024). Therefore, products should be marketed as solutions to consumer tasks and challenges. Referring back to Maslow's model, lower-level needs must be satisfied before higher-level ones, but individuals may experience

multiple competing needs simultaneously. By understanding specific needs and the consumer's motivation to address those needs, this hierarchy can aid in identifying consumer needs for particular marketing segments and help create highly targeted segments that aim to fulfill any needs present in the hierarchy.

Perception is another psychological factor that can significantly shape consumer behavior. It refers to how an individual thinks or understands a product, which may dictate their level of engagement with a brand and ultimately influence their purchase decisions. For marketing professionals, understanding perception can be challenging, as each person may interpret situations differently based on their past experiences, the information they focus on, and how they interpret that information. Consequently, perception may lead two consumers with identical needs to choose different products to fulfill those needs. Thus, it is beneficial to comprehend the three processes that lead to differences in perception. These processes are:

- *selective attention*, which is attention when individuals only pay attention to information that is immediately useful to them or people they know;
- *selective distortion*, when individuals perceive information in a biased way that reinforces their existing beliefs, thoughts and experiences;
- and *selective retention*, when individuals more frequently remember information that would be useful to them and forget extraneous, non-pertinent information (Indeed, 2024).

Moreover, attitudes and beliefs have the potential to influence all the aforementioned factors. For instance, some individuals learn more effectively through visual means. Consequently, images and visuals are frequently utilized as powerful communication tools in marketing. Attitudes and beliefs are critical psychological components that can shape consumer behavior (Indeed, 2024). Attitudes are defined as consistent perspectives an individual holds regarding a subject and are composed of beliefs. These beliefs represent preconceived notions individuals have established about various topics, along with their associated emotional responses. People utilize their attitudes and beliefs to evaluate a wide array of aspects - including individuals, locations, brands, religions, politics, and more. Furthermore, a negative attitude or belief towards a specific product or brand can deter consumers from engaging with that brand or purchasing any of its associated products. Thus, comprehending how attitudes and beliefs can affect consumers, and their decision-making processes is crucial. In some instances, marketing campaigns can positively shift consumer attitudes or beliefs. Conversely, when consumer perceptions

and beliefs negatively impact a brand's profitability, it may be wise for the brand to modify its strategy and adjust its product to better align with consumer attitudes (*Understanding consumer behavior: the four factors*, 2018). Such strategies are typically adopted by brands facing these challenges, as altering attitudes and beliefs can be difficult.

In terms of car ownership and usage behavior, psychological factors have also been investigated for their impact on travel behavior related to car usage and the degree to which car ownership fulfils psychological needs, in addition to serving its practical transportation function. According to Wright and Egan, who analyzed this issue through the lens of Maslow's hierarchy of needs, cars fulfil various needs by providing comfort, protection, and safety, acting as social spaces, symbolizing one's status, and serving as a form of personal expression (Wright & Egan, 2000). Diekstra and Kroon argue that cars "evoke feelings of power, while acceleration and speed elicit pleasurable physiological reactions," whereas Sheller claims that cars evoke emotions that extend beyond any economic evaluation of costs and benefits (Diekstra & Kroon, 1997; Sheller, 2004). Urry posits that societies have become increasingly entrenched in a self-reinforcing system of automobility, where acquiring a driver's license and a car allows individuals to reap the benefits of participating in this system (Urry, 2004). A group of researchers has noted that car ownership serves as an indicator of robust social and economic health (Macintyre et al., 1998). Hiscock further explored how cars offer protection, autonomy, and prestige, which can potentially promote health (Hiscock, 2002).

As previously discussed, several factors influence car purchasing decisions, including vehicle attributes such as operating and capital costs and horsepower fuel efficiency. Nevertheless, individual behavioral intentions also play a significant role. According to Ajzen's theory of planned behavior, behavior is formed by intention, which is directly influenced by attitudes towards that behavior (Ajzen, 1991). Consumer motivation to obtain a driver's license and purchase a vehicle may also stem from its status value (Buhmann & Criado, 2022). This status value, which reflects personal identity, is recognized as a symbolic factor of cars or the consumer's willingness to buy from companies that engage in CSR activities. The status associated with either a combustion engine vehicle or an EV exemplifies the self-construal theory, which posits that acquiring a luxury item can help fulfill hedonistic desires and foster social cohesion (Markus & Kitayama, 1991).

Furthermore, Steg's research demonstrated that individuals drive their cars not only out of necessity but also because they enjoy driving (Steg, 2005). Additionally, through principal component analysis

followed by regression analysis, it was found that symbolic or affective factors are the most significant determinants of car usage decisions, followed by instrumental and independence factors, respectively. Affective factors encompass deep emotional responses, which are grouped together based on their similarities (Belgiawan et al., 2011).

In general, psychological theories utilize various factors to elucidate behavior, including perceptions, attitudes, and norms. Huijts, Molin and Steg offered a framework that integrates most of the primary psychological theories and factors relevant to the acceptance/adoption of sustainable technologies (Huijts et al., 2012). The adoption of electric vehicles is often considered to be driven by environmental concerns. Thus, personal norms regarding eco-friendly behavior are typically included and found to be positively associated with preferences for EVs. Although the methods for measuring this norm differ across choice studies, many utilize indicators such as environmental concerns and eco-friendly behaviors. For example, Daziano, Bolduc and Kim assessed respondents' awareness of transportation issues and their specific perceptions of EVs as environmentally friendly vehicles (Daziano & Bolduc, 2013; Kim et al., 2014). Their findings suggest that concerns regarding value, battery life, and technological risks negatively impact the likelihood of choosing an EV.

EV adoption is sometimes regarded as an innovation adoption behavior due to the novelty of modern EVs. Rogers' theory of innovation diffusion indicates that an individual's innovativeness positively influences EV adoption, a finding confirmed by several choice studies (Rogers, 1995). However, it has been also concluded that uncertainty regarding technological advancements negatively affects the intention to adopt an EV, as EVs are often perceived as either the car of the future or a work in progress (Liao et al., 2016). Besides environmental considerations, other psychological characteristics can also influence EV adoption. Dittmar and Steg identified that instrumental, hedonic, and symbolic motives impact vehicle purchases and their usage (Dittmar, 1992; Steg, 2005). Exploratory research has demonstrated that emotions significantly affect these processes. A notable example is Helveston's study, which examined the symbolic value of BEVs (Helveston et al., 2015). Specifically, it has been found that in the U.S., individuals who attribute high symbolic value to their vehicles are more inclined to purchase an EV, as it symbolizes high social status. However, this finding does not hold true for all regions; for instance, in China, the opposite was observed. The mentioned theory of planned behavior and other integrative models are specifically proposed for pro-environmental or sustainable technology acceptance behavior (Ajzen, 1991).

To conclude, numerous psychological factors influence consumer behavior, notably Abraham Maslow's hierarchy of needs, which ranks human needs from basic physiological needs to higher-level self-actualization. Four key psychological factors include motivation, perception, learning, and attitudes and beliefs. Motivation drives consumers to act on their needs, while perception shapes how individuals understand and engage with products. Attitudes, defined as consistent perspectives on subjects, can significantly impact consumer decisions; negative attitudes towards a brand may deter purchases.

In the context of car ownership and usage, psychological factors are crucial, as cars fulfill various needs such as comfort, status, and personal expression. Research indicates that car ownership reflects social and economic health, and behavioral intentions, influenced by attitudes, play a significant role in purchasing decisions. The adoption of EVs is often driven by environmental concerns, although factors like value perception, battery life, and technological risks also affect consumer choices. Psychological traits such as innovativeness and emotional responses can influence the decision to adopt EVs, with symbolic value linked to social status playing a significant role in the U.S. However, perceptions of EVs as either futuristic or unreliable can hinder adoption in some regions.

3.4.4 Correlation between demographic, social and psychological factors influencing car consumer behavior

In the decision-making process, consumers are impacted by a variety of factors, both internal and external, which include demographic, social, and psychological influences. Some of these factors exert a direct and quantifiable impact on purchasing decisions, while others are less tangible and may merely indicate patterns in buying behavior. A relatively new area of study is impulse buying behavior. Cakanlar and Nguyen noted that this phenomenon has significantly increased over the past two decades, concluding that consumer purchases are typically related to the shopping environment, individual characteristics of shoppers, and situational cultural factors (Cakanlar & Nguyen, 2018).

Ng and Lee examined the effects of cultural differences on consumers' information processing, judgment, responses, and behavioral choices (Lee & Ng, 2015). Their findings highlighted that these differences are related to dimensions such as masculinity/femininity, uncertainty avoidance, individualism/collectivism, and long-term versus short-term orientation. Impulse buying behavior has also been studied in correlation with age, income, marital status, occupation, and education. For instance, Rawlings, Boldero and Wiseman identified a non-linear relationship between impulse behavior and age,

revealing that impulse buying tends to rise among individuals aged 18 to 39 and subsequently decline after 39 (Rawlings et al., 1995). Research by Bellenger, Robertson and Hirschman indicated that younger individuals are generally more impulsive and likely to embrace new lifestyles, often purchasing trendy items (Bellenger et al., 1978). Conversely, as individuals age, they typically learn to better manage their impulse buying tendencies.

Further, Abratt and Goodey found a positive correlation between income and impulse buying, suggesting that higher-income consumers face fewer financial constraints when acting on their impulses (Abratt & Goodey, 1990). Sangalang, Siochi and Plaza explored the connection between impulse behavior and marital status, discovering that single individuals without dependents are more inclined to make spontaneous purchases compared to married individuals (Sangalang et al., 2017). In contrast, married consumers with dependent children often experience more restrictions on their spending. Regarding occupation, individuals in lower-status jobs tend to prioritize enjoyment over future savings, exhibiting higher levels of impulse buying than those in higher-status positions. Additionally, research indicates that individuals with higher education levels tend to make more planned purchases.

Consumers' decision-making is influenced by a mix of internal and external factors, including demographics, culture, and psychological elements, with impulse buying behavior being a particularly significant area of study. Research indicates that impulse buying is affected by age, income, marital status, occupation, and education. Younger consumers tend to exhibit higher impulse buying tendencies, while factors such as higher income and education generally lead to more planned purchases. Additionally, marital status influences spending behavior, with single individuals often being more impulsive than those with dependents.

Chapter 4: Methodology overview

The goal of Chapter 4 is to explain the methodological ways of collecting and analyzing the data.

Section 4.1 explains the chosen research designs and methods in detail. It clarifies:

- why the combination of both qualitative and quantitative approaches is the best for this scientific work;
- how the qualitative methods have helped formulate specific research questions, hypotheses and the survey questions as the first step of the research;
- and the role of the survey as a quantitative method as the second step of this research.

4.1 Research design and methods

During the years, there has been a discussion on the validity of quantitative and qualitative methods and their combination. Moreover, certain researchers criticize the integration of both methodological strategies due to their incompatibility in epistemological values and methods, which, in their opinion, results in different epistemological consequences. Nevertheless, in most cases the combination of both methods helps better understand and interpret the received data. For instance, qualitative methods are particularly valuable for identifying and understanding multi-causal linkages whereas quantitative methods help analyze causal relations (Alasuutari et al., 2008).

Considering the topic of the research and the questions about beliefs, emotions, motives and habits of the electric vehicle consumers in the German, US and Ukrainian markets; possible obstacles keeping them away from buying EVs; social, economic and other factors influencing their buying decisions; as well as defining possible motives and choices for the future of electric automobiles, this research is based on a mixed method research combining qualitative and quantitative methods.

The qualitative method helps examine a small number of people in depth and detail (Patton, 2015). According to Patton, while such approach increases the depth of understanding, it also reduces generalizability. There are different types of qualitative analysis including grounded theory, ethnography, action research, phenomenological research and narrative research. And these approaches involve various methods such as secondary research, interviews, surveys, observations and focus groups. Also, in qualitative research, data is often gathered from the personal experiences of individuals within a specific group. Researchers then use inductive reasoning to identify overarching themes or patterns,

which serve as the foundation for formulating hypotheses about the phenomenon or behavior under study (Glaser & Strauss, 1967).

Since the main topic of this research is related to gathering and analyzing the data on a relatively new subject of current and future trends of EVs usage in three different markets of Germany, the USA and Ukraine, as well as the social processes related to that, grounded theory has been chosen as the main qualitative research method for this study. There are a few definitions of the grounded theory, for example, given by Charmaz, Chun Tie, Birks and Mills (Charmaz, Chun Tie, Birks & Mills, 2018). But all these authors have come to the conclusion that the grounded theory is a qualitative research method focused on developing specific structures or theories directly from the data, by conducting its inductive analysis (Baikady et al., 2022). The grounded theory process involves data collection, categorization, pattern identification, and theory development. And for the data analysis, there can be used a few different approaches, including open-ended analysis, thematic analysis and content analysis.

The qualitative part of the research was based on the semi-structured qualitative interviews conducted with the users / owners of the BEVs, HEVs and PHEVs as well as with the automotive industry professionals in all three markets - Germany, the USA and Ukraine. The interviews with EV users were a pilot testing of the survey in general and its questions in particular to make sure that the questions of the survey were understood correctly in each studied market. Access to all respondents of the interviews both with the users / owners of the BEVs, HEVs and PHEVs as well as with the automotive industry professionals was based on the convenience sampling and snowball sampling methods. The guides with questions for different country representatives were designed and used in English and in Ukrainian languages. The interviews were analyzed by coding the data into specific categories and sub-categories.

Quantitative methods, on the other hand, require the use of standardized measures. In this case quantitative methods facilitate efficient data collection and comparison, making it possible to analyze the responses of many people to a limited set of questions (Patton, 2015). Examples of the quantitative methods are surveys, case studies, observations. In this research, the method of survey was chosen to test the generalizability of the findings of the grounded theory. The survey method is a structured and systematic process of collecting information from a specific share of a population or its all members using specific techniques and procedures such as questionnaires, interviews, or observations. Surveys can be used to investigate relationships between variables. By selecting a representative sample, researchers can generalize findings from the sample to the entire population (Baikady et al., 2022).

The research questions and hypotheses which were tested with the help of the survey were the following:

Question 1. What motives and considerations drive automobile consumers to make their choices towards EV nowadays?

Hypothesis 1. Reduction in environmental pollution is among top reasons encouraging automotive users to switch to EVs.

Hypothesis 2. Low purchasing and maintenance costs, as well as other special state or local incentives bringing down the costs of electric cars are among top reasons encouraging automotive users to switch to EVs.

Hypothesis 3. Additional values added to the cars, such as better performance and special innovative digital and customized tools and services, are among top reasons encouraging automotive users to switch to EVs.

Hypothesis 4. Current EV users feel satisfied with their EVs and consider them safe and reliable.

Question 2. What are the obstacles keeping automobile users away from buying EVs?

Hypothesis 1. A lack of charging infrastructure and low driving range keep automotive users away from switching to EVs.

Hypothesis 2. Concerns about reliability and safety of EVs make it hard for potential automotive consumers to make their choice for EVs.

Question 3. How does consumers' behavior differ in the German, US and Ukrainian markets?

Hypothesis 1. EV consumers' behavior in the German, US and Ukrainian markets differs based on the way they own EVs.

Hypothesis 2. EV consumers' behavior in the German, US and Ukrainian markets differs based on the way they use EVs.

Hypothesis 3. EV consumers' charging behavior is different in the German, US and Ukrainian markets.

Question 4. How are consumers' decisions, considerations and motives regarding EVs in the German, US and Ukrainian markets framed by social and demographic factors?

Hypothesis 1. EV users portray is different in the German, US and Ukrainian markets.

Hypothesis 2. EV users' satisfaction with EVs is different in the German, US and Ukrainian markets.

Hypothesis 3. EV users' consideration of their EVs' safety and reliability is different in the German, US and Ukrainian markets.

Hypothesis 4. Consumers' preferences towards EVs differ based on demographic and social factors.

Hypothesis 5. EV users' motivation to have an EV differs based on demographic.

Question 5. Shifting priorities: what motives and choices are to be the most common for EV users in different markets in the next 5-15 years?

Hypothesis 1. Environmental concern will remain among top reasons for automobile users to switch to EVs in the future.

Hypothesis 2. Less dependency on fossil fuel supplies will become one of top reasons for automotive users to switch to EVs in the future.

Hypothesis 3. EV users' motivation to have an EV will be framed both by demographic and social factors.

Hypothesis 4. With affordable EVs, better charging infrastructure and other developed innovative solutions for EVs, automobile consumers will be more eager to make their choice towards EV during the next 5-15 years.

And considering these research questions and hypotheses as well as the obtained results from the interviews, there was designed the final survey with its questions as the second, quantitative part of this research to learn about the BEV and (P)HEV consumers as well as about their motives driving their choice regarding EVs, demographic and social factors potentially influencing such choice. To better distinguish between the current and potential users / owners of different types of electric vehicles, the questionnaire consisted of several parts covering BEVs, HEVs and PHEVs, as well as the part about potential usage / ownership for people who wouldn't have any electric vehicle at the moment of answering the survey, see Table 3.

	BEV	(P)HEV	None
Demographic section	X	X	X
Current EV user / owner section	X	X	
Trends	X	X	X
Potential EV user / owner section	X	X	X

Table 3. Questionnaire design

This survey was aimed at creating a portrait of the current and of the potential EV user. The questionnaire was designed on the "surveyplanet" platform and was shared among current and potential electric car users via special German, US and Ukrainian EV forums and social media groups and channels dedicated to the EV topic, see Table 44 in Appendix E. The survey for each country was localized and shared in English among German and USA users and in Ukrainian among Ukrainian users. All forums which were used for sharing the questionnaire were selected based on the information about top selling EVs in the specific market, see Table 4, Table 5, Table 6.

#	**EV model**
1	Tesla
2	Ford

3	General Motors
4	Hyundai/Kia
5	Volkswagen/Audi/Porsche
6	Nissan
7	BMW
8	Mercedes-Benz
9	Rivian
10	Lucid

Table 4. Top bestselling EVs in the USA (Montoya, 2023)

#	**EV model**
1	Tesla
2	Volkswagen
3	Hyundai
4	Fiat
5	Opel
6	Audi
7	Renault
8	Mercedes-Benz
9	BMW
10	Peugeot
11	Dacia
12	SEAT
13	Skoda
14	smart
15	MINI
16	Kia
17	MG Roewe
18	Polestar

19	Ford
20	Volvo
21	Porsche

Table 5. Top bestselling EVs in Germany (Bekker, 2023)

#	**EV model**
1	Nissan
2	Tesla
3	Volkswagen
4	Renault
5	BMW
6	Chevrolet
7	Honda
8	Fiat
9	smart
10	Audi
11	Mercedes-Benz
12	Kia
13	Hyundai
14	Ford
15	Jaguar

Table 6. Top bestselling EVs in Ukraine (Automotive Market Research Institute, 2023)

When analyzing the findings, the research questions and hypotheses were used as a main reference. Additionally, secondary resources such as previously conducted research and well-known theories referenced in Chapter 2 and Chapter 3 in the area of behavioral science and electric vehicles were used to better understand the missing gaps and to guide through the newly obtained knowledge.

Chapter 5: Tendencies and specialties of consumer choices towards EVs

Chapter 5 provides a detailed overview of the data collection and analysis on consumer behavior and its future developments regarding BEVs, HEVs and PHEVs across Germany, the USA and Ukraine. The analysis is based on the data collected with two methods – the interviews and the survey.

Section 5.1 describes consumer behavior and its future developments regarding BEVs, HEVs and PHEVs in the three markets from the qualitative point of view. This part consisted of the pilot survey testing with the help of the cognitive interviews described in Section 5.1.1 and the data collection through the interviews with the industry professionals described in Section 5.1.2.

Section 5.2 explains the quantitative part of the research based on the survey data collection. It provides a detailed analysis of the collected data, describing main trends in the current choices of EV users, their EV usage and charging behavior, the influence of demographic and social factors, levels of satisfaction with their EVs, concerns regarding safety and reliability as well as the chances of using EVs in the future and their main motivations for that or the factors holding them back.

5.1. Factors influencing consumer choices of EVs - qualitative findings

Rather than testing pre-existing hypotheses, the very first step of this research was to collect real data through the interviews and then to generate hypotheses as well as the questions for the survey. For the holistic overview, the interviews were held with the real EV users to gain the first impressions and real stories about their EV adoption as well as with industry professionals to learn more about EV industry insights and developments.

The interviews were analyzed with the help of the grounded theory approach. This allowed to gain a thorough understanding of the data and develop new concepts and patterns for the survey.

5.1.1 Survey pilot testing - cognitive interviews

The cognitive interviews were held as the first step in the survey data collection, before sending out the survey to large numbers of people. The interviews were aimed at doing a pilot testing of the survey in general and validating and finalizing its questions in particular to make sure that the questions in the survey were understood correctly in each studied market - Germany, the USA and Ukraine. The

interviews were held 1:1 with a representative of each market, online, each 0.5 - 1 hour long. Before starting each interview, the respondents were notified of the confidentiality of the conversions and were asked for their permission to record them. As a result, each interview was audio recorded, followed by transcriptions. For the Ukrainian market, English translations were provided and were used further for the analysis. Since the goal of the interviews was to test and validate the survey, the conversations were semi-structured and were based on the questions of the survey on the "surveyplanet" platform. The main topics that the questions covered were: a demographic overview, main tendencies in current usage / ownership BEVs, HEVs or PHEVs and a view on the future usage / ownership of the vehicles.

During the interviews, the respondents were asked to answer the questions while reading out loud the questions with offered options to choose. The task was to discuss:

- what they were thinking when responding a certain question;
- if the question was misleading or confusing;
- what they understood by the question;
- how confident they were with their answers.

These interviews turned into profound conversations with respondents sharing their own stories connected to the vehicles they had, some market insights, as well as their opinion on what could be improved in the survey.

CURRENT EV STATUS

- When talking about the *"current ownership status of EV",* all three respondents confirmed they had electric vehicles. They all turned out to have a BEV, with one of the respondents having 2 BEVs:

- *"Yes, we have a BEV. We have 2 BEVs, but I'm not sure if this is interesting or if one is necessary."* - Respondent from Germany.

- When answering the question about *"the type of EV ownership/usage"*, all respondents said that they bought their vehicles.

- *"EV safety and reliability"* question resulted in discussing safety and reliability as different terms. When doing the cognitive interviews, there was only one question asking about these terms. However, respondents from Germany and the USA pointed to the fact that safety and responsibility were different factors. For this, they suggested to make two different questions about each term:

- *"... safety and reliability are different topics. This can also help when you don't have a BEV, when you use a normal combustion engine… Most people think it's safe, but some cars are not reliable because they break up often or something like that."* - Respondent from Germany.

- *"Separate… There was a problem with the safety, and there were also problems with the reliability and also with the range. They promised a certain range, but we never received it."* - Respondent from the USA.

- All respondents confirmed they were "*satisfied with their electric vehicles."*

- As per *"usage of EVs both inside and outside cities"*, different respondents got different cases. Nevertheless, their main usage of EVs was inside the cities:

- *"I'm using them for both. There is a little bit of difference between both cars because the Mini is for short trips since it has only 200 kilometers. And the BMW has a lot more, therefore, we can use it for all the trips… but I'm not sure if it's a normal case here."* - Respondent from Germany.

- *"If they advertise 290 miles and you get 250, it's a big difference. We know after that experience; we don't take our car even outside of the city. So, it's basically our second car. Anytime we need a big family trip, we no longer use BEV anymore because of that and because of the experience we had with the charging network."* - Respondent from the USA.

- *"I use it only in the city where I live."* - Respondent from Ukraine

- Also, when talking about the driving range, the respondents from Ukraine and the USA highlighted the fact that their BEVs are used only as the second vehicle in the household:

- *"... then you can immediately note that in Ukraine this car (meaning "electric vehicle") is only for the city and as a second vehicle in the family. It cannot be used to its full extent on our Ukrainian market for trips outside of populated areas… And as the war showed, when we had to leave, we went in my wife's Mercedes. Although I later met the same cars (meaning "electric vehicles") in the Carpathians, I think that people drove 2-3 days in such cars in order to reach the Carpathians. Therefore, our market is very different from the Western market."* - Respondent from Ukraine.

- *"... it's a second car. It will be good to have a question about the BEV, whether it's your primary or a secondary vehicle."* - Respondent from the USA.

- When talking about charging infrastructure and charging their vehicles, the most common answer for respondents was that *"charging BEV at home is affordable and convenient"*:

- *"I use a special charger at home." In particular, it is a Tesla charger… There is an underground parking lot with an EV charging station there. And the vehicle charges like a phone: it turns on at night, and that's it."* - Respondent from Ukraine.

- *"Charging at home is very easy actually once we have got that box."* - Respondent from the USA.

- *"I'm using a charging station at home, it's mostly used in maybe 99%."* - Respondent from Germany.

- The respondents couldn't select only one option when talking about the factor that influenced their decision to start using BEVs. It was a "*combination of different factors as the main reason*". The participants from Germany and Ukraine highlighted the fact that they were both interested in switching to BEVs also because of a chance to "test" and experience new vehicle developments and technologies:

- *"If it were possible to choose several options and "innovative technologies", then I would choose that and, for example, "reduction of negative impact on the environment and cheaper, less regular maintenance". It's all relevant."* - Respondent from Ukraine.

- *"...it's difficult to choose one option here. I think it's a mix of all. I didn't choose it (meaning my vehicle) really because of a low fuel cost, and not because of the greenhouse effect. All this works in a combination for us. It was a good idea to start it and test it… A lot of people discussed electric*

vehicles, and we wanted to feel how it really is and how it is in daily life to use them." - Respondent from Germany.

- *"We got the tax credit. That was one of the good reasons to buy it."* - Respondent from the USA.

- As per the question about inconveniences, the respondents from the USA and Ukraine also expressed the desire to choose more than one option and the respondent from Germany advised to add the setting of a multiselection to the question. And when sharing their BEV usage experience, *"driving range became one of the biggest inconveniences"*:

- *"So most of the topics here are not really inconveniences... The biggest inconvenience is the driving range. It's not really a problem in daily living, but in some situations you have to plan that the vehicle is charged the next day…. It's a topic here."* - Respondent from Germany.

- *"Driving range and charging…"* - Respondent from the USA.

- *"Driving range… Yes, only one. I have nothing else. I don't have a problem with limited access to charging stations, although they may exist in Ukraine. I have a charging station at home. It removes all problems... "Service and maintenance costs" are minimal. I do not notice the electricity costs with the night rate at all. I just pay by the meter, because the charger is connected to the meter, and everything is convenient. I have not been serviced yet. Now it has become clear that the brake pads need to be changed. But this is relevant for any car - if it is electric or if it is not electric, you need to change them. Therefore, everything is normal."* - Respondent from Ukraine.

- All participants have answered that "*they currently or in the past had some friends or family members also having some type of the electric vehicle*":

- *"One friend had one, but he sold it. Not sure this year or last year. But at the moment, I'm not sure if they really have one now."* - Respondent from Germany.

- *"Yes, I do have a family member who has it."* - Respondent from the USA.

FUTURE BEHAVIOR TRENDS

- In the section covering their future behavior and opinion about their future usage of the BEVs, HEVs or PHEVs, the participants expressed their "*desire and willingness to have another electric vehicle in the future"* based on the current positive experience:

- *"In the future we will stay with the BEV because I hope that by then they will have a solid-state battery and it will be even better… But again as a second car, I will not buy it as a main car."* - Respondent from the USA.

And while the respondents from Germany and the USA were eager to get another BEV, the participant from Ukraine said he would go for a PHEV:

- *"... given the state of the market, now I would even think about a Mercedes plug-in hybrid."* - Respondent from Ukraine.

- Considering the potential form of usage / ownership, for all respondents, financing or leasing was chosen as the most common ways to own/use the vehicle in the future:

- *"I would consider buying or financing a vehicle here."* - Respondent from Germany.

- *"I have actually lost some money because when we bought it, Tesla reduced the price. So I don't know. I was actually thinking about leasing instead, then I would not have lost that kind of money… I was told by whoever had a lease, they had to pay the same price and then you're still stuck with your lease payment. So I would say I'm not sure at the moment."* - Respondent from the USA.

- *"In our market with our dictatorial banking system, this is still unprofitable and almost impossible. The payments are huge, the interest on loans is crazy. And yes, I am well aware of the leasing system that exists, for example, in Germany or America - it is the most developed there. In fact, it is beneficial. If you have a stable income, then you cannot worry about payments, about the future of this car… in reality buying would be the best."* - Respondent from Ukraine.

- "*The reasons to get another electric vehicle in the future*" were the same or similar to the ones that motivated participants to buy the BEV(s) in the past:

  - *"It's the same as before but for the future."* - Respondent from Germany.

  - *"The environment and hopefully a tax benefit…"* - Respondent from the USA.

  - *"Cheaper and less regular maintenance."* - Respondent from Ukraine.

- While the respondent from Germany didn't find *"any reason preventing him from buying another EV"*, the participants from Ukraine and the USA have named such reasons:

  - *"... driving range and charging. I will never have my first car as an electric vehicle yet."* - Respondent from the USA.

  - "*... now I have a new car and I don't need another one. But if we were talking about buying again, then "Expenses on the purchase" and "Driving range" would be my choice."* - Respondent from Ukraine.

- When talking about *"having another EV if someone from a family or friends/colleagues recommended it"*, the respondents from Ukraine and Germany confirmed that they would consider this. However, it was more difficult to answer for the German participant which he explained as following:

  - *"I'm an early adopter, so it's difficult for me to answer this question here. But I think, yeah, it was for me like that. My colleagues had it first and then we discussed it and so it was (a recommendation) for me."* - Respondent from Germany.

  The respondent from the USA stated that he wouldn't buy it because he *"already has one and doesn't want the second one."*

- When asked whether they saw *"a rise in the usage of electric vehicles in the future",* all three participants answered positively, saying they see the growing demand for battery electric vehicles growing in their markets accordingly.

- And all three participants also agreed with the statement that *"with more affordable BEVs/HEVs/PHEVs, better charging infrastructure and other developed innovative solutions, they will be more willing to make their choice towards BEVs/HEVs/PHEVs during the next 5-10-15 years."* The respondent from Germany also added:

- *"I'm sure there will be (in general good conditions for buying, for having, owning electric vehicles). It's always about the cost and so on. And when it's getting cheaper, and in the last few years there were also some offers from the government and so on to make it cheaper, a lot of people bought electric vehicles."* - Respondent from Germany.

The goal of the conducted cognitive interviews was reached - they helped test and verify the created survey questions. The overall feedback of the respondents on the survey was positive. The suggestions offered by the respondents were implemented in the questionnaire while keeping the created structure with three main respondent journeys targeting three main categories of the EV users - BEV users, HEV/PHEV users and the users who don't have any EV but may be potentially interested in that. And from the content point of view, the questions of the survey and the received answers also helped see the first trends in the consumer behavior and perceptions towards EVs in Germany, the USA and Ukraine.

5.1.2 Professional insights on EV developments and consumer choices

To better understand the consumer choices towards electric vehicles and the EV market development in Germany, the USA and Ukraine, there were also conducted 4 in-depth semi-structured 1:1 interviews with representatives of each market: 2 respondents from Germany, 1 respondent from the USA and 1 respondent from Ukraine. Each interview lasted around 1 hour. Before starting each conversation, the respondents were notified of the confidentiality of the interviews and were asked for their permission to record them. As a result, each interview was audio recorded, followed by transcriptions. The aim of such interviews was to get a professional view on the situation and include the considerations from the received answers into the survey questions. The chosen respondents were professionals working in the

automotive industry, directly or indirectly with the topics of BEVs, HEVs and PHEVs. The interviews contained the questions on:

- the current situation of the market, including the topics such as: the current state of supply from the supply point of view and the demand point of view; availability of EVs at dealerships; affordability and tax advantages for EVs; charging infrastructure situation; the influence of different economic and political circumstances on the market.

- EV users, their motivations and choices, covering the topics of typical groups of users of EVs; main reason for people to purchase EVs; motives and preferences regarding EVs; environmental protection as a separate motivation to choose EVs; the ways to encourage people to choose EVs; the obstacles keeping people away from buying EVs; safety and reliability of EVs and personal preferences framing the consumer choice.

- the future situation of the market, including the questions such as: the most common motives and choices in the next 5-15 years; potential of the EVs to fully replace the internal combustion engine vehicles (ICEVs) and consumer preferences to switch towards EVs with more affordable prices, better charging infrastructure and other developed solutions for EVs.

EV MARKET DEVELOPMENT AND TRENDS

- When evaluating the current state of the EV market in Germany, the USA and Ukraine, all respondents marked the fact that during the last 5-10 years the "*adoption of different types of electric vehicles increased in all countries*." However, the situation with demand and supply is different in different countries now. For example, in the USA the respondent said that although the overall supply of EVs was fine, there were still limited options of EVs compared to the ICEVs. To compare, the respondents from Germany and Ukraine mentioned the growing supply.

"During the last couple of years, the range of vehicles offered to customers increased a lot by German car manufacturers, by typical Western car manufacturers, but also to a certain degree by Asian, especially Chinese market participants." - Respondent from Germany.

- Talking about demand, according to the US respondent, it's not very high. Also, the respondent highlighted the difference in demand and the overall EVs and the infrastructure situation in urban and rural areas. In Germany the demand for EVs is fine, but due to decreased tax incentives since December 2023, it's slightly decreasing.

"There was this big fear that the demand would drop drastically. Apparently it didn't… There is still a demand, even though it's not as big as it could be or should be." - Respondent from Germany.

In Ukraine the demand is the opposite to the situation in Germany - it's increasing. According to the respondent, in December 2023 it tripled compared to how it was at the beginning of the year. The Ukrainian respondent also highlighted a difference with HEV/PHEV market in Ukraine compared to other European countries or the USA. According to him, now in Ukraine the demand for HEVs and PHEVs is growing which is the opposite to the demand for these vehicles in other countries.

"There's an explanation for this. It's a significant increase in imports of gray Chinese electric vehicles. This is the main factor that significantly affects the market as a whole, the market's development." - Respondent from Ukraine.

- The availability of EVs at dealerships was evaluated differently in Germany and the USA. While in the USA people were used to buying the cars that were available there, in Germany users were more inclined to personalize their vehicles and orders, with the overall dealership system working differently. In Ukraine dealerships were emerging very fast offering various EVs mainly due to many Asian companies.

- All respondents from all countries agreed on the fact of EVs being expensive:

"...especially in the case of plug-in hybrid electric vehicles, you'll always have the situation that you have to have both in the vehicle: a combustion engine and a battery. And therefore that's going to be a little bit more expensive." - Respondent from Germany.

In particular, the US respondent mentioned that incentives helped make EVs more affordable but their price range was still high for an average person. On the other hand, all interview participants stated that different tax incentives make the vehicles more affordable in all markets.

And while in the US, there are no changes to the government programs supporting the EV purchase, in Germany the tax benefits and initial benefits that were offered before, started getting less. One of the German participants has mentioned that the government support may not be the same as it used to be. Also, the German respondents explained the price difference between BEVs and PHEVs.

As per Ukraine, the respondent explained that there were no real tax benefits. There is a benefit for those who buy BEVs since no VAT applies to BEVs. But this is only applicable to the BEV users. There are no subsidies or benefits for HEV and PHEV users.

"And it's very simple, there's no VAT and no import duty (on BEVs). This is actually a huge saving because VAT in Ukraine is 20%. So that's immediately 20% off the price." - Respondent from Ukraine.

- Talking about the COVID, the war in Ukraine and other economic or political circumstances influencing the EVs market, both respondents from Germany and the USA mentioned issues with the supplies. However, those issues got solved efficiently. And as one of the German respondents explained:

"COVID or wars do not directly have an impact on the customers but they have changed the way car manufacturers decide to set their supplier production areas or potentially tend to have the second or third sourcing strategy compared to having only a single sourcing strategy." - Respondent from Germany.

To compare, in Ukraine, both COVID and the war influenced the way people started buying EVs. Especially during the war, seasonality became very noticeable in the buying behavior.

"It is associated with the fact that winters in Ukraine are not quite like the average in Europe. And these doubts and concerns of customers are constant: "What will happen this winter?" The seasonality is not related to technical characteristics, but to the awareness of our buyers. Therefore, it is very

pronounced: if during spring-summer, early autumn people buy electric cars with pleasure, during the winter period, let's call it conditionally, demand significantly decreases. People just want to wait and see how it goes." - Respondent from Ukraine.

And as the respondent explained, it's different for BEVs, HEVs and PHEVs:

"They hardly affect the market for hybrids and plug-in hybrids because they are more versatile means of transportation. There is always the option to choose whether to ride on electric traction or on an engine. And this is one of the advantages, one of the factors that is significant for our clients in Ukraine." - Respondent from Ukraine.

INFRASTRUCTURE AVAILABILITY AND DEVELOPMENTS

- According to the interviewed participants from all countries, the infrastructure situation is different in different markets. For example, according to the US respondent, there is a lack of infrastructure in the USA. Moreover, the situation is different if to compare urban areas and big cities with rural areas. The rural areas are lacking the charging infrastructure. In comparison, in Germany there is also a difference between rural and urban areas. But this difference is based on less public charging infrastructure available in rural areas compared to urban areas. Instead, in rural areas people can charge their vehicles for free at state owned administrative buildings. And both German respondents mentioned that there are also more opportunities to charge EVs at home, at private stations:

"In more rural areas, there's less public infrastructure. On the other hand, you do have more houses where you can charge at home, so it's a different situation altogether. For sure, it's also not cheap ...but I guess it's getting more and more attractive, also combining it, for example, with a photovoltaic infrastructure at home, so that you can actually charge your car with the energy that is provided by your house and the sun." - Respondent from Germany.

In Ukraine the charging infrastructure is actively developing.

"... and that's one of the mysteries. On one hand, it's understandable, the fleet of electric cars is growing. Why, as I say, it's one of the mysteries? Considering the current situation related to the state

of energy in Ukraine as a whole, due to mass bombardments, Russian missile attacks, and so on, we understand that compared to last year, when 50-60% of generation was destroyed by various estimates, and restored to a level of minus 30% compared to pre-war conditions (meaning we have 30% less generation than before the war), accordingly, there's an electricity deficit across the country. And despite this, despite this factor, the market for charging stations is developing very strongly." - Respondent from Ukraine.

CONSUMER BEHAVIOR AND PREFERENCES

- When answering the question about describing typical groups of EV users, all respondents were not able to provide a very clear definition. For example, according to the US respondent, in the USA the users of EVs are mainly young, more accomplished and have a high income. The US respondent also stressed the geographical difference between users from the rural and urban areas, explaining that the EV users mainly live in big cities or in more urban areas. And this fact is also connected with the fact that the people living in urban areas also have a higher income than in rural areas. And as an additional inner value, the EV users are more conscious about the environment.

- One of the German respondents mentioned good education. He also mentioned the value common for EV users such as doing something good. And these can be both younger and older people. To add, as another set of values, he mentioned that for some EV users it's also important to have a level of comfort and features known from the combustion engine vehicles.

- Another German respondent classified German EV users in a different way. As per him, one group of users can use EVs in order to simply benefit from the company vehicle or from benefits that the state or governmental programs offer. Another group can be users who are more driven by sustainability reasons and have not only an EV, but also solar panels on their houses, use special energy-saving batteries in the house etc. The third group are the users who like to try out the latest technologies and want to experience them on their own, to have their own opinion about that. And the last group of users can be people who are driven by more economic reasons when buying an EV and installing their own charging station at home. This respondent also provided another way to classify the users based on the experience they already had or didn't have with EVs. Thus, the first group can be those who have already had their first EVs and know how they

function and what to expect from them. Whereas, the second group of users are those who have been waiting for the first 5-10 years to pass and then they have got their first EVs. These users may have a different mindset and compare the EVs with the ICEVs.

- Meanwhile, according to the Ukrainian respondent, Ukrainians who use EVs are very diverse considering their age, education and income level. However, the unifying feature is that many EV customers see their vehicles as gadgets.

"...when we talk about a gadget, the name or brand is not so important anymore. What matters is what you get: how progressive it is, how technological it is, how it meets your expectations, what features it has, and what you can boast about it to your friends?" - Respondent from Ukraine.

- Considering the motivational factors, tax advantages and nice or special features were named to be the common main reasons for people to buy EVs in the USA and in Germany. Apart from that, the US respondent also mentioned status and the overall nice look of the vehicles. And she stressed that the factors influencing the buying behavior in urban areas could be different from the motives for people living in rural areas. One of the German respondents mentioned comfort as another important factor for Germans. In Ukraine the main drivers for people to buy EVs were named to be the desire to try out the latest technologies and operational costs and features which create a cost-saving effect.

- To continue the topic of innovative technologies and their perception, all respondents agreed that they are important for EV users. However, if for people in the USA they can be a selling point, for Germans they are not a selling point.

"And there are also some games you can play, for example, during your charging, during these 15 minutes of charging. It exists today. It's something that helps to make something out of this charging time. It's not a selling point that will make you say: "Now it's out there, now I'm going to buy a battery electric vehicle." - Respondent from Germany.

- Nevertheless, another respondent from Germany distinguished people who buy EVs to try out the latest technologies as one of the user groups.

- Regarding the main factors keeping people away from buying the EVs now, the respondents from the USA and from Germany agreed that not so good or missing infrastructure and high prices were the main reasons. The German interview participants also mentioned the mindset of people and fear which may be based on unreasonable stereotypes. And one of the German respondents also mentioned the effect of reselling the vehicle as EVs lose their performance with time. The Ukrainian respondent mentioned completely different factors related to uncertainty and electricity shortages reflecting the reality influenced by the war:

"In our case, the main obstacle is uncertainty about the future from the country's point of view as a whole. Unfortunately, that's true. And from the point of view of electric infrastructure, it's not about charging infrastructure, but about the potential shortage of electricity in the country as a whole - that's a very significant factor that affects decision-making." - Respondent from Ukraine.

- To continue the topic of the factors keeping people away from buying EVs, there was also a question about safety and reliability of the EVs - if some fears are related to them as well. And all respondents stated that burning is really more of an issue for EVs but there are no risks of driving EVs and that EVs are safe, just like any other cars. In this case, such fears are more related to the mindset of people. And legislation can be another factor since it contains, for example, the rules where and how the EVs can be charged.

ENVIRONMENTAL IMPACT

- As per environmental reasons, German participants of the interview highlighted this factor the most, as the one which is a part of many other factors making people buy EVs. In opinion of the US respondent, environmental protection is not the main motivation for buying:

"I really think the features of the vehicle are still the selling point over the environmental impacts." - Respondent from the USA.

And in Ukraine, according to the respondent, environmental reasons are not a priority for people now.

"It's a nice bonus. But it's definitely not for the mass market. Nobody thinks about ecology there, it's about saving… In the premium segment, maybe there are some clients for whom it's a nice bonus, but unfortunately, it's not a buying motive." - Respondent from Ukraine.

- When asking respondents about their opinion on the future environmental considerations, the respondent from the USA and one of the respondents from Germany shared the thought that this factor can become more important once EVs become more affordable. On the other hand, another German respondent stated that when the supply chain and other processes become more "green" and more sustainable in their way, then the environment concern may pass away. To compare, as per the Ukrainian respondent, the better impact on the environment can become more important in the future.

FUTURE EV MARKET DEVELOPMENTS

Talking about the future, there were discussed the topics such as: the most common motives across all groups of automotive and electric vehicle consumers in Germany/USA/Ukraine in the next years; a chance for EVs to fully replace ICEVs; switching to EVs for less dependency on fossil fuels; and the willingness to buy EVs in case they become more affordable, the infrastructure and other needed solutions are better developed and offered to people.

- As per future user motivations, the respondents mentioned a few different factors. For example, in the USA the choice towards EVs will depend on the affordability of EVs, the charging infrastructure - how quick and affordable it is, the way EVs look and their features, the overall cost efficiency and how long-lasting EVs are. In Germany the ways to encourage people to start using EVs are also related to affordability and charging infrastructure, as well as to higher driving range, beneficial tax measures and legislation. In Ukraine the situation is similar and related to good economic benefits, good infrastructure and technologies. Therefore, if all these measures are met, then people will be more open to switch to EVs. Moreover, based on the current market situation, the Ukrainian respondent described the possible future scenario for developments saying that people may start choosing less famous brands, may be willing to experiment more, choose EVs that have a "residual value" and may change their EVs more frequently meaning that the average ownership period will be reduced.

- The respondents' opinion on the chance for EVs to fully replace ICEVs divided. Thus, in the USA, as per respondent, this is very unlikely to happen, especially considering the rural areas for reasons related to possible problems with electricity. To compare, both German participants agreed that EVs can fully replace other vehicles. One of them explained:

"If the infrastructure is keeping up with the speed or with the needs that we do and if the legalization things ramp up, then I think there is an option to do it. But it's not only the battery electric vehicles that are needed for that. It's primarily the infrastructure that's needed and also the complete switch from a fuel powered industry to electric industry which means that we will come to a limit out of the available electricity to just support the cars. So in theory the car manufacturers could do it if the resources are available. But the question is whether the infrastructure in the cities and the legalization of potential charging areas in the lower basement of your building can meet the needs of the customers." - Respondent from Germany.

And as per Ukrainian respondent, such changes are possible but in case the EV prices get lower to the level of the ICEVs and the driving range increases.

- Talking about dependency on fossil fuel, the view on this topic among all interview participants turned out to be different. For example, as per the US respondent, the choice towards EVs for less dependency on fossil fuels can be different among people who live in urban and rural areas. The opinion among German respondents was divided: while one of them stated that the automotive users wouldn't be willing to switch to EVs due to the mentioned factor, another interview participant said that it could be possible but only for a small number of people.

"It's not in our minds now that the time when we run out of fuel will be that close. So that's why people tend to stick to their common values and go on with fuel cost, even though a minor group have understood that we may run out of fuel at any time and we'll switch to battery electric vehicles." - Respondent from Germany.

And as per the Ukrainian respondent, it can become a relevant factor for people when there is a shortage of fuel supplies.

"Unfortunately, we had the opportunity to test this in Ukraine. In May-June 2022, when, if you remember, there was a total shortage of any fuel in Ukraine. There was nothing… Let's imagine that tomorrow there will be a fuel crisis in the world, and this crisis will not affect the generation of electricity, then 3 seconds - and everyone will buy electric cars." - Respondent from Ukraine.

When answering the question whether with affordable BEVs, HEVs or PHEVs, better charging infrastructure and other developed innovative solutions for BEVs, HEVs or PHEVs, automobile consumers will be more eager to make their choice towards BEVs, HEVs or PHEVs during the next 5-15 years, all respondents shared the same positive opinion saying "yes."

The interviews with professionals working in the automotive industry in Germany, the USA and Ukraine helped look at the current EV market situation in each country and its future developments from a different perspective and better evaluate it.

As per respondents, there is no one unique group of EV users. What they can have in common is being accomplished in general which can mean a high level of education, a stable career and a good income. From another side, the interest in technologies was another common feature and motivation named by everyone. EV user descriptions were very diverse as well as their main motivations for using EVs. Nevertheless, the most common motivational factors the respondents named were related to nice special features of the vehicles, cost efficiency and tax advantages. Poor infrastructure (especially in the USA), high purchase costs and driving anxiety were mentioned as the main factors keeping people away from buying or using EVs.

The answers also demonstrated some differences in the EV market developments and the challenges that different markets are currently facing. For example, even though, according to the German and US respondents, the usage of EVs increased during the past 5-10 years, they marked a slight decrease in the current demand compared to the set government goals and earlier expectations. In Ukraine the situation developed in a different direction due to the war. On one side, the demand on EVs started increasing, especially significantly during the times of the lack of fossil fuel supplies. On the other side, people became more conscious about electricity usage, which could mean more risks for using electric vehicles. Also, in Ukraine seasonality became a significant factor influencing consumer behavior. Another difference not only for the Ukrainian but also for the US market was related to the environmental impact of using EV: while in Germany it turned out to be an important motivation, in other countries it wasn't.

The availability of EVs at dealerships in Germany and the USA and specialties of consumer behavior in these countries also turned out to be different. While in Germany many people don't buy directly at dealerships but make orders on personalized vehicles instead, it's the opposite in the USA. This may mean a different level of available EVs in these countries.

Regardless of these differences, all respondents shared the opinion on automobile consumers being more eager to make their choices towards EVs in the future, especially when the conditions of better charging infrastructure, overall cost efficiency and the driving range are met. The question whether EVs will fully replace ICEVs remains open since it depends on different factors, from electric industry developments to legislative changes.

5.2 Consumer choices towards electric vehicles - survey data analysis

The survey method was used to gain a precise overview of consumer behavior and its future developments regarding BEVs, HEVs and PHEVs across Germany, USA and Ukraine.

As mentioned in Section 5.1, the questionnaire structure and the questions were adjusted according to the feedback from the survey pilot testing and all interviews in general. All questions were connected together, creating three different "journeys" on a special online platform called "surveyplanet": for current BEV users with 31 questions, for current HEV/PHEV users with 32 questions and car users who don't have any BEV, HEV or PHEV but may be potentially interested with 18 questions.

As the next step, the survey was sent out to people who were using EVs or were interested in them in Germany, the USA and Ukraine. The survey was shared via online forums and pages in Facebook dedicated to different types of EVs. The total number of people who answered the survey was 109: 71 from Germany, 10 from the USA, 19 from Ukraine and 10 who marked their country of living as "Other".

- Overall, among all respondents, the majority - 72% (79 people) - answered that they had an electric vehicle while 28% (30 respondents) didn't have it. As per those survey participants in all countries who had or used an electric vehicle, 92% (73 people) drove a BEV and 8% (6 respondents) drove either a HEV or a PHEV. Corresponding responses are shown in Table 7.

	Germany		USA		Ukraine		Other		All countries	
Do you currently have an EV?	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	49 (67%)	24 (33%)	**10 100%)**	0 (0%)	**16 (84%)**	3 (16%)	**4 (57%)**	3 (43%)	**79 (72%)**	30 (28%)
Which type of an electric vehicle do you have?	BEV	HEV/ PHEV	BEV	HEV/ PHEV	BEV	HEV/ PHEV	BEV	HEV/ PHEV	BEV	HEV/ PHEV
	47 (96%)	2 (4%)	**9 (90%)**	1 (10%)	**13 (81%)**	3 (19%)	**4 (100%)**	0 (0%)	**73 (92%)**	6 (8%)
Which type of an electric vehicle do you have? (for (P)HEV drivers)	HEV	PHEV	HEV	PHEV	HEV	PHEV	HEV	PHEV	HEV	PHEV
	0 (0%)	**2 (100%)**	0 (0%)	**1 (100%)**	1 (33%)	**2 (67%)**	0 (0%)	0 (0%)	1 (17%)	**5 (83%)**

Table 7. Answers on EV ownership & EV type

- 92% of BEV drivers were distributed as follows: 64% (47 people) from Germany, 18% (13 respondents) from Ukraine, 12% (9 people) from the USA and 5% (4 respondents) from other countries.

- Describing the portrait of the BEV and HEV/PHEV drivers who participated in the survey, they were 35-54 years old (65%, 51 people), married or living in a domestic partnership (81%, 64 respondents), living in the household consisting of 2 people (46%, 36 people), having a higher education (25% or 20 respondents having German "Diplom"; 19% or 15 people - bachelor's degree; 16% or 13 respondents - doctoral degree and 15% or 12 people - master's degree), were full-time employed (67%, 53 respondents) and had middle (46%, 36 people) and high (38%, 30 respondents) income, see Table 8.

	Germany		USA		Ukraine	
	EV users	**EV non-users**	**EV users**	**EV non-users**	**EV users**	**EV non-users**
Age	BEV users: • 45-54% (49%)	• 35-44 (42%) • 25-34 (25%) • 45-54% (25%)	BEV users: • 55-64 (33.5%)	-	BEV users: • 45-54% (38%) • 35-44 (31%)	• 25-34 (33.3%) • 35-44 (33.3%) • 55-64 (33.3%)

	• 35-44 (24%) • 55-64 (19%)		• 65 and older (33.5%)		• 65 and older (23%)	
	HEV/PHEV users: • 35-44 (50%) • 65 and older (50%)		HEV/PHEV users: 65 and older (100%)		HEV/PHEV users: • 35-44 (67%) • 25-34 (33%)	
Marital status	BEV users: • married or domestic partnership (77%)	• Married or domestic partnership (63%)	BEV users: • married or domestic partnership (89%)	-	BEV users: • married or domestic partnership (84%)	• Married or domestic partnership (67%)
	HEV/PHEV users: • married or domestic partnership (100%)		HEV/PHEV users: • married or domestic partnership (100%)		HEV/PHEV users: • married or domestic partnership (100%)	
House-hold size	BEV users: • 2 people (43%) • 4 people (30%)	• 2 people (29%) • 4 people (29%) • 1 person (25%)	BEV users: • 2 people (56%) • 4 people (22%)	-	BEV users: • 2 people (46%) • 4 people (31%)	• 3 people (100%)
	HEV/PHEV users: • 2 people (50%) • 4 people (50%)		HEV/PHEV users: • 2 people (100%)		HEV/PHEV users: • 2 people (33.3%) • 3 people (33.3%) • 6 or more people (33.3%)	
Educa-tional level	BEV users: • Diplom (40%) • high school graduate or the equivalent (15%) • master's degree (13%)	• Diplom (42%) • Master's degree (25%) • Bachelor's degree (12%)	BEV users: • bachelor's degree (56%) • doctorate degree (33%)	-	BEV users: • doctorate degree (46%) • master's degree (39%)	• Professional degree (33.3%) • Bachelor's degree (33.3%) • Master's degree (33.3%)
	HEV/PHEV users: • Diplom (50%) • high school graduate or the		HEV/PHEV users: • bachelor's degree (100%)		HEV/PHEV users: • trade/technical/vocational training (33.3%) • bachelor's degree (33.3%) • master's degree (33.3%)	

	equivalent (50%)					
Employ - ment type	BEV users: • full-time employed (80%) HEV/PHEV users: • full-time employed (50%) • retired (50%)	• Full-time employed (78%)	BEV users: • full-time employed (44%) • retired (56%) HEV/PHEV users: • retired (100%)	-	BEV users: • self-employed (39%) • full-time employed (31%) HEV/PHEV users: • full-time employed (67%)	• Full-time employed (67%)
Income	BEV users: • €45,000-€90,000 (49%) • €90,000+ (40%) HEV/PHEV users: • €45,000-€90,000 (50%) • €90,000+ (50%)	• €45,000-€90,000 (46%)	BEV users: • $100,000+ (45%) • $50,000-$99,999 (33%) HEV/PHEV users: • $50,000-$99,999 (100%)	-	BEV users: • under ₴40,000 (38%) • ₴40,000 - ₴89,999 (31%) • ₴90,000+ (31%) HEV/PHEV users: • ₴40,000 - ₴89,999 (67%) • under ₴40,000 (33%)	• Under ₴40,000 (67%)

Table 8. Top demographic characteristics of EV users and non-users

- In Germany this trend was repeated. However, in the USA the main age range was 65 and older (40%, 4 people) and 55-64 (30%, 3 respondents), and 60% (6 people) had a bachelor's degree. In Ukraine the income level for EV users was different - low-middle (38%, 6 people) and middle (38%, 6 people).

- The distribution of the answers among BEV and HEV/PHEV users in particular was similar. Majority of BEV users were 35-54 years old (66%, 48 people), married or living in a domestic partnership (79%, 58 respondents), living in the household consisting of 2 people (45%, 33 people), having a higher education (26% or 19 respondents having German "Diplom"; 18% or 13 people - bachelor's degree; 18% or 13 respondents - doctoral degree and 15% or 11 people - master's degree), were full-time employed (67%, 50 respondents) and had middle (44%, 32 people) and high (29%, 40 respondents) income. In Germany this trend was repeated. However, in the USA the main age range was higher - 65 and older (33%, 3 people) and 55-64 (33%, 3

respondents), 56% (5 people) had a bachelor's degree and majority of the EV users / owners were retired. In Ukraine the income level for EV users was more equally distributed among the categories, with more people - 38% (5 respondents) having a low-middle income; and 31% (4 people) having a middle and a high income accordingly.

- Throughout all countries, the majority of HEV/PHEV users were 35-44 years old (60%, 3 people), all married (100%, 6 respondents), shared the household with another person (50%, 3 people), had a bachelor's degree (33%, 2 respondents), were full-time employed (50%, 3 people), retired (33%, 2 respondents) and had a middle income (67%, 4 people).

- As per those who didn't have any EV at the moment of answering the survey, the main difference was that majority was 35-44 years old (37%, 11 people), married or living together with a partner (60%, 18 respondents), having a higher education (33% or 10 respondents having German "Diplom"; 27% or 8 people - master's degree; 17% or 5 respondents - bachelor's degree and 10% or 3 people - doctoral degree), were full-time employed (76%, 26 respondents) and had a middle (40%, 12 people) and a high (37%, 11 respondents) income. The results in each country in particular were similar, with the only bigger difference for Ukraine where more participants who didn't have any EV had a low-middle income (67%, 2 people).

- Considering the question "Does anyone in your family or among your friends/colleagues have a BEV or a HEV/PHEV?" as a potential social factor influencing the owning or usage of EVs, the answers showed that 85% (62 respondents) of BEV drivers and 83% (5 people) of HEV/PHEV drivers had someone from the family or friends/colleagues circle who also used an EV, see Table 9.

	Germany		**USA**		**Ukraine**		**Other**		**All countries**	
BEV users	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
	Does anyone in your family or among your friends/colleagues have a BEV?									
	39 (83%)	8 (17%)	**8 (89%)**	1 (11%)	**12 (92%)**	1 (8%)	**3 (75%)**	1 (25%)	**62 (85%)**	11 (15%)
	Would you recommend getting a BEV?									
	47 (100%)	0 (0%)	**8 (89%)**	1 (11%)	**13 (100%)**	0 (0%)	4 **(100%)**	0 (0%)	**72 (99%)**	1 (1%)
	Germany		**USA**		**Ukraine**		**Other**		**All countries**	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**

HEV/ PHEV users	Does anyone in your family or among your friends/colleagues have a BEV/ PHEV?									
	2 (100%)	0 (0%)	**1 (100%)**	0 (0%)	**2 (67%)**	1 (33%)	0 (0%)	0 (0%)	**5 (83%)**	1 (17%)
	Would you recommend getting a HEV/PHEV?									
	1 (50%)	1 (50%)	**1 (100%)**	0 (0%)	**3 (100%)**	0 (0%)	0 (0%)	0 (0%)	**5 (83%)**	1 (17%)

Table 9. Answers of EV users on social factors' influence and desire to recommend using / getting an EV

- Majority of BEV drivers from all countries - 77% (56 people) - as well as HEV/PHEV drivers - 83% (5 respondents) - bought or financed their vehicles while the remaining part was leasing or renting a vehicle, using a subscription or using the company vehicle. In Germany, Ukraine and "Other" countries the answers were comparable. In the USA all 100% BEV vehicles were bought or financed. For the details, see Table 10.

- The BEV brands that were used the most among all respondents were Tesla (30%, 22 people), BMW (19%, 14 respondents) and Volkswagen (15%, 11 people). In Germany this trend was repeated while in the USA 33.5% (3 respondents) used Porsche, and in Ukraine top 3 brand leaders were Nissan (31%, 4 people), General Motors (23%, 3 respondents), Tesla (15%, 2 people) and Volkswagen (15%, 2 respondents). "Other" (Chevrolet) was the prevailing brand among HEV/PHEV drivers and was used by 50% (3 people). The next most common brands among HEV/PHEV drivers were Porsche (16.67%; 1 person), BMW (16.67%; 1 respondent) and Toyota (16.67%; 1 person). For more details, see Table 11 and Table 12.

		Germany	**USA**	**Ukraine**	**Other**	**All countries**
Which form of BEV ownership/ usage does apply to you?	Bought/ financed	**33 (70%)**	**9 (100%)**	**12 (92%)**	**2 (50%)**	**56 (77%)**
	Leasing/ renting/ using a subscription	6 (13%)	0 (0%)	0 (0%)	1 (25%)	7 (10%)
	Using a company vehicle	8 (17%)	0 (0%)	0 (0%)	1 (25%)	9 (12%)
	Using a family member's vehicle	0 (0%)	0 (0%)	1 (8%)	0 (0%)	1 (1%)

Which form of HEV/PHEV ownership/usage does apply to you?	Bought/ financed	**1 (50%)**	**1 (100%)**	**3 (100%)**	0 (0%)	**5 (83%)**
	Leasing/ renting/ using a subscription	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Using a company vehicle	**1 (50%)**	0 (0%)	0 (0%)	0 (0%)	1 (17%)
	Using a family member's vehicle	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 10. Answers of EV users on EV ownership form

Which brand of BEV do you use?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Tesla	**17 (36%)**	1 (11%)	**2 (15%)**	**2 (50%)**	**22 (30%)**
Volvo	0 (0%)	0 (0%)	1 (8%)	0 (0%)	1 (1.5%)
Ford	1 (2%)	0 (0%)	0 (0%)	0 (0%)	1 (1.5%)
General Motors	0 (0%)	0 (0%)	**3 (23%)**	0 (0%)	3 (4%)
Hyundai	2 (4%)	1 (11%)	0 (0%)	0 (0%)	3 (4%)
Kia	1 (2%)	0 (0%)	0 (0%)	0 (0%)	1 (1.5%)
Volkswagen	**6 (13%)**	1 (11%)	**2 (15%)**	**2 (50%)**	**11 (15%)**
Audi	0 (0%)	1 (11.5%)	0 (0%)	0 (0%)	1 (1.5%)
Porsche	3 (6%)	**3 (33.5%)**	0 (0%)	0 (0%)	6 (8%)
Nissan	0 (0%)	1 (11%)	**4 (31%)**	0 (0%)	5 (7%)
BMW	**13 (28%)**	1 (11%)	0 (0%)	0 (0%)	**14 (19%)**
Mercedes-Benz	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Toyota	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Other	4 (9%)	0 (0%)	1 (8%)	0 (0%)	5 (7%)

Table 11. Answers of BEV users on used BEV brands

Which brand of HEV/PHEV do you use?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Tesla	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Volvo	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Ford	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
General Motors	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Hyundai	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Kia	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Volkswagen	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Audi	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Porsche	**1 (50%)**	0 (0%)	0 (0%)	0 (0%)	**1 (16.67%)**
Nissan	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
BMW	**1 (50%)**	0 (0%)	0 (0%)	0 (0%)	**1 (16.67%)**
Mercedes-Benz	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Toyota	0 (0%)	0 (0%)	**1 (33%)**	0 (0%)	**1 (16.67%)**
Other	0 (0%)	**1 (100%)**	**2 (67%)**	0 (0%)	**3 (50%)**

Table 12. Answers of (P)HEV users on used HEV/PHEV brands

- Across all countries, the responses on whether the EV that survey participants had was their only vehicle, were almost evenly distributed among the BEV drivers who answered that they had one or more non-electric vehicles (38%, 29 respondents), see
- Table 13.

Among those BEV drivers who said it was their only vehicle (35%, 27 people); 25% (19 people) answered that they also got one or more electric vehicle. Only in Germany the category of the respondents who used their EV as the only vehicle was prevailing while in the USA and in Ukraine the responses repeated the overall trend.

To compare, 50% (3 people) of the HEV/PHEV drivers from all countries stated that they also had one or more non-electric vehicles. Only in the USA 1 person representing the country answered about having one or more electric vehicles, see

Table 13.

		Germany	**USA**	**Ukraine**	**Other**	**All countries**
Is this your only vehicle? (BEV users)	Yes	**19 (37%)**	2 (22%)	**5 (42%)**	1 (25%)	27 (35%)
	No, I have one or more non-electric vehicle(s)	16 (31%)	**5 (56%)**	**5 (42%)**	**3 (75%)**	**29 (38%)**
	No, I have one or more more electric vehicle(s)	14 (28%)	2 (22%)	2 (16%)	0 (0%)	19 (25%)
	Other	2 (4%)	0 (0%)	0 (0%)	0 (0%)	2 (2%)

Is this your only vehicle? (HEV/PHEV users)	Yes	**1 (50%)**	0 (0%)	1 (33%)	0 (0%)	2 (33%)
	No, I have one or more non-electric vehicle(s)	**1 (50%)**	0 (0%)	**2 (67%)**	0 (0%)	**3 (50%)**
	No, I have one or more electric vehicle(s)	0 (0%)	**1 (100%)**	0 (0%)	0 (0%)	1 (17%)
	Other	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 13. Answers of EV users on using EV as the only vehicle

- 88% (38 respondents) from all countries who answered that their BEV was not the only vehicle also stated that their BEVs were the vehicles they primarily used. This trend was similar to the responses in each country individually, see Table 14.

	Germany		**USA**		**Ukraine**		**Other**		**All countries**	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Is your BEV the vehicle, which you primarily use?	**25 (93%)**	2 (7%)	**5 (83%)**	1 (17%)	**5 (71%)**	2 (29%)	**3 (100%)**	0 (0%)	**38 (88%)**	5 (12%)
Is your HEV/ PHEV the vehicle, which you primarily use?	0 (0%)	**1 (100%)**	0 (0%)	**1 (100%)**	**2 (100%)**	0 (0%)	0 (0%)	0 (0%)	**2 (50%)**	**2 (50%)**

Table 14. Answers of EV users on using EV as a primary vehicle

- As per HEV/PHEV drivers, the answers from all respondents were distributed equally - 50% (2 people) answered about primary usage of their HEV/PHEV while another half - 50% (2 people) answered negatively about this. All respondents from Ukraine (100%, 2 people) answered they primarily used the vehicle. The users representing Germany, and the USA provided the opposite answers - “No”.

- Talking about the way the BEV drivers used their vehicles, 81% (59 respondents) stated they used them both inside and outside the living area, with the remaining share covering other answers. And while in Germany the answer distribution was similar, in the USA and in Ukraine no one answered about using the vehicles outside the living area.

  Majority of HEV/PHEV drivers - 83% (5 people) - also stated that they were using the vehicles both inside and outside the living area. In the USA and in Ukraine this answer was also prevailing. In Germany 1 person chose the answer about the usage only around the living area and another person answered about using the vehicle both inside and outside the living area, see Table 15.

How do you usually use your BEV?	**I'm using it only around the area/city I'm living**	**I'm using it both inside and outside the area/city I'm living**	**I'm using it mainly for the trips outside the area/city I'm living**
All countries	9 (12%)	**59 (81%)**	5 (7%)
Germany	1 (2%)	**42 (89%)**	4 (9%)
USA	3 (33%)	**6 (67%)**	0 (0%)
Ukraine	4 (31%)	**9 (69%)**	0 (0%)
Other	1 (25%)	**2 (50%)**	1 (25%)
How do you usually use your HEV/PHEV?	**I'm using it only around the area/city I'm living**	**I'm using it both inside and outside the area/city I'm living**	**I'm using it mainly for the trips outside the area/city I'm living**
All countries	1 (17%)	**5 (83%)**	0 (0%)
Germany	**1 (50%)**	**1 (50%)**	0 (0%)
USA	0 (0%)	**1 (100%)**	0 (0%)
Ukraine	0 (0%)	**3 (100%)**	0 (0%)
Other	0 (0%)	0 (0%)	0 (0%)

Table 15. Answers of EV users on EV driving preferences

- As per beliefs, motives and values driving consumers, innovative technologies (17%; 34 people), elimination of greenhouse emissions (16%; 32 respondents), low/no fuel costs (15%; 30 people), quiet running (15%; 29 respondents) and less/no dependency on fossil fuel supplies (14%; 27 people) were the most chosen factors across all countries. In Germany innovative technologies

(18%; 23 respondents), quiet running (18%; 23 people) and elimination of greenhouse emissions (17%; 22 respondents) were the most chosen. To compare, low/no fuel costs, less/no dependency on fossil fuels and elimination of greenhouse emissions were prevailing among the respondents from the USA (18%, 4 people per each answer) while low/no fuel costs (22.5%, 8 respondents), elimination of greenhouse emissions (18%, 6 people), less expensive and less frequent maintenance (18%, 6 respondents) and innovative technologies (18%, 6 people) were the most popular answers for the participants from Ukraine. Another difference was that in Germany more people chose the answer about the tax credits and incentives than in the USA. In Ukraine this factor was not chosen at all. The results for BEV are displayed in Table 16.

What was the main reason for you to get/start using a BEV instead of a vehicle with a combustion engine?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Low/no fuel costs	**14 (11%)**	**4 (18%)**	**8 (22.5%)**	**4 (40%)**	**30 (15%)**
Less/no dependency on fossil fuel supplies	**17 (13%)**	**4 (18%)**	**5 (15%)**	1 (10%)	**27 (14%)**
Elimination of greenhouse emissions	**22 (17%)**	**4 (18%)**	**6 (18%)**	0 (0%)	**32 (16%)**
Tax credits and incentives from the government	**16 (12%)**	1 (4%)	0 (0%)	0 (0%)	17 (9%)
Maintenance: less expensive and less frequent	9 (7%)	**3 (14%)**	**6 (18%)**	1 (10%)	19 (10%)
Quiet running	**23 (18%)**	**3 (14%)**	2 (6%)	1 (10%)	**29 (15%)**
Prestigious status	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Innovative technologies	**23 (18%)**	2 (9%)	**6 (18%)**	**3 (30%)**	**34 (17%)**
Other	5 (4%)	1 (5%)	1 (2.5%)	0 (0%)	7 (4%)

Table 16. Answers on main reason(s) for BEV users starting using BEVs

- Talking about beliefs, motives and values driving HEV/PHEV consumers, the motivation among all countries was mainly related to innovative technologies (27.5%; 3 people) and quiet running (18%; 2 respondents). Considering specific countries, in Germany, innovative technologies (50%; 2 people), quiet running (25%; 1 person) and prestigious status (25%; 1 person) were chosen the most. To compare, elimination of greenhouse emissions (100%; 1 person) was the only chosen answer by the US participant; low/no fuel costs (49.5%; 3 respondents), less

expensive and less frequent maintenance (16.5%; 1 person), quiet running (16.5%; 1 person) and innovative technologies (16.5%; 1 person) were the top answers among Ukrainian participants. The results for (P)HEV drivers are displayed in Table 17.

What was the main reason for you to get/start using a HEV/PHEV instead of a vehicle with a combustion engine?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Low/no fuel costs	0 (0%)	0 (0%)	**3 (49.5%)**	0 (0%)	**3 (27.5%)**
Less/no dependency on fossil fuel supplies	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Elimination of greenhouse emissions	0 (0%)	**1 (100%)**	0 (0%)	0 (0%)	1 (9%)
Tax credits and incentives from the government	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Maintenance: less expensive and less frequent	0 (0%)	0 (0%)	**1 (16.5%)**	0 (0%)	1 (9%)
Quiet running	**1 (25%)**	0 (0%)	**1 (16.5%)**	0 (0%)	**2 (18%)**
Prestigious status	**1 (25%)**	0 (0%)	0 (0%)	0 (0%)	1 (9%)
Innovative technologies	**2 (50%)**	0 (0%)	**1 (16.5%)**	0 (0%)	**3 (27.5%)**
Other	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 17. Answers on main reason(s) for (P)HEV users starting using HEV/PHEVs

- Considering different age categories, elimination of greenhouse effect (33%, 1 person), innovative technologies (33%, 1 person) and driving fun (33%, 1 person) were the most important for the youngest BEV drivers in the age of 18-24 years old. In the category of 25-34 years old, the users preferred less/no dependency on fossil fuels (33%, 1 person), elimination of greenhouse effect (33%, 1 person) and quiet running of the vehicle (33%, 1 person). In the groups of older age, the costs played a bigger role, and a reason of low/no fuel costs was among the widely chosen factors, with the highest chosen rate of 25% (9 people) among users aged 35-44 years and 14.4% (13 respondents) among users aged 45-54 years. Less/no dependency of fossil fuels received the highest chosen rate among users aged 55-64 years (13.6%; 6 people) and 65 and older (26.3%; 5 respondents). Elimination of the greenhouse emissions remained a relevant factor for people of all age categories. Tax credits and incentives from the government were the most important factor for drivers aged 35-44 years (13.9%; 5 people). Less expensive and less frequent maintenance

was mainly chosen by users aged 35 years and older. Quiet running was chosen by drivers aged 25 years and older. Prestigious status had no relevance to any survey participant.

- Regardless of the marital status, low/no fuel costs, less/no dependency on fossil fuels, elimination of greenhouse effect, quiet running and innovative technologies were the most chosen factors for the users. However, for the respondents who were married or in a partnership, the combination of different reasons related to costs played a more significant role.

- Considering the size of the household, the respondents living alone chose innovative technologies the most (33.3%; 4 people). The survey participants from larger households chose different factors combining cost savings, less/no dependency on fuels, elimination of greenhouse emissions, support from the government, quiet running and innovative technologies.

- On the educational level, the factors of low/no fuel costs were chosen mostly by the survey participants with a bachelor's degree (20%, 6 respondents). Even though elimination of greenhouse emissions was widely chosen among BEV users with different levels of education, elimination of greenhouse emissions (20.6%, 7 respondents) as well as dependency on fossil fuel supplies (23.5%, 8 people) were mostly chosen by BEV drivers with a doctoral degree. Similar situation was with quiet running and innovative technologies. Although these factors were chosen by different survey participants, their highest response rate (in both cases 20.8%; 11 people) was among the respondents who obtained Diploma and so potentially were Germans.

- Considering the motivational factors in regard to the employment level, low/no fuel costs were mostly chosen by the respondents who were part-time employed (22.2%, 2 people) and retired (20.8%, 5 respondents). Less dependency on fossil fuel supplies prevailed among those who marked the choice "Other" (33.3%, 1 person), self-employed (25.8%, 8 people) and retired (20.8%, 5 respondents). Elimination of greenhouse emissions was a popular answer among the respondents representing different employment categories, but it received the highest response rate among part-time employed (22.2%, 2 people) and self-employed (19.4%, 6 respondents). Tax credits and incentives from the government were mainly chosen by the full-time employed (11.2%, 15 people). Less expensive and less frequent maintenance was the main chosen answer among part-time employed (22.2% 2 respondents), retired (16.7%, 4 people) and self-employed

(16.1%, 5 respondents). Quiet running was mainly chosen by part-time employed (22.2%, 2 people) and full-time employed (17.2%, 23 respondents). Innovative technologies received the highest response rate among the participants who chose the answer "Other" (33.3%, 1 person), full-time employed (20.1%, 27 people) and self-employed (19.4%, 6 respondents). Such trends in choices showed that the cost-related topics were mostly relevant for the respondents who were not full-time employed while other factors more related to nice look or performance features of the vehicles, such as innovative technologies and quiet running, were more interesting to those who were full-time employed.

- From the income point of view, the motives such as low/no fuel and less/no dependency on fossil fuel costs were mostly chosen by the respondents with lower income (by 23.3% or 7 people and by 20% or 6 people correspondingly). The respondents with a middle level of income chose a variety of reasons, giving a preference to innovative technologies (20%, 18 people). For the participants with a high level of income the environmental reasons (16.2%, 12 respondents) and tax credits and incentives from the government (16.2%, 12 people) were the most popular choices. Both environmental reasons and innovative technologies turned out to be a valid reason for the majority of the respondents.

  Talking about HEV/PHEV users, quiet running (25%, 1 person), prestigious status (25%, 1 person) and innovative technologies (50%, 2 people) were mainly chosen by the respondents from Germany; elimination of greenhouse emissions was the only choice by the person from the US (100%, 1 person); low-no fuel costs (50%, 3 people), less expensive and less frequent maintenance (16.7%, 1 person), quiet running (16.7%, 1 person) and innovative technologies (16.7%, 1 person) were the choices made by Ukrainian representatives.

- As per the age groups, low/no fuel costs were the choices made by younger respondents - aged 25-34 years (33.3%, 1 person) and 35-44 years (33.3%, 2 people). In these age categories less expensive and less frequent maintenance (33.3%, 1 person), quiet running (33.3%, 1 person) and innovative technologies (33.3%, 2 people) were other most popular choices. Elimination of greenhouse emissions and innovative technologies were the most relevant for the older group aged 65 years and older (50%, 1 person for each choice correspondingly).

- The motivation choices didn't depend on the marital status since all respondents were married or living in a partnership. The distribution of the answers between the respondents having a different number of people living in their households was different, e.g., low/no fuel costs, quiet running, prestigious status and innovative technologies were important for those living with another person, 2 more people or 5 or more people.

- Low/no fuel costs, elimination of greenhouse emissions and innovative technologies were mostly chosen by the respondents with higher levels of education - 2 respondents with a bachelor's degree (50%, 1 person per each answer), 2 respondents with a master's degree (50%, 1 person per each answer) and by 1 person with a German "Diplom" degree.

- Considering the employment categories, low/no fuel costs were the most popular both among the full-time employed respondents (33.3%, 2 people) as well as 1 respondent being a student (33.3%, 1 person). Environmental reasons, quiet running, prestigious status and innovative technologies were mainly chosen by both full-time employed and retired. And while low/no fuel costs, less expensive and less frequent maintenance and quiet running were the choices made by people with a lower income (33.3%, 1 person per each choice), innovative technologies were chosen by 1 person (100%) with a higher income.

- As per biggest inconveniences for the respondents already using EVs, the general trend for BEV drivers was that the majority said "No inconveniences" (36%, 31 respondents). The corresponding results are displayed in Table 18.

  The overall results reflected the answers among the respondents in Germany (37%, 21 people), the USA (40%, 4 people) and "Other" countries (50%, 2 respondents). Only in Ukraine the majority - 53% (8 people) - chose "Driving range." "Driving range" was one of other most common choices across all countries (26%, 22 respondents) as well as "Charging infrastructure" (16%, 14 people); in Germany "Electricity costs" was another popular answer (16%, 9 people).

What is the biggest inconvenience for you as a BEV owner/user?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Driving range	**11 (19%)**	**2 (20%)**	**8 (53%)**	**1 (25%)**	**22 (26%)**

Charging infrastructure	**8 (14%)**	**2 (20%)**	**3 (20%)**	**1 (25%)**	**14 (16%)**
Complexity of charging the vehicle at home	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Service and maintenance costs	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Electricity costs	**9 (16%)**	0 (0%)	0 (0%)	0 (0%)	9 (11%)
Inconvenience to have a vehicle serviced	2 (3%)	0 (0%)	0 (0%)	0 (0%)	2 (2%)
No inconveniences	**21 (37%)**	**4 (40%)**	**4 (27%)**	**2 (50%)**	**31 (36%)**
Other	6 (11%)	**2 (20%)**	0 (0%)	0 (0%)	8 (9%)

Table 18. Answers on the biggest BEV inconveniences for BEV users

- As per HEV/PHEV drivers, "No inconveniences" (72%, 5 respondents), "Driving range" (14%, 1 person) and "Other" (14%, 1 person) were the most common answers, with "No inconveniences" being the only choice for the respondents from Germany and USA and one of the top ones for Ukraine. The corresponding results are displayed in Table 19.

What is the biggest inconvenience for you as a BEV owner/user?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Driving range	0 (0%)	0 (0%)	**1 (25%)**	0 (0%)	**1 (14%)**
Charging infrastructure	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Complexity of charging the vehicle at home	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Service and maintenance costs	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Electricity costs	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Inconvenience to have a vehicle serviced	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
No inconveniences	**2 (100%)**	**1 (100%)**	**2 (50%)**	0 (0%)	**5 (72%)**
Other	0 (0%)	0 (0%)	**1 (25%)**	0 (0%)	**1 (14%)**

Table 19. Answers on the biggest HEV/PHEV inconveniences for (P)HEV users

- Considering the safety factor, 97% (71 people) of BEV drivers across all countries evaluated their vehicles as safe, 3% (2 respondents) chose the answer "Maybe" and no one responded negatively. The answers in each country were comparable and positive with the only difference that 2 responses "Maybe" - 15% - were chosen by Ukrainian survey participants. As per (P)HEV drivers, all 100% considered their EVs as safe, see Table 20.

Do you consider your BEV safe?	**Yes**	**Maybe**	**No**
All countries	**71 (97%)**	2 (3%)	0 (0%)
Germany	**47 (100%)**	0 (0%)	0 (0%)
USA	**9 (100%)**	0 (0%)	0 (0%)
Ukraine	**11 (85%)**	2 (15%)	0 (0%)
Other	**4 (100%)**	0 (0%)	0 (0%)
Do you consider your HEV/PHEV safe?	**Yes**	**Maybe**	**No**
All countries	6 (100%)	0 (0%)	0 (0%)
Germany	2 (100%)	0 (0%)	0 (0%)
USA	1 (100%)	0 (0%)	0 (0%)
Ukraine	3 (100%)	0 (0%)	0 (0%)
Other	0 (0%)	0 (0%)	0 (0%)

Table 20. Answers of EV users on EV safety

- The responses on the question about reliability showed a similar trend - 92% (67 respondents) of BEV users across all countries marked their answer as “Yes”. The remaining 8% (6 people) demonstrated the uncertainty by answering “Maybe”. The responses in each country demonstrated a similar pattern. Among (P)HEV drivers, in the USA and in Ukraine all 100% respondents considered their vehicles reliable, only in Germany the answers distributed evenly – 50% – among the answers “Yes” and “Maybe”, see Table 21.

Do you consider your BEV reliable?	**Yes**	**Maybe**	**No**
All countries	**67 (92%)**	6 (8%)	0 (0%)
Germany	**45 (96%)**	2 (4%)	0 (0%)
USA	**8 (89%)**	1 (11%)	0 (0%)
Ukraine	**11 (85%)**	2 (15%)	0 (0%)
Other	**3 (75%)**	1 (25%)	0 (0%)
Do you consider your HEV/PHEV reliable?	**Yes**	**Maybe**	**No**
All countries	**5 (83%)**	1 (17%)	0 (0%)
Germany	**1 (50%)**	**1 (50%)**	0 (0%)
USA	**1 (100%)**	0 (0%)	0 (0%)
Ukraine	**3 (100%)**	0 (0%)	0 (0%)
Other	0(0%)	0 (0%)	0 (0%)

Table 21. Answers of EV users on EV reliability

- Majority of survey participants from all countries using BEVs - 93% (68 people) and (P)HEVs – 100% - felt satisfied with their vehicles, see Table 22.

Are you feeling satisfied with the BEV you use?	**Yes**	**Maybe**	**No**
All countries	**68 (93%)**	5 (7%)	0 (0%)
Germany	**45 (96%)**	2 (4%)	0 (0%)
USA	**9 (100%)**	0 (0%)	0 (0%)
Ukraine	**10 (77%)**	3 (23%)	0 (0%)
Other	**4 (100%)**	0 (0%)	0 (0%)
Are you feeling satisfied with the HEV/PHEV you use?	**Yes**	**Maybe**	**No**
All countries	**6 (100%)**	0 (0%)	0 (0%)
Germany	**2 (100%)**	0 (0%)	0 (0%)
USA	**1 (100%)**	0 (0%)	0 (0%)
Ukraine	**3 (100%)**	0 (0%)	0 (0%)
Other	0 (0%)	0 (0%)	0 (0%)

Table 22. Answers of EV users on their EV satisfaction

- The results of the answers on safety, reliability and how satisfied the respondents were in connection with the demographic features, as well as with the social factor of someone in the family or among friends/colleagues having an EV were similar to the general portrait of the EV users.
- Analyzing the charging behavior of the majority of BEV users, 58% (42 people) of them were using a special charging station at home. Standard outlets at home (18%, 13 respondents), dedicated public charges (12%, 9 people) and work-related chargers (5%, 4 respondents) were used by a minority group of the survey participants. Similar responses were in Germany (62%, 29 people) and in the USA (78%, 7 respondents). In Ukraine, the majority - 69% (9 people) - responded about using a standard outlet at home, see Table 23.
- Among PHEV users, the number of responses was smaller and so it was more evenly distributed among different options. Nevertheless, the answer “Using a standard outlet at home” received majority, 40% (2 people) responses, see Table 24.

How do you usually charge your BEV vehicle?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Using a standard outlet at home	3 (6%)	1 (11%)	**9 (69%)**	0 (0%)	13 (18%)

Using a charging station at home, e.g. a WallBox	**29 (62%)**	**7 (78%)**	3 (23%)	**3 (75%)**	**42 (58%)**
Using dedicated public chargers	8 (17%)	0 (0%)	1 (8%)	0 (0%)	9 (12%)
Using work-related chargers	2 (4%)	1 (11%)	0 (0%)	1 (25%)	4 (5%)
Other	5 (11%)	0 (0%)	0 (0%)	0 (0%)	5 (7%)

Table 23. Answers of BEV users on their charging behavior

How do you usually charge your PHEV vehicle?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Using a standard outlet at home	0 (0%)	0 (0%)	**2 (100%)**	0 (0%)	**2 (40%)**
Using a charging station at home, e.g. a WallBox	**1 (50%)**	0 (0%)	0 (0%)	0 (0%)	1 (20%)
Using dedicated public chargers	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Using work-related chargers	**1 (50%)**	0 (0%)	0 (0%)	0 (0%)	1 (20%)
Other	0 (0%)	**1 (100%)**	0 (0%)	0 (0%)	1 (20%)

Table 24. Answers of PHEV users on their charging behavior

FUTURE BEHAVIOR TRENDS

- As per current BEV users, only 1% (1 person) answered that he/she wouldn't like to have another EV as a replacement or a second vehicle in the future. All others responded positively: 86.5% (63 people) would like to have a BEV and 6% (4 respondents) considered purchasing a HEV/PHEV.

- As per HEV/PHEV users, all of them would like to have another EV as a replacement or a second vehicle in the next 5-15 years: 67% (4 people) would like to have a PHEV and 33% (2 respondents) would like to have a BEV. In Germany and in the USA BEV was one of the most common choices while in Ukraine all 3 respondents (100%) chose PHEV as a preference, see Table 25.

BEV users					
Would you like to have another electric vehicle in the next 5-15 years? (as a replacement/second vehicle)	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Yes, a BEV	**43 (92%)**	**8 (89%)**	**8 (61%)**	**4 (100%)**	**63 (86.5%)**

Yes, a HEV	0 (0%)	0 (0%)	1 (8%)	0 (0%)	1 (1%)
Yes, a PHEV	0 (0%)	0 (0%)	4 (31%)	0 (0%)	4 (6%)
Maybe a BEV	3 (6%)	0 (0%)	0 (0%)	0 (0%)	3 (4.5%)
Maybe a HEV	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Maybe a PHEV	0 (0%)	1 (11%)	0 (0%)	0 (0%)	1 (1%)
No	1 (2%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)
Other	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
HEV/PHEV users					
Would you like to have another electric vehicle in the next 5-15 years? (as a replacement/second vehicle)	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Yes, a BEV	**1 (50%)**	**1 (100%)**	0 (0%)	0 (0%)	**2 (33%)**
Yes, a HEV	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Yes, a PHEV	**1 (50%)**	0 (0%)	**3 (100%)**	0 (0%)	**4 (67%)**
Maybe a BEV	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Maybe a HEV	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Maybe a PHEV	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
No	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Other	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 25. Answers of EV users on their desire to have another EV in the future

- The motivation for BEV users across all countries who were interested in getting another EV as a replacement or a second vehicle in the future was mainly related to quiet running (19% or 32 respondents), elimination of greenhouse effect (16% or 28 people), innovative technologies (15% or 25 respondents), low/no fuel costs (14% or 24 respondents) and less/no dependency on fossil fuel supplies (14% or 23 people). No one would have chosen another EV for the prestigious status. In Germany the answers were distributed in a way of the majority choosing quiet running (24%, 27 respondents), innovative technologies (17%, 19 people), elimination of greenhouse effect (16%, 18 respondents) and less/no dependency on fossil fuel supplies (12%, 14 people). In the USA most BEV users chose elimination of greenhouse gas emissions (28%, 5 respondents) and low/no fuel costs (22%, 4 people). In Ukraine the top answers were low/no fuel costs (21%, 6 respondents), less/no dependency on fossil fuel supplies (21%, 6 people), elimination of greenhouse gas emissions (17%, 5 respondents), less expensive and less frequent maintenance (14%, 4 people) and innovative technologies (14%, 4 respondents). In “Other” countries the main

responses were related to low/no fuel costs (38%, 3 people) and less expensive and less frequent maintenance (24.5%; 2 respondents), see Table 26.

What will be the main motivation for you to have another electric vehicle?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Low/no fuel costs	11 (9%)	**4 (22%)**	**6 (21%)**	**3 (38%)**	**24 (14%)**
Less/no dependency on fossil fuel supplies	**14 (12%)**	**2 (11%)**	**6 (21%)**	1 (12.5%)	**23 (14%)**
Elimination of greenhouse emissions	**18 (16%)**	**5 (28%)**	**5 (17%)**	0 (0%)	**28 (16%)**
Tax credits and incentives from the government	6 (5%)	1 (5%)	1 (3%)	0 (0%)	8 (5%)
Maintenance: less expensive and less frequent	8 (7%)	**2 (11%)**	**4 (14%)**	**2 (24.5%)**	16 (9%)
Quiet running	**27 (24%)**	**2 (11%)**	2 (7%)	1 (12.5%)	**32 (19%)**
Prestigious status	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Innovative technologies	**19 (17%)**	1 (6%)	**4 (14%)**	1 (12.5%)	**25 (15%)**
Other	11 (10%)	1 (6%)	1 (3%)	0 (0%)	13 (8%)

Table 26. Answers of BEV users on their main motivation(s) to have another EV in the future

The main motivation for (P)HEV drivers was mainly related to low/no fuel costs (30%, 3 people), innovative technologies (30%, 3 respondents) and quiet running (20%, 2 people). The responses were similar for the choices among the respondents from Germany, with the majority choosing innovative technologies (50%, 2 respondents), tax credits and incentives from the government (25%, 1 person) and quiet running (25%, 1 person). The respondent from the USA chose innovative technologies (100%) while among the respondents from Ukraine top choices were low/no fuel costs (60%, 3 respondents), less expensive and less frequent maintenance (20%, 1 person) and quiet running (20%, 1 person). For the corresponding results on the desire of the EV users to have another EV in the future, see Table 27.

What will be the main motivation for you to have another electric vehicle?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Low/no fuel costs	0 (0%)	0 (0%)	**3 (60%)**	0 (0%)	**3 (30%)**

Less/no dependency on fossil fuel supplies	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Elimination of greenhouse emissions	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Tax credits and incentives from the government	**1 (25%)**	0 (0%)	0 (0%)	0 (0%)	1 (10%)
Maintenance: less expensive and less frequent	0 (0%)	0 (0%)	**1 (20%)**	0 (0%)	1 (10%)
Quiet running	**1 (25%)**	0 (0%)	**1 (20%)**	0 (0%)	**2 (20%)**
Prestigious status	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Innovative technologies	**2 (50%)**	**1 (100%)**	0 (0%)	0 (0%)	**3 (30%)**
Other	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 27. Answers of (P)HEV users on their main motivation(s) to have another EV in the future

- As per the respondents from all countries who already had a BEV and would like to have another one, the main preventing reasons from not getting it were “Purchase costs” (25%, 24 people) and “No need” (25%, 24 respondents). “No reason” was named as the third biggest factor (21%, 20 people). While in Germany the trend was similar, in the USA the majority of the respondents named “Purchase costs” (22%, 3 people) and “Driving range” (22%, 3 respondents). In Ukraine the “Purchase costs” factor received the largest number of responses - 50% (8 people), see Table 28.

- Among the HEV and PHEV users from all studied countries, the main factors that kept these respondents from getting another EV vehicle were “No reason” (57%, 4 people), “Other” (29%, 2 respondents) and “Purchase costs” (14%, 1 person). In different countries the responsive trend was similar, with “No reason” prevailing in Germany (100%, 2 respondents); “Purchase costs” and “Other” prevailing in the USA (50%, 1 person per each answer); and “No reason” (67%, 2 people) and “Other” (33%, 1 person) prevailing in Ukraine, see Table 29.

What is the main reason preventing you from having another electric vehicle?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Purchase costs	**13 (22%)**	**3 (22%)**	**8 (50%)**	0 (0%)	**24 (25%)**
Driving range	4 (7%)	**3 (22%)**	**2 (12%)**	0 (0%)	9 (9%)
Charging infrastructure	2 (3%)	1 (7%)	0 (0%)	0 (0%)	3 (3%)

Service and maintenance costs	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Electricity costs	1 (1%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)
Inconvenience to have a vehicle serviced	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Inconvenience to charge a vehicle at home	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Uncertain safety	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Uncertain reliability (e.g., unreliable battery technology, innovative digital and customized tools and services)	0 (0%)	1 (7%)	0 (0%)	0 (0%)	1 (1%)
Fear of not being able to sell a vehicle in the used car marketplace	4 (7%)	0 (0%)	0 (0%)	0 (0%)	4 (4%)
No need	**18 (30%)**	**2 (14%)**	**3 (19%)**	**1 (25%)**	**24 (25%)**
No reason	**14 (23%)**	**2 (14%)**	**2 (13%)**	**2 (50%)**	**20 (21%)**
Other	4 (7%)	**2 (14%)**	1 (6%)	**1 (25%)**	10 (11%)

Table 28. Answers of BEV users on main reasons preventing them from having another EV in the future

- Considering the social factor influencing the decision to have another EV, the recommendation of friends or colleagues would not be important for 67% (49 people) of BEV drivers. Such an answer was similar to the opinion in Germany, the USA and Ukraine. In “Other” countries the responses were evenly distributed.

- A similar trend was for the HEV/PHEV users - 67% (4 respondents) of all survey participants answered negatively. Such an answer was similar to the opinion in Germany and the USA. In Ukraine, a similar majority (67%, 2 people) considered this factor as a relevant one, see Table 30.

What is the main reason preventing you from having another electric vehicle?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Purchase costs	0 (0%)	**1 (50%)**	0 (0%)	0 (0%)	**1 (14%)**
Driving range	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Charging infrastructure	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Service and maintenance costs	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Electricity costs	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Inconvenience to have a vehicle serviced	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Inconvenience to charge a vehicle at home	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Uncertain safety	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Uncertain reliability (e.g., unreliable battery technology, innovative digital and customized tools and services)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Fear of not being able to sell a vehicle in the used car marketplace	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
No need	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
No reason	**2 (100%)**	0 (0%)	**2 (67%)**	0 (0%)	**4 (57%)**
Other	0 (0%)	**1 (50%)**	**1 (33%)**	0 (0%)	**2 (29%)**

Table 29. Answers of (P)HEV users on main reasons preventing them from having another EV in the future

	Would you consider having another electric vehicle if someone from your family or friends/ colleagues recommended it to you?									
	Germany		**USA**		**Ukraine**		**Other**		**All countries**	
BEV users	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
	15 (32%)	**32 (68%)**	2 (22%)	**7 (78%)**	5 (38%)	**8 (62%)**	**2 (50%)**	**2 (50%)**	24 (33%)	**49 (67%)**
	Germany		**USA**		**Ukraine**		**Other**		**All countries**	
HEV/ PHEV users	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
	0 (0%)	**2 (100%)**	0 (0%)	**1 (100%)**	**2 (67%)**	1 (33%)	0 (0%)	0 (0%)	2 (33%)	**4 (67%)**

Table 30. Answers of EV users on social factors potentially influencing their EV usage

- In all countries, the majority of BEV drivers - 64% (46 people) - and the main part of the HEV/PHEV drivers - 83% (5 people) - who would like to have another EV in the future would consider buying or financing their vehicles. No one would use the family member's vehicle. In Germany and Ukraine, the answers were comparable. In the USA, 89% of BEV users chose buying or financing the vehicle and the rest - the option "Other". Among HEV/PHEV drivers from Germany, the answers were evenly distributed among the answers "Buying/financing" (50%, 1 person) and "Using a company vehicle" (50%, 1 person), see Table 31.

		Germany	USA	Ukraine	Other	All countries
BEV drivers						
Which form of ownership would you consider?	Buying/ financing	**27 (59%)**	**8 (89%)**	**8 (61%)**	**3 (75%)**	**46 (64%)**
	Leasing/ renting/ using a subscription	11 (24%)	0 (0%)	4 (31%)	1 (25%)	16 (22%)
	Using a company vehicle	6 (13%)	0 (0%)	1 (8%)	0 (0%)	7 (10%)
	Using a family member's vehicle	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Other	2 (4%)	1 (11%)	0 (0%)	0 (0%)	3 (4%)
HEV/PHEV drivers						
Which form of ownership would you consider?	Buying/ financing	**1 (50%)**	**1 (100%)**	**3 (100%)**	0 (0%)	**5 (83%)**
	Leasing/ renting/ using a subscription	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Using a company vehicle	**1 (50%)**	0 (0%)	0 (0%)	0 (0%)	1 (17%)
	Using a family member's vehicle	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Other	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 31. Answers of EV users on future EV ownership form

- 87% of the BEV drivers (61 respondents) who would like to have another EV in the future would consider using it as their primary vehicle. Majority of HEV/PHEV users answered similarly - 67% (4 people) would consider using another EV in the future as their primary vehicle. The similar results were across all countries, see Table 32.

BEV users			
Would you consider using another EV in the future as your primary vehicle?	**Yes**	**Maybe**	**No**
All countries	**61 (87%)**	8 (12%)	1 (1%)
Germany	**42 (93%)**	3 (7%)	0 (0%)
USA	**5 (62%)**	2 (25%)	1 (13%)
Ukraine	**10 (83%)**	2 (17%)	0 (0%)
Other	**4 (100%)**	0 (0%)	0 (0%)
HEV/PHEV users			

Would you consider using another EV in the future as your primary vehicle?	Yes	Maybe	No
All countries	**4 (67%)**	1 (16,5%)	1 (16,5%)
Germany	**1 (50%)**	0 (0%)	**1 (50%)**
USA	**1 (100%)**	0 (0%)	0 (0%)
Ukraine	**2 (67%)**	1 (33%)	0 (0%)
Other	0 (0%)	0 (0%)	0 (0%)

Table 32. Answers of EV users on potential usage of another EV in the future

- Considering the category of users from all countries who didn't have any EV, 43% (13 people) - would definitely like to have it in the next 5-15 years; 27% (8 respondents) answered negatively. All these responses came from people from Germany, Ukraine and other countries. None of the survey participants from the USA didn't answer this question because they all used or had a BEV, HEV or PHEV, see Table 33.

		Germany	USA	Ukraine	Other	All countries
If you don't have an electric vehicle (BEV, HEV or PHEV), would you like to have it in the next 5-15 years?	**Yes**	**11 (46%)**	0 (0%)	**2 (67%)**	0 (0%)	**13 (43%)**
	Maybe	**7 (29%)**	0 (0%)	1 (33%)	1 (33%)	**9 (30%)**
	No	6 (25%)	0 (0%)	0 (0%)	**2 (67%)**	8 (27%)

Table 33. Answers of EV non-users on their desire to have an EV in the future

- As per those respondents who didn't have any EV but would like to have it, BEV was the most common choice for the respondents from Germany (56%, 10 respondents) and Ukraine (67%, 2 people), see Table 34.

Which type of an electric vehicle would you like to have?	Germany	USA	Ukraine	Other	All countries
A BEV	**10 (56%)**	0 (0%)	**2 (67%)**	0 (0%)	**12 (55%)**
A HEV	2 (11%)	0 (0%)	0 (0%)	0 (0%)	2 (9%)
A PHEV	1 (5%)	0 (0%)	0 (0%)	0 (0%)	1 (4%)
Maybe a BEV	**3 (17%)**	0 (0%)	1 (33%)	0 (0%)	**4 (18%)**
Maybe a HEV	0 (0%)	0 (0%)	0 (0%)	**1 (100%)**	1 (5%)

Maybe a PHEV	2 (11%)	0 (0%)	0 (0%)	0 (0%)	2 (9%)
Other	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 34. Answers of EV non-users on EV type they would like to have in the future

- As per a demographic portrait of those users from all countries who didn't have any EV but would like to have it in the future, the majority were in the groups of 35-44 years old (39%, 5 respondents) and of 25-34 years old (31%, 4 people). They were married or living in a domestic partnership (61%, 8 respondents), having 2 or 3 people living in the household (62%, 8 people), having higher education (92%, 12 respondents), were working full-time (69%, 9 people) and had a middle or high income (77%, 10 respondents). A similar category of the survey participants chose the answer "Maybe", with the only difference that majority of them were single (55%, people) and were having low and middle incomes (78%, 7 respondents). Those who negatively answered this question, were in the age group of 35-54 years old (75%, 6 people), were married or living in a domestic partnership (75%, 6 respondents), having 2 people living in the household (50%, 4 people), having higher education (63%, 5 respondents), working full-time (100%, 8 people) and having a middle or high income (100%, 8 respondents).

- It was a similar trend for German respondents who answered positively; the ones who chose the answer "Maybe" were mainly either living alone (43%, 3 people) or in the household of 4 people (43%, 3 respondents).

- In Ukraine the respondents who answered positively represented two different categories: one person was single while another person was married (50% in each case), both were living in the household of 2 people, one respondent had a professional degree while the other one obtained a master's degree, 1 was full-time employed while the other one was unemployed. The difference in income was also different; 1 having a low income and another one - a high income. The person who answered "Maybe" was 55-64 years old, married, living in a household of 3 people, having a bachelor's degree, being full-time employed and had a low income.

- The person who was from "Other" country and answered "Maybe" was 18-24 years old, single, living in the household of 2 people, having a master's degree, full-time employed and had the income below medium. Two people who wouldn't like to have an EV in the future were 55-64

years old, one being married or in a domestic partnership while another one was divorce, living alone or with another person, obtained a trade/technical or a vocational training, were full-time employed and had a middle and high income.

- More than a half of those respondents from all countries who chose “Yes” and “Maybe” - 55% (12 people) - would consider buying or financing the vehicle, see Table 35.

		Germany	USA	Ukraine	Other	All countries
Which form of ownership would you consider?	Buying / financing	**8 (44%)**	0 (0%)	**3 (100%)**	**1 (100%)**	**12 (55%)**
	Leasing / renting / using a subscription	7 (39%)	0 (0%)	0 (0%)	0 (0%)	7 (32%)
	Using a company vehicle	2 (11%)	0 (0%)	0 (0%)	0 (0%)	2 (9%)
	Using a family member’s vehicle	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Other	1 (6%)	0 (0%)	0 (0%)	0 (0%)	1 (4%)

Table 35. Answers of EV non-users on potential EV ownership form in the future

- More than a half of the respondents from all countries who chose “Yes” and “Maybe”- 59% (13 respondents) - would consider using it as the only vehicle; 9% (2 people) wouldn't do this. Similar answers were in Germany. In Ukraine and in “Other” countries, there were no negative responses, see Table 36.

		Germany	USA	Ukraine	Other	All countries
Would you consider using it as your only vehicle?	Yes	**11 (61%)**	0 (0%)	**2 (67%)**	0 (0%)	**13 (59%)**
	Maybe	5 (28%)	0 (0%)	**1 (33%)**	**1 (100%)**	7 (32%)
	No	2 (11%)	0 (0%)	0 (0%)	0 (0%)	2 (9%)

Table 36. Answers of EV non-users on potential usage of EV as the only vehicle

- When answering the question about using an EV as the primary vehicle, more of these respondents from all countries (who didn’t have any EV but would like to have it) - 77% (17 people) - answered positively and 5% (1 person) responded negatively. Similar answers were in Germany. In Ukraine and in “Other” countries, there were no negative responses, see Table 37.

		Germany	USA	Ukraine	Other	All countries
Would you consider using it as your primary vehicle?	Yes	**15 (83%)**	0 (0%)	**2 (67%)**	0 (0%)	**17 (77%)**
	Maybe	**2 (11%)**	0 (0%)	**1 (33%)**	**1 (100%)**	**4 (18%)**
	No	1 (6%)	0 (0%)	0 (0%)	0 (0%)	1 (5%)

Table 37. Answers of EV non-users on potential usage of EV as a primary vehicle

- Among all EV non-users who chose "Yes" and "Maybe", the main motives for them were low/no fuel costs (17%, 9 people), elimination of greenhouse effects (17%, 9 respondents), tax credits and incentives from the government (17%, 9 people) and less/no dependency of fossil fuel supplies (15%, 8 respondents). Apart from the USA with no answers on the question regarding the willingness to have an EV in the future, the distribution of the answers in Germany and in Ukraine was similar, see Table 38.

What will be the main motivation for you to have an electric vehicle?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Low/no fuel costs	**8 (18%)**	0 (0%)	**1 (11%)**	0 (0%)	**9 (17%)**
Less/no dependency on fossil fuel supplies	**8 (18%)**	0 (0%)	0 (0%)	0 (0%)	**8 (15%)**
Elimination of greenhouse emissions	**7 (16%)**	0 (0%)	**2 (22.5%)**	0 (0%)	**9 (17%)**
Tax credits and incentives from the government	**7 (16%)**	0 (0%)	**1 (11%)**	**1 (100%)**	**9 (17%)**
Maintenance: less expensive and less frequent	2 (4%)	0 (0%)	**2 (22.5%)**	0 (0%)	4 (7%)
Quiet running	**6 (14%)**	0 (0%)	**1 (11%)**	0 (0%)	**7 (13%)**
Prestigious status	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Innovative technologies	4 (9%)	0 (0%)	**1 (11%)**	0 (0%)	5 (9%)
Other	2 (5%)	0 (0%)	**1 (11%)**	0 (0%)	3 (5%)

Table 38. Answers of EV non-users on their main motivation(s) to have an EV in the future

- As displayed in Table 39, the recommendation from a family, a friend or a colleague to have an EV turned out to not be a relevant factor for the majority of the respondents who didn't have any EV - 77% (23 people). This trend was similar to Germany, Ukraine and "Other" countries.

Would you consider having an electric vehicle if someone from your family or friends/ colleagues recommended it to you?									
Germany		**USA**		**Ukraine**		**Other**		**All countries**	
Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
7 (29%)	**17 (71%)**	0 (0%)	0 (0%)	0 (0%)	**3 (100%)**	0 (0%)	**3 (100%)**	7 (23%)	**23 (77%)**

Table 39. Answers of EV non-users on social factors influencing potential EV usage

The main reasons preventing the respondents from having an EV were mostly related to purchase costs (30%, 21 people), charging infrastructure (16%, 11 respondents) and driving range (16%, 11 people). In Germany and in "Other" countries the results were similar. In Ukraine the main preventing factor was related to purchase costs (49%, 3 people). There were no respondents from the USA to answer this question, see Table 40.

What is the main reason preventing you from having an electric vehicle?	**Germany**	**USA**	**Ukraine**	**Other**	**All countries**
Purchase costs	**16 (29%)**	0 (0%)	**3 (49%)**	**2 (22%)**	**21 (30%)**
Driving range	**8 (15%)**	0 (0%)	**1 (17%)**	**2 (22%)**	**11 (16%)**
Charging infrastructure	**9 (16%)**	0 (0%)	0 (0%)	**2 (22%)**	**11 (16%)**
Service and maintenance costs	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Electricity costs	2 (4%)	0 (0%)	0 (0%)	**1 (12%)**	3 (4%)
Inconvenience to have a vehicle serviced	0 (0%)	0 (0%)	**1 (17%)**	0 (0%)	1 (2%)
Inconvenience to charge a vehicle at home	5 (9%)	0 (0%)	0 (0%)	**2 (22%)**	**7 (10%)**
Uncertain safety	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Uncertain reliability (e.g., unreliable battery technology, innovative digital and customized tools and services)	1 (2%)	0 (0%)	0 (0%)	0 (0%)	1 (2%)
Fear of not being able to sell a vehicle in the used car marketplace	5 (9%)	0 (0%)	0 (0%)	0 (0%)	5 (7%)
No need	4 (7%)	0 (0%)	**1 (17%)**	0 (0%)	5 (7%)
No reason	1 (2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Other	4 (7%)	0 (0%)	0 (0%)	0 (0%)	4 (6%)

Table 40. Answers of EV non-users on main reasons for not willing to have an EV in the future

- Those who didn't have or use an EV at the moment of answering the survey and who wouldn't like to have it in the future were from Germany and from "Other" countries.

  The main reasons preventing these respondents from having an EV in the future were related to purchase costs (20%, 4 people) and driving range 20% (4 respondents). Charging infrastructure (15%, 3 people) and inconvenience of charging a vehicle at home (15%, 3 respondents) turned out to be the next widely chosen results.

- Evaluating the answers to the question "Do you see a rise in usage of electric vehicles (BEVs, HEVs or PHEVs) in your country?" on a cross-country level, 96% (70 people) of BEV drivers; 83% (5 respondents) of HEV/PHEV users and 87% (26 people) of those who didn't have an EV said "Yes". Among the EV users, in the USA, in Ukraine and in "Other" countries the answers were comparable. In Germany HEV/PHEV drivers answered equally "Yes" (50%, 1 person) and "No" (50%, 1 person), see Table 41 and Table 42.

Do you see a rise in usage of electric vehicles (BEVs, HEVs or PHEVs) in your country?					
	Germany	**USA**	**Ukraine**	**Other**	**All countries**
Yes, there are more and more people switching to these vehicles	**45 (96%)**	**9 (100%)**	**12 (92%)**	**4 (100%)**	**70 (96%)**
No, there are fewer people using these vehicles now	2 (4%)	0 (0%)	1 (8%)	0 (0%)	3 (4%)

With more affordable BEVs, HEVs or PHEVs, better charging infrastructure and other developed innovative solutions for BEVs, HEVs or PHEVs, will you be more eager to make your choice towards BEVs, HEVs or PHEVs during the next 5-15 years?					
	Germany	**USA**	**Ukraine**	**Other**	**All countries**
Yes	**43 (92%)**	**9 (100%)**	**10 (77%)**	**4 (100%)**	**66 (90%)**
Maybe	2 (4%)	0 (0%)	3 (23%)	0 (0%)	5 (7%)
No	2 (4%)	0 (0%)	0 (0%)	0 (0%)	2 (3%)

Table 41. Answers of BEV users on future EV trends

Do you see a rise in usage of electric vehicles (BEVs, HEVs or PHEVs) in your country?					
	Germany	**USA**	**Ukraine**	**Other**	**All countries**
Yes, there are more and more people switching to these vehicles	**1 (50%)**	**1 (100%)**	**3 (100%)**	0 (0%)	**5 (83%)**
No, there are fewer people using these vehicles now	**1 (50%)**	0 (0%)	0 (0%)	0 (0%)	1 (17%)

With more affordable BEVs, HEVs or PHEVs, better charging infrastructure and other developed innovative solutions for BEVs, HEVs or PHEVs, will you be more eager to make your choice towards BEVs, HEVs or PHEVs during the next 5-15 years?					
	Germany	**USA**	**Ukraine**	**Other**	**All countries**
Yes	**1 (50%)**	0 (0%)	**2 (67%)**	0 (0%)	**3 (50%)**
Maybe	**1 (50%)**	**1 (100%)**	**1 (33%)**	0 (0%)	**3 (50%)**
No	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 42. Answers of (P)HEV users on future EV trends

- When answering the last survey question regarding the chance to make a choice towards BEVs, HEVs or PHEVs in the future, with better charging infrastructure and other developed solutions for EVs, 90% (66 people) of BEV users and 50% (3 respondents) of HEV/PHEV drivers answered positively. The answers among BEV drivers were similar to the answer for each individual country. To compare, another half of HEV/PHEV users were not so sure and chose the answer "Maybe". This reflected the trend in Germany and Ukraine while in the USA all HEV/PHEV users answered positively.

- Among those respondents who didn't use EVs, 50% (15 people) would consider making their choice towards BEVs, HEVs or PHEVs in the future; 30% (9 respondents) were not sure about their answer and 20% (6 people) said "No". In Ukraine all 100% (3 respondents) answered positively. Majority of the respondents – 87% (26 people) – also answered positively on the question whether they saw a rise in usage of EVs, see Table 43.

		Germany	**USA**	**Ukraine**	**Other**	**All countries**
Do you see a rise in usage of electric	**Yes, there are more and more**	**21 (87%)**	0 (0%)	**3 (100%)**	**2 (67%)**	**26 (87%)**

vehicles (BEVs, HEVs or PHEVs) in your country?	**people switching to these vehicles**					
	No, there are fewer people using these vehicles now	3 (13%)	0 (0%)	0 (0%)	1 (33%)	4 (13%)
With more affordable BEVs, HEVs or PHEVs, better charging infrastructure and other developed innovative solutions for BEVs, HEVs or PHEVs, will you be more eager to make your choice towards BEVs, HEVs or PHEVs during the next 5-15 years?	**Yes**	**12 (50%)**	0 (0%)	**3 (100%)**	0 (0%)	**15 (50%)**
	Maybe	**8 (33%)**	0 (0%)	0 (0%)	**1 (33%)**	**9 (30%)**
	No	4 (17%)	0 (0%)	0 (0%)	**2 (67%)**	6 (20%)

Table 43. Answers of EV non-users on future EV trends

ADDITIONAL ASPECTS

- If to consider the group of users who had an EV at the moment of answering the survey and their answers on the question “With more affordable BEVs, HEVs or PHEVs, better charging infrastructure and other developed innovative solutions for BEVs, HEVs or PHEVs, will you be more eager to make your choice towards BEVs, HEVs or PHEVs during the next 5-15 years?”, 90% (66 respondents) of BEV users answered positively; HEV/PHEV drivers answered equally either “Yes” (50%, 3 people) or “Maybe” (50%, 3 respondents). 80% (24 people) of those who didn’t have an EV answered “Yes” or “Maybe”. In Germany and in Ukraine the trend with answers was similar, in the USA all BEV users (100%, 9 people) answered “Yes" and 1 PHEV user chose “Maybe”. All BEV users (100%, 4 respondents) from “Other” countries answered positively while 3 survey participants who didn’t have an EV were mainly negative (67%, 2 people); 1 respondent chose “No”.

- The BEV drivers from all countries who felt satisfied with the BEV they used (93%, 68 people) also answered positively on the question about their eagerness to switch to BEVs, HEVs or PHEVs in the future, when they become more affordable, the infrastructure is better and there are more solutions for EVs - 97% (73 people) answered “Yes” and “Maybe”. This trend was comparable to the answers in each country, with no negative answers. Only in Germany 4% (2 respondents) answered negatively. In “Other” countries the answers were 100% positive (4 respondents). As per HEV/PHEV users, all of them (100%, 6 people) also answered “Yes” and “Maybe”. Comparable responses were in each country.

- The BEV drivers from all countries who felt satisfied with the BEV they used (93%, 68 people) also answered positively in their majority to the question “Do you see a rise in usage of electric vehicles (BEVs, HEVs or PHEVs) in your country?” - 96% (70 people); 4% (3 respondents) said “No”. Similar results were in Germany and Ukraine. In the USA 100% (6 people) and in “Other countries” 100% (4 people) chose “Yes”. There was a similar distribution of the answers for HEV/PHEV drivers in all countries overall, in Germany and in “Other” countries. In the USA 100% (6 people) and in Ukraine 100% (4 people) chose “Yes”.

Overall, many responses were similar across Germany, the USA and Ukraine. Majority of all respondents had or used BEVs rather than HEVs/PHEVs, they bought or financed their EVs, had other non-electric vehicles but used their EV as the primary vehicle, or used their EV as the only vehicle. And the most common usage of the EVs was both inside and outside the living areas. The survey answers have also proved that safety and reliability were not problems for them. Moreover, the majority of the respondents said they felt satisfied with their vehicles.

Considering the demographic characteristics such as age, marital status, the size of the household, education level, employment and the level of income, the survey proved that they play an important role. The main EV users who participated in the questionnaire were in the age group category of 35-54 years old, married, mainly living with a few other family members, had higher education, worked full-time and had a middle or a high income. This showed that people who were educated, already reached a certain career level, had families and certain values and beliefs were more inclined to use or have EVs. More detailed demographic comparison between EV users and non-users is displayed in Table 8.

Talking about the main motives influencing the respondents' decisions towards EVs, innovative technologies, elimination of greenhouse effect, low/no fuel costs, quiet running and less/no dependency on fossil fuel supplies were the top factors. Analyzing the motives from the demographics point of view, major differences can be visible among different countries. For example, while in Germany people paid more attention to nice features and innovative technologies, in the USA the factors related to the costs were more important. And in Ukraine the cost efficiency, less expensive and less frequent maintenance and innovative technologies played the biggest role. Also, the factors related to the cost efficiency and less fuel consumption were the most important ones for the respondents in the middle of their careers, either single or being married and with a lower income. This can be explained with the fact that during this period of the life people may have many different expenses they need to take care of. And in the earlier or later stages of life, people care more about other things related to pleasant and comfortable ways of living. Elimination of greenhouse emissions was proved to be an important factor for people regardless of their age, a level of education, income and a country of living.

For the majority of the EV drivers, driving range and charging infrastructure were the biggest inconveniences. In Germany the respondents have also highlighted electricity costs. The overall view of the answers on the current and potential EV ownership type, usage, motivators and barriers to EV adoption between current EV drivers is displayed in Table 45 in Appendix F.

Since majority of the respondents answered positively about having someone from the family or friends/colleagues circle who also used an EV, it's possible to assume that peer influence may have played a role for the respondents when getting an EV, and they could have been more inclined to adopt an EV because of the influence from their social circle. However, when they were asked directly about considering having an EV if someone from their friends or family would have recommended that to them, the answer was mainly negative. Such answers may mean that social circles may influence decisions indirectly, without people realizing that consciously.

The main differences in answers between countries were related to the Ukrainian and US respondents using BEVs mainly inside the living areas and using their HEVs/PHEVs both inside and outside. This may mean that these users rely more on the hybrid solutions to drive their vehicles outside the living areas. Another difference was that in the US and in Ukraine the reason to have less expensive and less frequent maintenance was an additional main motivation to use BEVs highlighting the importance of saving costs. To add, in Ukraine no one selected tax credits and governmental incentives as a motivation

which can be explained by a lack of such support and corresponding programs in this country. Another difference was related to the charging behavior. While for the majority of the BEV respondents, using charging stations at home was the most common answer, Ukrainian survey participants answered about using mainly standard outlets at home for charging their EVs which can be a more cost-efficient way of charging.

The survey showed a positive trend towards future EV consumer behavior. Regardless of the fact of having an EV or not, the majority of both survey participant groups were eager to have an EV (as a replacement or a second EV for those who already had or used an EV, or as a first EV for those who didn't have it) in the next 5-15 years, see Table 46 in Appendix F.

Those who didn't have an EV but would like to have it were open to buy or finance it and use it as the only or the primary vehicle. They had similar demographic characteristics to those who had EV but were in a slightly younger group aged 25-44 years. The difference between them and those who wouldn't like to have an EV in the future was mainly related to the age – the latter were in the older group aged 55-64 years. Another difference was the country of living - those who wouldn't like to have an EV were from Germany and from "Other" countries.

Main reasons motivating them in getting a new EV were related to a few different factors combined such as low/no fuel costs, elimination of greenhouse effect, quiet running, innovative technologies, less/no dependency on fossil fuel supplies and tax credits and incentives from the government. Similar to the answers of EV drivers, the recommendation from a family, a friend or a colleague to have an EV turned out to not be a relevant factor for those who didn't have an EV. Purchase costs, charging infrastructure and driving range remained top reasons preventing respondents from having an EV, regardless of using an EV at the moment of answering the survey, or not.

Regardless of the different EV market changes, all respondents answered positively about the rise in usage of EVs in their countries.

Chapter 6: Discussion

Chapter 6 presents the outcomes of the research results described in Chapter 5 and discusses their meaning in relation to a few factors. First, it explores the findings from the perspective of the formulated research questions. Secondly, the results are compared to the findings of other studies on the topic of tendencies and specialties of EV industry developments in Germany, the USA and Ukraine as well as to the recent economic, political and social changes in these three markets. And third, based on the obtained outcomes, there are developed opportunities for the possible future studies and recommendations on potential usage of the results.

Section 6.1 provides a detailed analysis and interpretation of the results by analyzing them from the perspective of 5 formulated research questions and whether they prove or disprove the supportive hypotheses to each research question.

Section 6.2 describes the findings in a way of comparing them to the results of other research. In particular, there are analyzed motivators and barriers to EV adoption; specialties of consumer behavior considering the types of EV ownership, usage and charging; demographic and social variables; as well as future trends. There are also covered EV developments and trends based on the recent changes in governmental support and tariffs as well as in charging infrastructure.

Based on the received interpretations, Section 6.3 refers to the research limitations influencing the received results and provides the directions for future studies as well as recommendations for marketing specialists, automotive players, governmental structures and energy companies on the ways to address the evolving needs of current and potential EV users and positively impact EV adoption in the future in all three countries.

6.1 Thesis discussion

Considering the hypotheses for the **first research question** which are mentioned in Chapter 4, the reduction in environmental pollution was among important reasons for people to start using EVs (specifically BEVs). The survey answers proved that the EV users were encouraged to switch to EVs for low fuel and maintenance costs, for other special state or local incentives bringing down the costs of buying or leasing electric cars as well as for additional values added to the cars, such as better performance and special innovative digital and customized tools and services. This means that *the survey*

results proved the first, the second and the third hypotheses of the first research question. The fourth hypothesis regarding the automotive users feeling satisfied with their BEV, HEV and PHEV vehicles and considering them safe and reliable *was also proved.*

The answers of the *industry professionals* varied at this point, depending on the market. While the environmental impact was more highlighted by the respondents from Germany, the respondents from the USA and Ukraine stated that this factor was not a priority for people in the USA and Ukraine but could become more relevant in the future. To add, tax advantages and nice or special features were mentioned as the main reasons for people to buy EVs in the USA and in Germany while the latest technologies and operational costs and features were more important for the users in Ukraine. Safety and reliability were also unquestionable.

When studying the obstacles keeping the automotive users away from buying EVs to answer the **second research question**, there were considered two main respondent groups - the users who had an EV at the moment of answering the survey and were asked about having another EV and the respondents who didn't have it. As per *the first and the second hypotheses* about a lack of charging infrastructure and low driving range keeping the users away from switching to electric vehicles, they *were not confirmed by the first category of users* (main answers were "Purchase costs", "No need" and "No reason"). While "No need" and "No reason" were mainly prevailing among the respondents from Germany and the USA, in Ukraine the respondents mostly chose "Purchase costs". However, *the first hypothesis was partially proved by the users who didn't have an EV* at the moment of answering the survey but would like to have it. A similar situation was with the users who didn't have an EV at the moment of answering the survey and wouldn't like to have it. In this case, in addition to charging infrastructure and driving range, another influencing factor was purchase costs. Considering different markets, while in Germany "Purchase costs" and "Driving range" were the top preventing reasons, in Ukraine the top reason was related to "Purchase costs". The results among different user groups proved expected differences in the consumer behavior. Those who already had an EV, could have had other priorities in terms of vehicles or purchases in general whereas the choice of those users who didn't have an EV would be mainly framed with the factors related to the purchase of EVs.

Considering the second hypothesis, reliability and safety were not decision-influencing factors neither for the respondents who already had EVs nor for the respondents who didn't have them. Therefore, the *survey results did not confirm the second hypothesis*.

From the *industry professionals'* point of view, main factors keeping people away from switching to EVs varied across different markets. In particular, in the USA there were mentioned factors such as not so good or missing infrastructure and high purchase prices. In Germany, in addition to these factors, a specific mindset of people as well as an effect of EVs losing their performance with time for reselling purposes also played an important role. To compare, the Ukrainian market had a completely different situation, with uncertainty about the future and a fear regarding a potential shortage of electricity in the country.

To answer the **third research question** about EV users and their behavior in German, US and Ukrainian markets and how different it is or not, there were developed three hypotheses stating that EV consumers' behavior is different in these three markets based on the ways EVs are owned, used and charged.

As per the first hypothesis, it was confirmed. Even though buying or financing was the prevailing form of owning the vehicles for the respondents from all countries, there were still small differences in answers, especially in owning a (P)HEV among German respondents.

To measure the ways the respondents used their vehicles, they were asked questions whether they had one or more electric or non-electric vehicles; whether they used their vehicles as primary ones; whether they used their vehicles inside or outside their living areas; whether they would consider using another EV that they would like to own as a primary one. Based on all these answers, there were recorded certain *differences between the markets proving the second hypothesis.*

The third hypothesis about different charging behavior was also proved. While in Germany and in the USA the majority of the respondents used special charging stations at home, in Ukraine the majority used standard outlets at home.

Therefore, the conclusion for the third research question is that EV consumer behavior in Germany, the USA and in Ukraine is different based on the ways the respondents own their EVs, the ways they use and charge them. Such results were expected, proving the difference in consumer behavior across different markets.

To add, the interviewed *industry professionals* specifically highlighted the differences in charging behavior connected with different charging conditions in different markets. The respondent from the

USA stressed the lack of charging infrastructure, especially in rural areas whereas the respondents from Germany explained the difference in charging infrastructure between urban and rural areas with mainly different charging options. In Ukraine the situation was completely different and connected with an active phase of development, regardless of the war situation.

The **fourth research question** focused on the influence of demographic and social factors on consumers' decisions, considerations and motives in Germany, the USA and in Ukraine.

There were more similarities than differences among the respondents from different countries considering demographic characteristics. However, considering inconsistencies in the results, *the first hypothesis was partially proved.*

The connection of the demographic factors' influence with EV users' considerations regarding their EV safety, reliability and satisfaction was consistent with the results of the overall profile of EV users and their demographic specialties. However, there was no difference among the answers of the respondents from Germany, the USA and Ukraine. *This means that the second and the third hypotheses were not confirmed.*

To validate the fourth hypothesis about how consumers' decisions and preferences towards EVs were framed by both demographic and social factors, there was checked a connection between the fact of a user having an EV and the demographic factors such as a country of living, age, marital status, a number of people living in the household, the highest obtained degree of education, an employment status and a level of income; as well as with the social factors such as someone among friends or colleagues having or using an EV and a user considering having an EV based on recommendations from friends or colleagues.

On the demographic level, the hypothesis was proved. The survey results showed that the most typical EV users in Germany, Ukraine and "Other" countries were aged 35-54, married or living in a domestic partnership in the household of 2 people, having a higher level of education, full-time employed and had middle or high income. In the USA the difference concerned age and an education level while in Ukraine the income level was different. On the contrary, those who didn't have any EV yet, were in a slightly younger age group; a lower percentage of these respondents was married or living together with a partner.

But the type of employment, the level of education and the level of income were similar to the ones that users with EVs had.

Regarding the social factors, the majority of EV users had someone in their families or among their friends or colleagues using an EV. However, when the survey participants were asked about considering having an EV if someone from their friends or family would have recommended that to them, the majority answered negatively. Similar to the answers of EV drivers, the recommendation from a family, a friend or a colleague to have an EV turned out to not be a relevant factor for those who didn't have an EV. *In this case, peer and social influence is partially proved and may be indirect.* While it is easier to distinguish a main EV user group based on demographic results, the conclusion as well the question of how strong or weak the connection or correlation between the demographic and social factors will require further research. This means that *overall, the fourth hypothesis was partially proved.*

Considering respondents' motivational reasons towards having or using their EVs, there were noticed specific tendencies in terms of the country of living, age and the level of income. For example, while elimination of greenhouse emissions was a relevant factor for the respondents from all countries, quiet running and innovative technologies were mostly chosen by the respondents form Germany; low/no fuel costs and less/no dependency on fossil fuels were prevailing factors among the respondents from the USA and low/no fuel costs, less expensive and less frequent maintenance and innovative technologies were the most popular answers for the participants from Ukraine. These answers were similar for both BEV and HEV/PHEV users. To conclude, the results of the motivational factors showed specific differences between the markets, with a focus on more qualitative features for the German market, on a more financial side for the USA market and on both financial, fuel-related and at the same time innovative-related features for the Ukrainian market.

To add, with a slight difference between BEV and HEV/PHEV users, the factors such as elimination of greenhouse effect, innovative technologies and driving fun were more important for younger drivers than for older ones. On the contrary, the respondents from the older age group gave preferences to less/no dependency on fossil fuels, less expensive and less frequent maintenance and quiet running of the vehicle while elimination of the greenhouse emissions remained a relevant factor for people of all age categories.

Another tendency was that while low/no fuel costs, less expensive and less frequent maintenance and

quiet running were the choices made more by people with a lower income; innovative technologies and environmental reasons were chosen more by the respondents with a higher income.

Regarding other factors, they all to a certain extent - sometimes less, sometimes more - were relevant for the respondents representing different marital levels, sizes of households, levels of education and types of employment. These factors may require further research, with a bigger sample size, especially with respondents from the USA and Ukraine. This means that *the fifth hypothesis was partially proved.*

To conclude, the hypotheses for the fourth research question may require further research to better understand the correlations between decisions, considerations and motives of EV users in Germany, the USA and Ukraine and demographic and social factors.

The *industry professionals* also provided a few descriptions of EV users depending on the users' demographic features, motives and values. This may lead to the conclusion that there is no unique EV target user audience, and the users' portrait can be shaped by different variables and factors.

To answer **the fifth research question** about the most common motives and choices among EV consumers in Germany, the USA and Ukraine in the next 5-15 years, the survey participants (the current EV users as well as those respondents who didn't have any EV at the moment of answering the survey but would like to have one) were asked questions about their main motivations to have an EV in the future. These questions were covered by the first and the second hypotheses. When validating these hypotheses, the results of the survey showed that for BEV users, elimination of greenhouse effects remained an important factor to get another EV vehicle, along with low/ no fuel costs and tax credits or incentives from the government. Only in the USA, elimination of greenhouse effects was chosen to be the most important factor. To compare, for HEV/PHEV users, motivation to get another EV vehicle was related to low/no fuel costs, innovative technologies and quiet running. And as per those respondents who didn't have any EV at the moment of answering the survey but would like to have one, the environmental concern was also chosen as one of the main influencing factors. Therefore, *the first hypothesis was confirmed.*

Consequently, less dependency on fossil fuel supplies was not chosen as one of top reasons to switch to EVs. Therefore, *the second hypothesis was disproved.*

The third hypothesis regarding the EV users' motivation to have an EV being framed both by demographic and social factors was partially confirmed. In this case none of the respondents from the USA showed a desire to have an EV. Therefore, geographically-wise the answers are representative for Germany, Ukraine and "Other" countries. Considering other demographic characteristics, the tendency to have an EV in the future was mainly relevant for a younger group of the respondents in the age of 25-44, being married or living in a domestic partnership, having 2 or 3 people living in the household, having higher education, working full-time and having a middle or high income. This portrait was also representative for the respondents from Germany. In Ukraine and in "Other" countries, however, the characteristics were slightly different. And the social aspect, specifically in this research - the recommendation from a family, a friend or a colleague to have an EV - turned out to not be a relevant factor for the majority of the respondents from each country individually. Therefore, while demographic features were partially confirmed to frame the EV users' motivation, social factors, on the contrary, were disproved.

The fourth hypothesis stated that with affordable EVs, better charging infrastructure and other developed innovative solutions for EVs, automobile consumers would be more eager to make their choice towards EV during the next 5-15 years. And *the answers confirmed this (fourth) hypothesis*, with the majority of the respondents from all asked countries saying "Yes" or "Maybe".

Thus, answering the fifth research question, we can state that in 5-15 years, people will be eager to make their choices towards EVs if EVs are affordable, charging infrastructure is developed in a proper way and there are available various innovative salutations. Additional motives positively influencing people will be low/no fuel costs, tax credits or incentives from the government and elimination of greenhouse gas effects. From these results, we can see a positive trend towards EVs and their adoption if specific needs and conditions are met.

Based on the industry professionals' answers, the future EV user motives in Germany, the USA and Ukraine were also stated to be similar in terms of good charging infrastructure, affordability and innovations. Additional mentioned factors were durability of EVs in general for the USA; high driving range and proper legislation for Germany; and good economic benefits and proper "residual value" for Ukraine.

6.2 Results from other research works

MOTIVATORS TO EV ADOPTION

Considering other researches covering the topic of consumer choices towards EVs in Germany, the USA and Ukraine and the factors influencing and shaping these choice and consumer behavior in general, Kantar conducted a research among 4,000 people across four countries - the USA, UK, Germany and Singapore - studying the factors that motivate consumers to consider purchasing an EV and the factors that may deter them from making such decision (Kantar, 2023). In this case the results on the current consumer behavior and consumers' future intentions regarding buying an EV as well as motivations and barriers to EV adoption turned out to be similar with these research results. The Kantar research focused on different types of questions and covered a higher number and a more diverse group of the respondents including gasoline and diesel car users. To compare in this research the respondent group was related only to the EV specialization. In particular, according to this research, BEVs were the most popular choice in Germany (96%) and in the USA (90%), followed by a HEV/PHEV vehicle. The results of Kantar study demonstrated that the majority of the respondents still primarily drove gasoline vehicles. Also, Kantar study didn't specify whether they distinguished hybrid vehicles into HEVs and PHEVs or not. Therefore, comparing the results of both studies on the current adoption of EVs may not be valid.

Considering the question regarding consumers' intention to buy an EV for their next car, in Germany the results of both research studies were similar, with BEVs being one of the top choices in this research (92% among current BEV users; 50% among HEV/PHEV users) and a top choice in Kantar study (22%). In the USA, however, hybrid cars took a leading position in the Kantar study (22%) while in this research the results pointed towards BEVs (89% among BEV users; 100% among HEV/PHEV users). And again, since there was no information regarding whether Kantar distinguished hybrid vehicles into HEVs and PHEVs, thus, comparison if these results are not accurate.

Talking about motivators for current EV users, the results of both studies were similar, with cost savings and a *positive environmental impact* being among top influencing reasons. Considering potential EV users, the motives in these two studies were defined slightly differently. Some factors that Kantar defined in its study as the important ones for those to consider buying an EV such as "driving performance and range", availability of charging stations" etc. were partially categorized in this study as potential obstacles. Nevertheless, while Kantar suggested that the priorities of potential buyers differed from those

of the current EV users, in this research the results were similar. To add, while Kantar specified differences in the preferences among potential buyers within different regions of the US, there were no US respondents answering the questions about their plans to have an EV in the future and their potential motives. Therefore, comparison of the results on the future motives of the US consumers is not possible.

Comparing barriers to EV adoption among potential EV buyers, the results of Kantar study and this research pointed to similar problems in Germany related to the limited driving range, high purchase costs and lack of charging infrastructure. In the USA there were no respondents among potential EV buyers in this study to compare the results for this market.

While Kantar study suggested that hybrid cars are getting more attractive for consumers, the results of this study didn't show such a trend. Therefore, it's not accurate to make such conclusions based only on this research. But based on the results of both studies, it's possible to conclude that the future of EVs looks generally optimistic and consumers are interested in further adoptions of EVs, especially considering improvements in terms of infrastructure, pricing policy and vehicle features.

Environmental concerns as well as other factors which were discussed in this research have also been found to play an important role for consumers. For example, the relevance of *lower greenhouse emissions, purchase costs, driving range and the vehicle performance* was discussed in the studies by Mandys (2021), Rezvani (2015) and others.

The importance of *lower consumption and maintenance costs* for EV consumers was also discussed in other studies, suggesting that these factors can even compensate for a higher purchase price (Gallagher & Muehlegger, 2011; Lane and Potter, 2007). To add, Rousseau et al. proved that for PHEVs, longer ownership durations and higher annual mileage are more advantageous for their relevant cost of ownership (RCO). The benefit of lower fuel costs as another motivational factor was also identified in the studies of Jiao et al. (2023), Alanazi (2023), Kamguia Simeu (2018) and others. These results are consequent with the results of this research and the survey, showing that the maintenance, particularly less expensive and less frequent, was one of other motives influencing EV adoption.

Another highly ranked by the respondents of this research survey motivation to EV adoption was related to the *innovative technologies*. This result was unexpected, considering environmental and cost-related issues to be widely cited motivators. In particular, innovations received one of the highest rankings

among the current EV users explaining their motivation to switch to EVs as well as among the current EV users considering buying another EV. However, for the respondents who didn't have or use an EV but considered adopting an EV in the future, this factor lost its relevance and received a lower position in the ranking. These research results can be explained with the diffusion of innovation (DOI) theory. The latter identifies five key factors that affect the decision to adopt from the innovation point of view. And these factors are the following: relative advantage, compatibility, complexity, trialability, and observability (Peters & Dütschke, 2014; Rogers, 1962, 1995). The intention to adopt EVs for the innovativeness feature was discussed by Schuitema et al. (2013). He defined "consumer innovativeness" as the intention to purchase new products earlier than most other consumers. And the reasons for this were named were instrumental, hedonic and symbolic motives.

Talking about fossil fuels from the consumers' perception point of view, very few studies discussed consumers' desire to switch to EVs to minimize their own *fossil fuel dependency*. For example, Brown et al. (2023) raised a relevant topic of the war in Ukraine, mentioning that the sharp rise in fossil fuel prices, driven by the conflict in Ukraine, could trigger a significant shift in thinking, where consumers view fossil fuels - such as oil, coal, and gas - as having high collective costs and limited collective benefits. Other researchers mainly focus on fossil fuel reliance and the ways to minimize it from the ecological perspective. In line with Brown, this research has also shown that less/no dependency on fossil fuel supplies was chosen as one of the strong motivations. However, in the interviews for this research the industry professionals from Germany commented that the relevance of dependency on fossil fuels seemed to decrease in the market.

Several studies highlighted the significance of *government support* in further EV adoption (Gallagher and Muehlegger, 2011; Hardman et al., 2017; Jiao et al., 2020). To add, the policy measures have been categorized into three groups - financial incentives, information provision, and convenience policies (Wang et al., 2017). It's been also demonstrated that all three of them are associated with the intention to adopt EVs. Hackbarth and Madlener (2013) discovered that while consumers did not place high value on government subsidies for purchase prices, vehicle tax exemptions and non-monetary incentives could still increase the likelihood of selecting an EV. Such results slightly differ from the results of this study, demonstrating that tax credits and incentives from the government were a considered factor by current EV drivers but were not chosen as a priority for their motivation. On the contrary, potential EV users from Germany, Ukraine and "Other" countries who didn't have an EV at the moment of answering the survey but would like to have one in the future considered governmental support as one of key factors.

Moreover, this factor was chosen by more participants from Germany than by respondents from other countries. The differences in results would require further studies on the governmental support level, especially considering changes in policies.

A study by Kato and Yokote (2023) showed that the *quietness of EVs* turned out to be more attractive for consumers (especially among younger respondents and men) than the sound of the sports car engine. And this research also demonstrated the big importance of quiet running since this choice was among the most highly ranked ones, especially among German survey respondents.

Talking about *reputation and status*, some authors (Barbaro et al., 2001; Lane and Potter, 2007) proved them to be important for consumers to be able to show others their socially responsible values. While these features were mentioned in the interviews to be important for EV users in the USA and in Ukraine, in the survey the variable of prestigious status unexpectedly received only one response among all participants.

BARRIERS TO EV ADOPTION

Earlier in the studies, researchers concluded that one of the primary barriers to the adoption of EVs is their high initial cost, which is generally higher than that of traditional vehicles (Bjerkan et al., 2016; Lane and Potter, 2007; Wang et al., 2023). The answers of both current and potential EV users of this research proved this conclusion. Regardless of the fact whether those respondents already used an EV or didn't have an EV and would like or wouldn't like to have it in the future, one of the main preventing reasons was *purchase costs*. The industry professionals also agreed on the fact of EVs being expensive. Thus, we can conclude that if EV prices do not decrease, their market share and overall adoption may remain limited.

Driving range, which refers to the distance an EV can travel before requiring a battery recharge, was one of other top inconveniences for the potential customers in this research. While some studies showed the driving range in the low ranking of barriers to EV adoption (Hladik et al., 2023; Adapetu & Keshav, 2015), the majority of other studies proved the driving range to be still important (Hoen and Koetse, 2014; Wei et al., 2022). It has been demonstrated that a greater driving range increases the acceptance of EVs, while a limited range negatively affects their acceptance, adoption, usage and distribution. There is

also a specific term used in this case - range anxiety, which refers to the concern that the battery might deplete before reaching a charging station (Buhmann & Criado, 2022).

Even though, according to the data, there are positive changes in terms of *charging infrastructure* - in 2023 the numbers of public charging stations have grown to over 106,431 points in Germany; to over 60,000 points in the USA; to over 10,000 points in Ukraine - the infrastructure factor remains crucial for many customers. Although the respondents in this research who already used an EV and would like to have another one didn't name infrastructure to be a barrier for them, this factor turned out to be a crucial one for the potential customers, especially from Germany and "Other" countries and their EV adoption. According to the answers of the industry professionals, the situation with the charging infrastructure differed and also required further improvements in different markets. Nevertheless, the survey results on the question regarding the chance to make a choice towards BEVs, HEVs or PHEVs in the future, with better charging infrastructure and other developed solutions for EVs demonstrated a positive tendency to EV adoption in the future. Such outcomes are similar to other studies. For example, it's been proven that sufficient charging infrastructure, charging capacity and timing may have substantial effects on the preferences for EVs (Hoen & Koetse, 2014; Chakraborty et al., 2021). Moreover, it's suggested that high-power public charging infrastructure is essential along travel corridors to support long-distance driving and should complement standard charging options (Figenbaum & Kolbenstvedt, 2016; Gnann et al., 2019; Hall & Nicholas, 2018).

As per *safety and reliability*, all current EV users who participated in the survey considered their vehicles safe and reliable, regardless of the market. Safety and reliability were also no main barriers for the potential EV adopters. While the results for the first category were expected, the results for the second category turned out to be unexpected. And they also differed from the results of the already conducted studies by other researchers (Punnakitikashem et al., 2017; Ma et al., 2017), which showed concerns regarding these two factors and were explained with fears about the battery igniting in the event of an accident.

The *fear of not being able to sell a vehicle in the used car marketplace* was also chosen by a very few current EV users - from Germany - as the barrier to having another EV. This is showing how the understanding of the residual value of EVs is changing with the industry developments. The resale value of EV was shown by other researchers to become another significant barrier to consumers (Berkeley et al., 2018; Bernauer et al., 2021).

CONSUMER BEHAVIOR - EV OWNERSHIP, USAGE, CHARGING

To better understand the consumer behaviors, this research focused on studying the EV ownership, usage and charging preferences and patterns. Considering the *forms of ownership*, buying or financing the vehicle was the prevailing answer among the survey respondents from all markets. These results can be explained with governmental subsidy programs, especially in Germany and the USA, and tax exemptions in Ukraine. However, with changing governmental support and subsidies as well as with development of the EV rental offers, such tendency may change towards the rental and leasing preferences (Cebecauer et al., 2019; Shao et al., 2021). And the findings from the S&P Global Mobility's survey suggested that although 67% of the 7,500 participants surveyed in May 2023 were receptive to the idea of buying an EV - an increase from 2019 - this represented a 19%-point drop compared to 2021 (S & P Global Mobility, 2023).

The results of this research showed that the survey respondents *used their EVs along with another electric or non-electric vehicle* and used them as their *primary vehicles*. Such results were more representative for BEV drivers while the results for HEV/PHEV drivers were more diverse. And the data regarding usage patterns for EVs from other studies is also proving this, even highlighting that EVs are predominantly used for everyday commuting and shorter trips (S & P Global Mobility, 2023; Chowdhury et al., 2024) Potential EV users considered driving their EVs as their only and primary vehicles. This shows a positive change in the EV perception among potential EV buyers and potentially less fear regarding charging options and less range anxiety. Moreover, current EV users answered to be already using their EVs both inside and outside their living areas.

The answers from the survey of this research about *the ways of charging EVs* showed that using special charging stations at home was the most preferable way for the respondents in Germany and the USA while in Ukraine it was more common to use standard charging outlets at home. The results are similar to McKinsey’s survey, demonstrating that respondents prefer charging at home, with roughly half of all charging sessions taking place at their residences. European respondents reported the highest rates of home charging (Fischer, 2024).

DEMOGRAPHIC VARIABLES

Talking about other studies on consumers' preferences for EVs, Buhmann and Criado in their paper "Consumer preferences for electric vehicles: The role of status and reputation" mention specific consumers' variables and their relation to the behavior (Buhmann & Criado, 2022). In particular, they mention inconsistent results for demographic variables. For example, while some literature (Mandys, 2021; Hackbarth and Madlener, 2016; Barbaro-Forleo et al., 2001) and statistical reports (Carlier, 2022) show that EV consumers "are rather young", other authors (Jansson et al., 2017; Dütschke & Peters, 2014) stress the older age when consumers are more willing to purchase green vehicles. The latter argument is more consistent with the results of this study, with people in the age of 35-54 having or in the age of 35-44 willing to have EVs. They also covered the variables such as gender suggesting that "females are more likely to prefer EVs than men", education stating that "higher education leads to an increased probability of preferring an EV over an ICEV" and income saying that "higher income leads to an increased probability of preferring an EV."

Also, according to the study of BEV consumers in Ukraine during 2021-2023 by Pro-Consulting, the primary buyers of these vehicles are young professionals (25-35 years old) and affluent older adults (45-55 years old), both having a higher income. These groups, often residing in cities or suburbs, value environmental consciousness and social responsibility. While younger buyers prioritize affordability and convenience and are more inclined to buying used vehicles, older buyers seek reliability and comfort and so are more attracted to new vehicles. The number of personal vehicles per family tends to be higher among older adults. Both groups are increasingly drawn to electric vehicles due to their practical benefits and alignment with sustainable values (*Analysis of BEV market in Ukraine,* 2024).

This study also covered the *demographic features* such as education and income. And the results turned out to be similar for the respondents from Germany but more diverse for the respondents from the USA and Ukraine. Based on these results, we can also conclude rather inconsistent results for specific demographic variables that require further research.

Gender, a factor of having children as well as a type of the living area weren't studied in the survey of this research. The type of living area was mentioned in the interviews with the industry experts and so these variables could be studied in further research. Talking about car ownership, the respondents were asked this question to learn more about the trend in general. However, the connection between car usage

or ownership as well as having previous experience with an EV and a probability of preferring an EV wasn't explored in this research.

SOCIAL VARIABLES

Considering the *social factors'* influence, e.g., peer influence on EV adoption, most survey respondents from this indicated having a family member, friend, or colleague who also used an EV. Given that, it's reasonable to infer that peer influence may have contributed to their decision to adopt an EV, potentially making them more inclined to do so. However, when asked directly whether they would consider getting an EV based on a recommendation from someone in their social circle, the majority responded negatively. Such indirect peer effects on the decision-making process were also discussed in the study by Axsen (2020) as well as by Bai and Peng (2024) regarding the peer effect on the adoption of new technologies. Also, the studies showed that in different countries around the world, especially throughout Europe, EV adoption may be linked to the perception by others, to the willingness to opt for an EV to position themselves as "innovation adapters" and align with specific social norms, status and lifestyle (Anastasiadou & Gavanas, 2022). Direct and indirect peer influence on EV adoption can also be one of the specific topics for further studies.

FUTURE TRENDS

The survey of this research showed a positive trend in future EV consumer behavior. Most participants, whether they already owned an EV or not, were eager to own one in the next 5-15 years. Those without an EV were open to buying or financing one as their primary vehicle, with younger participants (aged 25-44) being more inclined to adopt EVs compared to older groups (55-64).

Key motivators included low/no fuel costs, elimination of greenhouse effect, quiet running, innovative technologies, less/no dependency on fossil fuel supplies and tax credits and incentives from the government. The main barriers remained purchase costs, charging infrastructure, and driving range. Despite these challenges, respondents were optimistic about the increasing use of EVs in their countries in the future.

The sales statistics proves a positive trend for EVs. Electric car sales in 2023 surged by 3.5 million compared to 2022, reflecting a 35% year-on-year growth (IEA, 2024). And this figure is over six times

higher than the sales recorded in 2018. Considering Germany, the removal of purchase subsidies in this market slowed EV sales growth. PHEV subsidies ended in early 2023, reducing sales compared to 2022, and all EV subsidies were phased out by December after a Climate and Transformation Fund (CTF) ruling. As a result, electric car sales dropped from 30% in 2022 to 25% in 2023. Nevertheless, Germany became the third country, after China and the United States, to surpass half a million new battery electric car registrations in a single year. Battery electric vehicles accounted for 18% of total car sales, with an additional 6% being plug-in hybrids; the share of HEVs in the German market comprises around 25% (IEA, 2024). To add, while the European Union has revealed the plan of implementing tariffs of up to 38.1% on Chinese EV makers, China remains the largest exporter of EVs to Germany, boosting its share of the electric vehicle import market in the country to 40.9% (*China increases EV market share in Germany despite import slump*, 2024). Talking about the infrastructure, the data from the National Charging Infrastructure Coordination Center (NLL) shows that as of early 2024, there are around 106,431 public charging points across the country, which reflects an increase of approximately 20,000 from 2023 (National Centre for Charging Infrastructure, 2024). And the infrastructure continues to expand, with charging stations becoming increasingly powerful. This is happening thanks to the state support. Moreover, the government also provides subsidies for private wallboxes to assist households and businesses in setting up their own charging infrastructure. Germany now has over one million private and commercial charging stations for electric vehicles. Alongside the officially subsidized wallboxes, there is also a substantial number of privately financed, non-subsidized wallboxes. This results in approximately one charging point available for each electric vehicle in the country (Wendering, 2024).

The U.S. has seen significant growth in EV sales, driven by federal policies like the Inflation Reduction Act, which offers incentives for EV purchases (U.S. Energy Information Administration, 2024). In the second quarter of 2024 the share of HEVs reached almost 9%; the share of PHEVs - 2%; and the share of BEVs - 7%. But this doesn’t relate to the Chinese EVs. To protect local automotive manufactures, in May 2024 U.S. President Joe Biden unveiled a 100% tariff on electric vehicles imported from China which used to compose 1-2% of the total US EV market. Talking about the charging infrastructure, specific laws were introduced, including the 2021 Infrastructure Investment and Jobs Act and the 2022 Inflation Reduction Act, aimed at promoting the growth of electric vehicle infrastructure and boosting EV adoption. This resulted in over 61,000 publicly accessible EV charging stations as of February 2024 (with a goal of establishing a nationwide network of 500,000 public EV charging stations by 2030) and about 6 in 10 Americans living within approximately 3 km of a public EV charger. But even though the

stations exist across the country, the majority of them are still concentrated in and around urban areas and the country still faces challenges in expanding charging infrastructure to meet rising demand (U.S. Department of Energy, 2024). And as of the latest reports in 2024, As of 2024, approximately 1.6 million private chargers for electric and plug-in hybrid vehicles are installed across the United States (U.S. Department of Energy, 2024).

As per Ukraine, the data shows that EV sales in Ukraine are rising rapidly, surpassing pre-war levels *Ukraine's BEV market nearly triples in 2023*, 2024). Also, according to the data, in 2023 the sales of BEVs reached approximately 15% and of HEVs - 21%; the share of PHEVs is smaller and varies in different sources (*In Ukraine, the share of hybrids and electric vehicles in new car sales has increased*, 2024). This can be explained with a few reasons. First, since 2018, Ukraine has eliminated the need to pay customs duties and VAT when importing electric vehicles, only requiring an excise tax of 1 euro per kilowatt-hour of battery capacity. And secondly, opposed to the strong regulations in the EU and the USA regarding the Chinese automakers, there are no specific restrictions targeting the import of Chinese electric vehicles to Ukraine. The primary regulations affecting these imports are related to general compliance with Ukrainian standards and the payment of an excise duty on battery capacity. Importers should ensure that all vehicles meet technical and safety standards and be aware of any potential non-tariff barriers that could impact the market. The customs benefits and relatively low prices for BEVs imported from the Chinese market, allowing independent dealers to offer customers very attractive deals, comparable to the cost of new hybrids (*Demand on HEVs in Ukraine is decreasing. What is happening?*, 2024). All these factors combined result in an increasing share of the Chinese EV import to Ukraine which composes over 80% of the new EVs import market and over 10% of the used EVs import market in the country (*Overview of the electric car market in Ukraine: trends and prospects*, 2024).

Nevertheless, when discussing key challenges, the results of other studies also demonstrated that infrastructure availability and development, battery capacity enhancement, fiscal- and non-fiscal incentives and awareness-related issues can be the main tasks to handle and improve the EV adoption in the near future (Al-Wahedi et al., 2024; Sachon, 2024).

6.3 Limitations and implications

The goal of this research to learn the current and future electric automotive developments and sustainable mobility transitions in the USA, Germany and Ukraine was met. Based on this study results, there were

determined main motivational and barrier obstacles to EV adoption in Germany, the USA and Ukraine; consumer behavior trends related to the types of usage and ownership, specialities of using and charging EVs in three different markets; the influence of demographic and social factors; future EV consumer trends; as well as differences and similarities between the mentioned factors in these markets.

The main limitations of this study are related to the limited access of the survey respondents, particularly from the USA and Ukraine, mainly due to special EV forum policies blocking the requests to join the needed forums or communities, especially in the USA; as well as a lack of specialized EV forums in Ukraine. This means that the analysis of the survey may not correspond to all requirements of a representative study, mostly because of a sample size, creating a lack of precision and reliability when interpreting the data. To add, when answering both the survey and the interview questions, the respondents could feel uncomfortable providing answers that could represent them in a negative way or could interpret some questions differently, providing not accurate or valid answers. And in regards to the interviews, the limitations were related to the sample size as well as to the risk of expressing personal bias on specific topics.

Certain received survey and interview results turned out to have certain differences which made it challenging to describe as a trend. For example, certain differences were related to the motives and barriers to EV adoption and their correlation with demographic and social factors. Therefore, the connection between these factors will require further research, preferably with a bigger sample size and especially with respondents from the USA and Ukraine. To add, specific factors and topics were not covered in this research but could definitely be valid and valuable for further studies. Such factors can be: gender; children in the household; a type of the living area; the connection between previous experience with an EV and a probability of preferring an EV in the future; influence of resale value and range anxiety on EV adoption; direct and indirect peer influence etc.

Therefore, the results of this research created a good basis for future studies on the following specific topics:

- changes within demographic and social portrayals of EV users in Germany, the USA and Ukraine within the next years. This will help further identify future market segments for EVs and how strong or weak their connection or correlation is motives and barriers to EV adoption.

- changes within motives and barriers to EV adoption in Germany, the USA and Ukraine within the next years. Considering different economic and political situations in these three markets and how fast-changing and fast-developing the landscape of the energy, transportation and sustainability policies is, there are high chances that the EV outlook will adjust accordingly.

- changes in EV user behavior based on future changes in terms of infrastructure, pricing policy, governmental support and vehicle features.

Based on the research results as well as the industry situation in all three markets described in the Section 6.2, it is sufficient to develop marketing strategies and campaigns that continue educating consumers about the long-term benefits of EV usage / ownership, including cost savings, advanced features, and environmental impact. These messages should be tailored to the specific motivators and barriers identified in each market.

For all three markets, it's relevant to focus on:

- **financial opportunities**: while different countries have different subsidy and financial support programs, it's important to raise awareness about financial benefits of EVs such as the total cost of ownership (TCO). In this case potential users can become aware of the fact that while initial retail prices of electric cars can be typically higher than those of their ICE counterparts, the greater fuel efficiency and reduced maintenance costs of EVs help offset this by providing fuel cost savings, ultimately lowering their TCO. In addition, it's possible to address the customer concerns about purchase costs by offering flexible financing plans, leasing options, and highlighting government incentives (where it's possible) to make EV ownership more attainable.

- **developing charging infrastructure**: the research and statistics results prove that the charging infrastructure continues developing in all three markets. This means that it's important to keep customers informed of the ongoing expansion efforts with the help of specific interactive maps, testimonials and success stories highlighting positive experiences and how easy and convenient it can be to charge EVs.

- **increased driving range:** since the driving range is also increasing, it's important to address customers' range anxiety and make customers aware of the battery improvements. This can be done with the help of emphasizing the latest advancements and using real-life scenarios explaining how many commutes and long road trips it's possible to do without recharging.

- **innovations:** EVs are known and often preferred for their innovative features. Therefore, highlighting personalized driver-assistance systems, enhanced safety solutions, smart infotainment systems, connected car features as well as many other developments related to enhanced performance, convenience and sustainability creates a solid base to embrace the future of mobility and effectively attract tech-savvy customers.

- **positive environment changes:** eliminations of greenhouse effect has been widely chosen as one of the motives that drove the respondents to start using EVs in all three markets. In this case, besides mentioning positive changes for the environment when using EVs, it's also important to emphasize the EV customers' contribution to renewable energy transition by sharing the facts and real-world cases that are easy to understand and show a positive impact; reduction in fossil fuel consumption; reduction in noise pollution; health benefits etc.

- **social proof:** considering the fact that many EV users know others in their social circles who own EVs, it's possible to incorporate peer recommendations, user testimonials, and community-driven campaigns to create a sense of belonging and influence.

While these topics are important to address in the marketing campaigns throughout all three markets, specific markets still require focusing on the areas that are more relevant for their customers. For example, in Germany main recommendations can be related to emphasizing:

- long-term cost savings;

- home charging stations as convenient and cost-effective options as well as government incentives for home charging infrastructure installation;

- advanced performance features of EVs and innovative digital and customized tools that come with them;

- flexible financing options, trade-in deals, or leasing options for those hesitant about upfront costs.

In the USA key recommendations may focus more on highlighting:

- positive charging infrastructure developments, especially in rural areas, as well as home charging stations as a primary solution, leveraging government rebates and incentives;

- long-term cost savings and availability of federal and state incentives;

- reliability of EVs which means less expensive and less frequent maintenance as well as less or no dependency of fossil fuel supplies;

- advanced performance capabilities of EVs, along with innovative digital features and customized tools that they offer.

And in Ukraine main recommendations can be related to emphasizing:

- lower purchase costs, affordable models and financing options that make it possible to afford EVs;

- reliability of EVs, which translates to reduced maintenance costs, along with minimal or no reliance on fossil fuel supplies;

- enhanced performance of EVs and their innovative tech features;

- easy-to-install home charging options that are compatible with standard outlets.

In addition, based on the EV developments in Germany and the USA, there are recommendations that the automotive industry players, government and energy companies in Ukraine can potentially incorporate in their future strategies and operations.

Automotive players in Ukraine should focus on promoting the affordability of electric vehicles (EVs) by highlighting cost savings on fuel, maintenance, and government incentives, following the examples of the USA and Germany. Addressing range anxiety is key, so marketing campaigns should emphasize EVs with extended ranges and promote home charging solutions. Tech-savvy consumers can be targeted

by showcasing safety, innovative features, and environmental benefits. Additionally, supporting the used EV market can provide an affordable entry point for new buyers.

The Ukrainian government should incorporate specific purchase subsidies, tax breaks, and incentives for both EVs and charging infrastructure. Investing in a nationwide charging network is essential, with a focus on both urban and rural areas. Public education campaigns are crucial to increase awareness of EV benefits and their positive environmental impact.

Energy companies should strategically place charging stations in high-traffic areas, residential complexes, and workplaces. Collaborating with automakers to bundle charging solutions with vehicle purchases can further enhance convenience for consumers. Developing user-friendly apps and offering competitive pricing will also improve the overall EV experience. These combined efforts can help drive EV adoption and create a supportive and a user-friendly ecosystem in Ukraine.

Additionally, the blackouts in Ukraine may impact EV adoption by affecting charging infrastructure reliability, raising consumer concerns about vehicle practicality, and potentially influencing government and industry responses. Addressing these challenges will be crucial for sustaining and growing the EV market in the country.

Conclusions

Considering the changes in the EV industry in the last 5 years under various economic, political and social circumstances, this research was aimed at identifying the current and future EV consumer behavior developments in Germany, the USA and Ukraine, and how similar or different they are across the three countries.

Based on the combination of the qualitative method with the grounded theory approach to semi-structured interviews with EV users and industry professionals and the quantitative method with the survey developed for both EV users and non-users, the following conclusions can be drawn.

Most respondents owned or used BEVs, primarily as their main or only vehicle. They were generally satisfied with their EVs and were not concerned with their safety and reliability. Demographics, such as age (35-54), marital status, higher education, full-time employment and middle-to-high income, emerged as common patterns of EV adoption. The results also indicated that peer influence played a subtle, indirect role in EV adoption. Key motivations included innovative technology, low fuel costs, and reduced greenhouse emissions, though cost considerations were more important in the USA and Ukraine. The differences included the general usage of EVs not always being the only and primary vehicle; the usage of BEVs mainly within urban areas in Ukraine and the USA; and a different charging behavior based on using standard outlets at home in Ukraine. The future EV interest is high, especially among younger groups (25-44). However, key barriers remain purchase costs, infrastructure challenges and driving range.

The findings helped develop marketing recommendations, covering future financial needs, charging infrastructure development, increased driving range and positive environmental change opportunities, as well as more specific advice that the automotive industry players, government and energy companies in Ukraine could potentially incorporate ino their future strategies and operations.

This research has created a good basis for future studies on the topics related to EV adoption, especially considering the complexity of the influence of demographic and social factors on consumer behavior and how fast-changing and rapidly developing the EV industry is.

References

Abbasi, H.A., Borovkov, A., Farooqi, A. S., Johl, S. K., Mazhar, M., Moughal, W., Musarat, M. A., Rafiq, W., & Shaari, Z. B. H. (2021). Consumer motivation by using unified theory of acceptance and use of technology towards electric vehicles. Sustainability 2021, 13, 12177. https://doi.org/10.3390/su132112177

Abratt, R., & Goodey, S. D. (1990). Unplanned buying and in-store stimuli in supermarkets. *Managerial and Decision Economics, 11*(2), 111-121. https://doi.org/10.1002/mde.4090110204

Aceleanu, M. I., & Burghelea, C. (2014). Education - determinant of consumer's conditions in an era of technological change. *Amfiteatru Economic, 16*, 535-549. Retrieved from https://www.amfiteatrueconomic.ro/temp/Article_1289.pdf

Adepetu, A., & Keshav, S. (2017). The relative importance of price and driving range on electric vehicle adoption: Los Angeles case study. https://doi.org/10.17863/CAM.46818

Adobe. (2021). *Adobe digital economy index: April 2021*. https://business.adobe.com/content/dam/dx/us/en/resources/reports/adobe-digital-economic-index-april-2021/Digital_Economy_Index_April_2021.pdf

Agarwal, A. & Chetty, P. (2019, September 10). *Use of Hawkins Stern's impulse buying theory (1962) in online shopping.* Project Guru. https://www.projectguru.in/hawkins-sterns-impulse-buying-theory-online-shopping/

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

Alanazi, F. (2023). Electric vehicles: benefits, challenges, and potential solutions for widespread adaptation. *Applied Sciences (Switzerland), 13*(10), 6016. https://doi.org/10.3390/app13106016

Alasuutari, P., Bickman, L., & Brannen, J. (2008). *The SAGE handbook of social research methods*. SAGE Publications Ltd. https://doi.org/10.4135/9781446212165

Alderson, W. (1957). Marketing behavior and executive action a functionalist approach to marketing theory Wroe Alderson. Homewood: o. Richard D. Irwin Inc.

Allen, M. W. & Ng, S. H. (2004). Economic behavior. *Encyclopedia of Applied Psychology*, 661-666. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/B0126574103002208

Almeida, F. M. (2015). The psychology of early institutional economics: The instinctive approach of Thorstein Veblen's conspicuous consumer theory, *EconomiA*. https://doi.org/10.1016/j.econ.2015.05.002

Al-Wahedi, A., Ali, A., Iqbal, A., & Qadir, A. S. (2024). Navigating the complex realities of electric vehicle adoption: A comprehensive study of government strategies, policies, and incentives. *Energy Strategy Reviews, 53.* https://doi.org/10.1016/j.esr.2024.101379

Anable, J., Kinnear, N., Schuitema, G., & Skippon, S. (2013). The role of instrumental, hedonic and symbolic attributes in the intention to adopt electric vehicles. *Transportation Research Part A, 48,* 39-49. https://doi.org/10.1016/j.tra.2012.10.004

Analysis of BEV market in Ukraine. (2024, July 17). InVenture. https://inventure.com.ua/uk/analytics/investments/analiz-rinku-elektromobiliv-v-ukrayini

Anastasiadou, K., & Gavanas, N. (2022). State-of-the-art review of the key factors affecting electric vehicle adoption by consumers. *Energies*, *MDPI*, *15*(24), 1-23. https://doi.org/10.3390/en15249409

Andreazzi, F. (2024, March 25). *The 4 social factors that influence consumer behavior*. *Leadster*. https://getleadster.com/blog/consumer-behavior/

Appiah, S. A. (2020). Understanding car ownership among households in developing countries: a case study of Accra, Ghana. (Doctoral dissertation, The University of Leeds and Samuel Adjei Appiah). Retrieved from https://etheses.whiterose.ac.uk/28077/1/Samuel%20Adjei%20Appiah%20Thesis.pdf

Araghi, Y., Kroesen, M., Molin, E., & van Wee, B. (2014). Do social norms regarding carbon offsetting affect individual preferences towards this policy? Results from a stated choice experiment. *Transportation Research Part D: Transport and Environment*, *26*, 42–46. https://doi:10.1016/j.trd.2013.10.008

Aragone, B. (2020, October 13). *Consumer behavior theory: how well do you know your audience?* LinkedIn. https://www.linkedin.com/pulse/consumer-behaviour-theory-how-well-do-you-know-your-audience-aragone/

Arcuri, G., & Athanasia G. (2022, March 14). *Russia's invasion of Ukraine impacts gas markets critical to chip production.* Center for Strategic & International Studies. https://www.csis.org/blogs/perspectives-innovation/russias-invasion-ukraine-impacts-gas-markets-critical-chip-production

Argo, J. J., Berger, J., Broniarczyk, S. M., Chan, C., Escalas, J., Forehand, M. R., Häubl, G., Kettle, K. L., Mercurio, K. R., Sengupta, J., Sood, S., Townsend, C., Van Boven, L., Ward, M. K., & White, K. (2013). Self-Identity and Consumer Behavior. *Journal of Consumer Research, 39*(5), xv–xviii. https://doi.org/10.1086/669165

Atlas EV Hub. (2020). *State EV Registration Data*. Atlas EV Hub. https://www.atlasevhub.com/materials/state-ev-registration-data/

Automotive Market Research Institute. (2023, January 5). *Against all odds: in 2022 the electric car market will grow by 45%.* https://eauto.org.ua/en/news/244-against-all-odds-in-2022-the-electric-car-market-will-grow-by-45

Axsen, J., Daina, N., Manca, F., Polak, J. W., & Sivakumar, A. (2020). Modeling the influence of peers' attitudes on choice behavior : theory and empirical application on electric vehicle preferences. *Transportation Research Part A: Policy and Practice, 140*, 278-298. https://doi.org/10.1016/j.tra.2020.08.016

Axsen, J., & Kurani, K. S. (2011). Interpersonal influence in the early plug-in hybrid market: Observing social interactions with an exploratory multi-method approach. *Transportation Research Part D: Transport and Environment*, *16*, 150–159. https://doi:10.1016/j.trd.2010.10.006

Axsen, J., Orlebar, C., & Skippon, S. (2013). Social influence and consumer preference formation for pro-environmental technology: The case of a U.K. workplace electric-vehicle study. *Ecological Economics*, *95*, 96–107. https://doi:10.1016/j.ecolecon.2013.08.009

Axsen, J., Pettifor, H., Wilson, C. (2017). Social influence in the global diffusion of alternative fuel vehicles – a meta-analysis. *Journal of Transport Geography, 62*, 247-261. https://eprints.whiterose.ac.uk/118716/1/Manuscript%20with%20revisions.pdf

Azhar, N., & Zahari, H. (2022). The demographic impact on car ownership in Kuala Lumpur. *International Journal of Academic Research in Business and Social Sciences*, *12*(9), 522–537. *12*. https://doi.org/10.6007/IJARBSS/v12-i9/14613

Badir, Y. F., Frank, B., & Kamolsook, A. (2019). Consumers' switching to disruptive technology products: the roles of comparative economic value and technology type. *Technological Forecasting and Social Change, 140,* 328-340. https://www.doi.org/10.1016/j.techfore.2018.12.023

Bagozzi, R., Dholakia, U.M., Gopinath, M., Nataraajan, R. (2006). The role of regulatory focus in the experience and self-control of desire for temptations. *Journal of Consumer Psychology, 16*(2), 163–175.

Bagwell, L. S. & Bernheim, B. D. (1996). Veblen Effects in a Theory of Conspicuous Consumption. *The American Economic Review*, *86*(3), 349–373. http://www.jstor.org/stable/2118201

Baikady, R., Islam, M., & Khan, N. (2022). Principles of social research methodology. Springer. https://doi.org/10.1007/978-981-19-5441-2

Balazs, C. L., Morello-Frosch, R. (2013). The three Rs: How community-based participatory research strengthens the rigor, relevance, and reach of science. *Environmental justice*, *6*(1), 9-16. Retrieved from https://www.liebertpub.com/doi/full/10.1089/env.2012.0017

Bamberg, S., & Schmidt, P. (2003). Theory-based promotion of environment-friendly transport behavior: A longitudinal study of the effects of interventions to reduce car use. *Journal of Environmental Psychology*, *23*(3), 315-327. https://doi.org/10.1016/S0272-4944(03)00032-3

Bao, X., Du, K., Fan, R., & Wang Y. (2023). Exploring incentives to promote electric vehicles diffusion under subsidy abolition: An evolutionary analysis on multiplex consumer social networks. *Energy*, *276*. https://doi.org/10.1016/j.energy.2023.127587

Barbaro-Forleo, G., Bergeron, J., & Laroche, M. (2001) Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing*, *18*, 503-520. http://dx.doi.org/10.1108/EUM0000000006155

Barg, F. K., Bazen, A., & Takeshita, J. (2021). Research techniques made simple: An introduction to qualitative research. *Journal of Investigative Dermatology*, *141*, 241-247. https://doi.org/10.1016/j.jid.2020.11.029

Barros, G. (2010). Herbert A. Simon and the concept of rationality: boundaries and procedures. *Brazilian Journal of Political Economy , 30(3).* https://doi.org/10.1590/S0101-31572010000300006

Batra, G., Cardell, M., & Miller, R. (2022, May 23). *Why consumers are charging toward electric vehicles*. Ernst & Young. https://www.ey.com/en_ee/insights/automotive/mobility-consumer-index-wave-3

Bauer, G., Hsu, C.-W., Lutsey N. (2021). When might lower-income drivers benefit from electric vehicles? Quantifying the economic equity implications of electric vehicle adoption. *International Council on Clean Transportation*. https://doi.org/10.13140/RG.2.2.19144.03842

Becker, L., & Pizzutti, M. (2016). Consumer behavior in the context of lifestyle constraints: The impact of time and location on purchasing decisions. *Journal of Consumer Research, 43*(4), 611-629. https://doi.org/10.1093/jcr/ucw059

Behling, O., Labovitz, G., & Kosmo, R. (1968). The Herzberg Controversy: A Critical Reappraisal. *The Academy of Management Journal*, *11*(1), 99–108. https://doi.org/10.2307/255200

Bekker, H. (2023, January, 7). *2022 (Full Year) Germany: Best-Selling Electric Cars by Brand and Model.* Best-Selling Cars. https://www.best-selling-cars.com/electric/2022-full-year-germany-best-selling-electric-cars-by-brand-and-model/?utm_content=cmp-true

Belgiawan, P. F., Fujii, S., & Schmöcker, J.-D. (2011). Psychological determinants for car ownership decisions. *Proceedings of the 16th International Conference of Hong Kong Society for Transportation Studies (HKSTS). Hong Kong: Hong Kong Society for Transportation Studies,* 315–322. Retrieved from https://www.researchgate.net/publication/270961556_Psychological_Determinants_for_Car_Ownership_Decisions

Belch, M. A, & Belch, G. E. (1998). Advertising and promotion 4 Ed. (4). Boston: Mc Graw-Hill.

Bellenger, D. N., Robertson, D. H. and Hirschman, E.C. (1978). Impulse buying varies by product. *Journal of Advertising Research*, *18*, 15-18.

Berkeley, N., Jarvis, D., & Jones, A. (2018). Analyzing the take up of battery electric vehicles: An investigation of barriers amongst drivers in the UK. *Transportation Research Part D: Transport and Environment.* https://doi.org/10.1016/j.trd.2018.06.016

Bernardi, L., Huinink, J., & Settersten, R. A., Jr (2019). The life course cube: A tool for studying lives. *Advances in life course research, 41*, 100258. https://doi.org/10.1016/j.alcr.2018.11.004

Bernauer, T., Brückman, G., & Wicki, M. (2021). Is resale anxiety an obstacle to electric vehicle adoption? Results from a survey experiment in Switzerland. Environmental Research Letters, Volume 16(12). https://doi.org/10.1088/1748-9326/ac3531

Bestvater, S., & Shah, S. (2024, May 23). *Electric Vehicle Charging Infrastructure in the U.S.* Pew Research Center. https://www.pewresearch.org/data-labs/2024/05/23/electric-vehicle-charging-infrastructure-in-the-u-s/

Bettman, J. R. (1979). An information processing theory of consumer choice. Reading, Mass., Addison-Wesley Pub. Co.

Bettman, J. R., Luce, M. F., & Payne, J. W. (1998). Constructive consumer choice processes. *Journal of Consumer Research, 25*(3), 187–217. https://doi.org/10.1086/209535

Bhat, C. R., & Koppelman, F. S. (1993). An endogenous switching simultaneous equation system of employment, income, and car ownership. *Transportation Research Part A: Policy and Practice, 27*, 447-459.

Bhattacharya, C. B., & Sen, S. (2003). Consumer-company identification: A framework for understanding consumers' relationships with companies. *Journal of Marketing*, 67(2), 76-88.

Bilney, A. (2021). *Marital status and family - anatomy of a target client.* The Marketing detective agency. https://www.themarketingdetectiveagency.com/post/marital-status-and-family-anatomy-of-a-target-client

Bjerkan, K., Nørbech, T., & Nordtømme, M. (2016). Incentives for promoting Battery Electric Vehicle (BEV) adoption in Norway. *Transportation Research Part D: Transport and Environment. 43*. http://dx.doi.org/10.1016/j.trd.2015.12.002

Bodin, J., Jansson, J., & Rezvani, Z. (2015). Advances in consumer electric vehicle adoption research: A review and research agenda. *Transportation Research Part D-transport and Environment, 34*, 122-136. https://doi.org/10.1016/j.trd.2014.10.010

Bogomolova, S., Villani, C., & Kapulski, N. (2010). A lifetime of consumer brand experiences: a grounded theory approach. Paper presented at the 24th Annual Australian & New Zealand Academy of Management Conference.

Borgoni, R., Ewert U.-C., Fürnkranz-Prskawetz, A. (2002). How important are household demographic characteristics to explain private car use patterns? A multilevel approach to Austrian data. *MPIDR Working Papers WP-2002-006*, Max Planck Institute for Demographic Research, Rostock, Germany. http://dx.doi.org/10.4054/MPIDR-WP-2002-006

Borysova, T., Ivanechko, N., & Monastyrskyi, G. (2020). Marketing communication policy of local authorities as a tool for forming the image of municipal service providers. *Galician Economic journal, 2,* 188-198. https://doi.org/10.33108/galicianvisnyk_tntu2024.02.188

Boschmann, E. E., & Brady, S. A. (2013). Travel behaviors, sustainable mobility, and transitoriented developments: a travel counts analysis of older adults in the Denver, Colorado metropolitan area. Journal of Transport Geography, 33, 1–11. https://doi.org/10.1016/j.jtrangeo.2013.09.001

Bray, J. P. (2008). Consumer behaviour theory: approaches and models. http://eprints.bournemouth.ac.uk/10107/1/Consumer_Behaviour_Theory_-_Approaches_&_Models.pdf

Brehm J. W. (1966). A theory of psychological reactance. New York: Academic Press.

Brewer, M. B. (2003). Concepts of self and social identity. In M. B. Brewer & M. S. Hewstone (Eds.), *Self and social identity* (pp. 1-21). Blackwell Publishing.

Brown, A., Caulfield, B., Foley, A., Furszyfer Del Rio, D., Hampton, H., & Lowans, C. (2023). Understanding domestic consumer attitude and behaviour towards energy: a study on the Island of Ireland. *Energy Policy, 181,* Article 113693. https://doi.org/10.1016/j.enpol.2023.113693

Buhmann, R. C., & Criado, J., R. (2022). Consumers' preferences for electric vehicles: The role of status and reputation. *Transportation Research Part D: Transport and Environment, 114.* https://doi.org/10.1016/j.trd.2022.103530

Cakanlar, A., & Nguyen, T. (2018). The influence of culture on impulse buying. *Journal of Consumer Marketing, 36*(1), 12-23. https://doi.org/10.1108/JCM-03-2017-2139

Carlier, M. (2022). *EV purchase likelihood in the U.S. by consumer age group 2022*. Statista. https://www.statista.com/statistics/1277794/electric-vehicle-purchase-likelihood-in-the-us-by-consumer-age-group/#statisticContainer

Cebecauer, M., Franklin, J., Georén, P., Langbroek, J., Malmsten, J., & Susilo, Y. (2019). Electric vehicle rental and electric vehicle adoption. *Research in Transportation Economics, 73.* https://doi.org/10.1016/j.retrec.2019.02.002

Chakraborty, A. Kumar, R. R., & Mandal, P. (2021). Promoting electric vehicle adoption: Who should invest in charging infrastructure? *Transportation Research Part E: Logistics and Transportation Review, Elsevier, 149*(C). https://doi.org/10.1016/j.tre.2021.102295

Chandan, A., Hardman, S., Tal, G., & Turrentine, T. (2017). The effectiveness of financial purchase incentives for battery electric vehicles – A review of the evidence. *Renewable and Sustainable Energy Reviews, 80. 1100-1111*. https://doi.org/10.1016/j.rser.2017.05.255

Charm, T., Dhar, R., Haas, S., Liu, J., Novemsky, N., & Teichner, W. (2020, July 24). *Understanding and shaping consumer behavior in the next normal.* McKinsey & Company. https://www.mckinsey.com.br/~/media/McKinsey/Business%20Functions/Marketing%20and%20Sales/Our%20Insights/Understanding%20and%20shaping%20consumer%20behavior%20in%20the%20next%20normal/Understanding-and-shaping-consumer-behavior-in-the-next-normal.pdf

Charmaz, K., Chun Tie, L., Birks, M., & Mills, J. (2018). *Grounded theory in practice* (2nd ed.). London: Sage Publications.

Chen, C., Tai, C., & Chen, Y. (2016). Consumer-company identity and the relationship between consumer and company. *Journal of Business Research*, 69(3), 1037-1046.

Chisnall, P. M. (1975). *Consumer behavior: The psychology of marketing.* London: McGraw-Hill.

Chowdhury, V., Hernandez, S., & Mitra, S. (2024). Electric vehicle usage patterns in multi-vehicle households in the US: A machine learning study. *Sustainability, 16.* https://doi.org/10.3390/su16125200

China increases EV market share in Germany despite import slump. (2024, June 18). Reuters. https://www.reuters.com/business/autos-transportation/china-increases-ev-market-share-germany-despite-import-slump-2024-06-18/#:~:text=In%202023%2C%20China%20exported%20a,other%20direction%2C%20according%20to%20Destatis

Chufama, M. (2021). An understanding of the development of marketing, consumer behavior place in marketing and consumer behavior notions. *International Journal of Multidisciplinary Research and Publications*, *4*(1), 9-17. Retrieved from https://www.researchgate.net/publication/357748559_An_Understanding_of_the_Development_of_Marketing_Consumer_Behaviour_Place_in_Marketing_and_Consumer_Behavior_Notions

Clark, B. (2013). Understanding how household car ownership changes over time. (Doctoral dissertation, University of the West England, Bristol). https://uwe-repository.worktribe.com/output/949211/understanding-how-household-car-ownership-changes-over-time

Clark, B., Chatterjee, K., & Lyons, G. (2016). Understanding the process that gives rise to household car ownership level changes. *Journal of Transport Geography, 55*, 110-120. https://doi.org/10.1016/j.jtrangeo.2016.07.009

Clean Energy Ministerial. (n.d.). *Electric vehicles initiative.* https://www.cleanenergyministerial.org/initiatives-campaigns/electric-vehicles-initiative/

Consumer Behavior: Person's Age or Generation. (2022, January 8). StudyCorgi. https://studycorgi.com/consumer-behavior-persons-age-or-generation/

Consumer Reports. *Consumer Interest and Knowledge of EVs: 2020 Survey Results.* (2020, December). https://advocacy.consumerreports.org/wp-content/uploads/2020/12/CR-National-EV-Survey-December-2020-2.pdf

Counterpoint. (2023, January 4). *Tesla leads us EV market, eclipsing next 15 brands combined*. https://www.counterpointresearch.com/insights/us-ev-sales-q3-2022/

Creusen, M. E. H., Schoormans, J., & Veryzer, R. (2010). Product value importance and consumer preference for visual complexity and symmetry. *European Journal of Marketing*, *44*, 1437-1452. https://doi.org/10.1108/03090561011062916

Cui, H., & Hall, D. (2022). Annual update on the global transition to electric vehicles: 2021. *International Council on Clean Transportation.* Retrieved from https://theicct.org/publication/global-ev-update-2021-jun22/

Daziano, R. A., & Bolduc, D. (2013). Incorporating pro-environmental preferences towards green automobile technologies through a Bayesian hybrid choice model. *Transportmetrica, 9*(1), 74–106.

De Bock, T., & Van Kenhove, P. (2010). Consumer Ethics: The Role of Self-Regulatory Focus. *Journal of Business Ethics, 97*(2), 241–255. Retrieved from http://www.jstor.org/stable/40929407

Deloitte. (2023). *Connected and autonomous vehicles*. https://www2.deloitte.com/us/en/pages/consumer-business/solutions/connected-and-autonomous-vehicles-solutions.html.html

Demand on HEVs in Ukraine is decreasing. What is happening? (2024, 14 March). Auto.ria.com. https://auto.ria.com/uk/news/topnews/258674/popit-na-gibridni-avto-v-ukraini-skorochujetsya-scho-im-zavazhaje.html

Dhar, R., & Wertenbroch, K. (2000). Consumer choice between hedonic and utilitarian goods. *Journal of Marketing Research, 37*(1), 60–71. https://doi.org/10.1509/jmkr.37.1.60.18718

Dias, L. C., & Oliveira, G. D. (2019). Influence of demographics on consumer preferences for alternative fuel vehicles: A review of choice modeling studies and a study in Portugal. *Energies, 12*(2), 318. https://doi.org/10.3390/en12020318

Dichter, E. (1960). The strategy of desire (1st ed.). Doubleday. https://archive.org/details/strategyofdesire0000dich_s8u9

Diekstra, R., & Kroon, M. (1997). Cars and behaviour: psychological barriers to car restraint and sustainable urban transport. *In: R. Tolley, ed. The Greening of Urban Transport. 2nd ed. Chichester: Wiley,* 147-160.

Differences in how men and women car shop. (2012, August, 27). Boston.com. https://www.boston.com/cars/news-and-reviews/2012/08/27/differences-in-how-men-and-women-car-shop/

Dittmar, H. (1992). *The social psychology of material possessions: To have is To Be*. New York, NY: St Martin's Press.

Dütschke, E., & Peters, A. (2014). How do consumers perceive electric vehicles? A comparison of German consumer groups *Journal of Environmental Policy & Planning 16*(3), 359-377. https://doi.org/10.1080/1523908X.2013.879037

Economides, S., Han, C.L., Orowitsch, S., Scoullos, I., & Nuttall, W. J. (2012). Paradigm Shift for Future Mobility: A Cross Country Analysis of Behavioural Policies. *Procedia - Social and Behavioral Sciences, 48,* 2588-2596. https://doi.org/10.1016/j.sbspro.2012.06.1229

Einwiller, S. A., Fedorikhin, A., Johnson, A. R., & Kamins, M. A. (2006). What we believe in speaks volumes: The influence of corporate social responsibility on consumer behavior. *Journal of Marketing*, 70(1), 122-139.

Engel, J. F., Blackwell, R. D., & Miniard, P. W. (1995). Consumer behavior. 6th Edition, Dryden Press, Chicago, New York.

Engel, J. F., Kollat, D. T., & Blackwell, R. D. (1968). Consumer Behavior. Holt, Rinehart &Winston, New York.

Escalas, J. (2013). Self-identity and consumer behavior. *Journal of Consumer Research, 39*(5), xv–xvi. https://doi.org/10.1086/669165

EV Consumers Still Need Education as 40% Don't Understand Benefits of Buying an Electric Car. (2022, January, 28). Exchange wire. https://www.exchangewire.com/blog/2022/01/28/ev-consumers-still-need-education-as-40-dont-understand-benefits-of-buying-an-electric-car/

Farkas, Z., Nickkar, A., Shin, H. (2019). An analysis of attributes of electric vehicle owners' travel and purchasing behavior: the case of Maryland. https://doi.org/10.1061/9780784482582.008

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). (2016). *Climate action plan 2050: Principles and goals of the German government's climate policy.* Berlin, Germany: BMUB.

Federation of Employers of Automotive Industry. (2020). *The Ukrainian market for new cars in 2019 showed stable growth.* https://fra.org.ua/en/an/publikatsii/novosti/ukrayinskii-rinok-novikh-avto-v-2019-rotsi-prodemonstruvav-stabilne-zrostannia

Fiedler, K. (2007). Construal level theory as an integrative framework for behavioral decision-making research and consumer psychology. *Journal of Consumer Psychology, 17*(2), 101–106. https://doi.org/10.1016/S1057-7408(07)70015-3

Figenbaum E., & Kolbenstvedt, M. (2016). Learning from Norwegian battery electric and plug-in hybrid vehicle users – Results from a survey of vehicle owners. *TØI Transportøkonomisk institutt*. Retrieved from https://www.toi.no/getfile.php/1343167-1467632310/Publikasjoner/T%C3%98I%20rapporter/2016/1492-2016/Summary.pdf

Fishbein, M. (1967). Attitude and the prediction of behavior. In M. Fishbein (Ed.), *Readings in attitude theory and measurement*, 477-492. New York, NY John Wiley & Sons.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior: an introduction to theory and research. Reading, MA: Addison-Wesley.

Fischer, L., Rupalla, F., Sahdev, S., & Tanweer, A. (2024). *Exploring consumer sentiment on electric-vehicle charging.* McKinsey & Company. https://www.mckinsey.com/features/mckinsey-center-for-future-mobility/our-insights/exploring-consumer-sentiment-on-electric-vehicle-charging

Foster, B. D., & Cadogan, J. W. (2000). Relationship selling and customer loyalty: an empirical investigation. *Marketing Intelligence & Planning. 18*(4), 185–199. https://doi:10.1108/02634500010333316

Foxall, G. R. (2017). Behavioral Economics in Consumer Behavior Analysis. *Behavior Analyst, 40*(2), 309–313. https://doi.org/10.1007/S40614-017-0127-4/TABLES/1

Foxall, G. R., & Greenley, A. (1995). The role of affect in consumer behavior. *Journal of Economic Psychology*, *16*(3), 269-293.

Francis, A. (n.d.). *The Engel Kollat Blackwell (EKB) model of consumer behavior*. MBA Knowledge Base. https://www.mbaknol.com/marketing-management/the-engel-kollat-blackwell-model-of-consumer-behavior/

Freud, S. (1960). Group psychology and the analysis of the ego. Bantam Books.

Fullerton, R. (2013). The birth of consumer behavior: Motivation research in the 1940s and 1950s. *Journal of Historical Research in Marketing*, *5*, 212-222. https://doi:10.1108/17557501311316833

Gai, K. (2018). Self-construal and its implications for marketing. *Open Journal of Social Sciences*, *6*, 269-286. https://doi.org/10.4236/jss.2018.65020

Gallagher, K. S., & Muehlegger, E. (2011). Giving green to get green? Incentives and consumer adoption of hybrid vehicle technology. *Journal of Environmental Economics and Management, Elsevier*, *61*(1), 1-15. https://doi.org/10.1016/j.jeem.2010.05.004

Giele, J..Z., & Elder, G. H. J. (1998). Methods of life course research: qualitative and quantitative approaches. *Sage Publications, Thousand Oaks, CA*

Glaser, B., & Strauss, A. (1967). The discovery of grounded theory: strategies for qualitative research. *Aldine Publishing*, Chicago. https://doi.org/10.1007/978-3-658-13213-2_59

Gnann, T., Patrick P, Simon Á., & Sprei, F., (2019). How much charging infrastructure do electric vehicles need? A review of the evidence and international comparison. *Transportation Research Part D: Transport and Environment*, *77*, 224–242. https://doi.org/10.1016/j.trd.2019.10.024

Gollwitzer, P. M., Delius, W., & Oettingen, G. (1995). The volitional benefits of planning. *Personality and Social Psychology Bulletin*, *21*(11), 1189-1196.

Gonçalves, D. A., Gonçalves, M. A., & Nique, W. (2017). Shopping the way to my goals: an analysis of purchase impact on perceived goal progress. *Revista de Administração*, *52*(3), 246-255. https://doi.org/10.1016/j.rausp.2017.05.002

Gonzalez, G. (2021). The psychic life of consumer power: Judith Butler, Ernest Dichter, the American marketing reception of Freud, and the rituals of consuming religion. *Critical Research on Religion*, *9*(1), 8-30. https://doi.org/10.1177/2050303220952871

Goodwin, P. (2012). Urban transport policy and car dependence: The need for a new approach. *Transport Policy*, *19*(1), 1-9. https://doi.org/10.1016/j.tranpol.2011.06.003

Grady, J. S., Her, M., Moreno, G., Perez, C., & Yelinek, J. (2019). Emotions in storybooks: A comparison of storybooks that represent ethnic and racial groups in the United States. *Psychology of Popular Media Culture*, *8*(3), 207–217. https://doi.org/10.1037/ppm0000185

Grønhaug, K. (1974). Education and Buyer Behavior. *Acta Sociologica, 17*(2), 179–189. Retrieved from http://www.jstor.org/stable/4193995

Gulzhanat, S., & Budiono, G. L. (2012). Car purchasing selection of women and men: a different behavior. Retrieved from https://www.academia.edu/50481649/Car_Purchasing_Selection_of_Women_and_Men_A_Different_Behavior

Hackbarth, A., & Madlener, R. (2013). Willingness-to-pay for alternative fuel vehicle characteristics: A stated choice study for Germany. *Transportation Research Part A: Policy and Practice 85*, 89-111 https://doi.org/10.1016/j.tra.2015.12.005

Hall, D., & Nicholas, M. (2018). Lessons learned on early electric vehicle fast-charging deployments. International Council on Clean Transportation, Washington, USA, 54. Retrieved from https://theicct.org/wp-content/uploads/2021/06/ZEV_fast_charging_white_paper_final.pdf

Han, S., & Shavitt, S. (1994). Persuasion and culture: Advertising appeals in individualistic and collectivistic societies. *Journal of Consumer Research*, *21*(3), 232-249.

Hansen, H., Kanuk, L., Schiffman, L. G. (2012). Consumer behavior: a European outlook. 2nd ed. Harlow, England: Pearson Financial Times/Prentice Hall.

Hasan, A., 2020. Consumer buying behavior in the automobile industry in Bangladesh. Retrieved from https://www.theseus.fi/handle/10024/353742

Hawkins, D. (2002). The motorcar: The history of the automobile from its invention to the present day. New York: Oxford University Press.

He, C., Li, J., Wei, H., & Zhao, L. (2022). Online estimation of driving range for battery electric vehicles based on SOC-segmented actual driving cycle. *Journal of Energy Storage.* Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S2352152X22001281

Helveston, J. P., Liu, Y., Feit, E. M., Fuchs, E., Klampfl, E., & Michalek, J. J. (2015). Will subsidies drive electric vehicle adoption? Measuring consumer preferences in the U.S. and China. *Transportation Research Part A: Policy and Practice*, *73*, 96–112. https://doi:10.1016/j.tre.2014.11.004

Hidayat, R. (2009). *Generic goal system: Content, structure and determinants of goals at the generic level of consumer behavior.* Tiara Wacana. Retrieved from https://pure.uvt.nl/ws/portalfiles/portal/1111237/R_HIDAYAT_dissertation.pdf

Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. *Advances in Experimental Social Psychology*, *30*, 1-46.

High price and range anxiety stops Germans from buying e-cars. (2021, August, 21). Tallbloke. https://tallbloke.wordpress.com/2021/08/21/high-price-and-range-anxiety-stops-germans-from-buying-e-cars/

Hiscock, R., Macintyre, S., Kearns, A. and Ellaway, A. (2002). Means of transport and ontological security: Do cars provide psycho-social benefits to their users? *Transportation Research Part D*, *7*, 119-135.

Hladik, G., Kermanshachi, S., Pamidimukkala, A., & Rosenberger, J. M. (2023). Evaluation of barriers to electric vehicle adoption: A study of technological, environmental, financial, and infrastructure factors. *Transportation Research Interdisciplinary Perspectives, 22*, Article 100962. https://doi.org/10.1016/j.trip.2023.100962

Hoen, A. J., & Koetse, M. J. (2014). A choice experiment on alternative fuel vehicle preferences of private car owners in the Netherlands. *Transportation Research Part A-policy and Practice, 61*, 199-215. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S0965856414000184

Hoen, A. J., & Koetse, M. J. (2012). Preferences for alternative fuel vehicles of lease car drivers in the Netherlands. *PBL Working Paper, 4*. Retrieved from https://www.pbl.nl/uploads/default/downloads/pbl-2012-Preferences-for-alternative-fuel-vehicles-of-lease-car-drivers-in-The-Netherlands.pdf

Hofstede, G. (1980). Culture's consequences: international differences in work-related values. Beverly Hills, CA: Sage Publications.

Holbrook, M. B. (1999). Consumer value: A framework for analysis and research. London: Routledge.

Holbrook, M. B., & Hirschman, E. C. (1982). The experiential aspects of consumption: consumer fantasies, feelings, and fun. *Journal of Consumer Research, 9*, 132-140. http://dx.doi.org/10.1086/208906

Holbrook, M. B., Kahn, B. E., Lehman, D. R., Malter, M. S., & Parker, J. R. (2020). The past, present, and future of consumer research. Marketing Letters: *A Journal of Research in Marketing, 31*(2-3), 137–149. https://doi.org/10.1007/s11002-020-09526-8

Horowitz, D. (1986). The Birth of a Salesman: Ernest Dichter and the Objects of Desire, available at Hagley Museum. Retrieved from https://digital.hagley.org/08185337_dichter

Howard, J. A., & Sheth, J. N. (1969). The theory of buyer behavior. John Wiley, New York.

Huber, J. & Shiv, B. (2000). The impact of anticipating satisfaction on consumer choice. *Journal of Consumer Research*, *27*(2), 202–216. https://doi.org/10.1086/314320

Huffman, C., Ratneshwar, S., & Mick, D. G. (2000). Consumer goal structures and goal-pursuit behavior: The role of personal striving in consumer research. *Journal of Consumer Research, 27*(3), 331–348. https://doi.org/10.1086/317588

Huijts, N. M. A., Molin, E. J. E., & Steg, L. (2012). Psychological factors influencing sustainable energy technology acceptance: A review-based comprehensive framework. *Renewable and Sustainable Energy Reviews*, *16*, 525–531. https://doi:10.1016/j.rser.2011.08.018

IEA. (2022, May 23). *Global electric car sales have continued their strong growth in 2022 after breaking records last year.* https://www.iea.org/news/global-electric-car-sales-have-continued-their-strong-growth-in-2022-after-breaking-records-last-year

IEA. (2024). *Global EV Outlook 2024.* https://www.iea.org/reports/global-ev-outlook-2024

IEA. (2024). *Global EV outlook 2024: Outlook for electric vehicle charging infrastructure*. https://www.iea.org/reports/global-ev-outlook-2024/outlook-for-electric-vehicle-charging-infrastructure

IEA. (2024). *Global EV outlook 2024: Trends in electric cars*. https://www.iea.org/reports/global-ev-outlook-2024/trends-in-electric-cars

Indeed. (2024, August, 18). 7 psychological factors in marketing that influence consumer behavior. https://www.indeed.com/career-advice/career-development/psychological-factors-in-marketing

Inglehart, R., & Baker, W. E. (2000). Modernization, cultural change, and the persistence of traditional values. *American Sociological Review, 65* (1), 19-51. https://doi.org/10.2307/2657288

Jahshan, E. (2019, January, 21). *Commuters contribute £22.8bn to UK economy.* https://www.retailgazette.co.uk/blog/2019/01/commuters-contribute-22-8bn-uk-economy/

Jakhar, A. (2020, June 17). 5 powerful consumer behavior theories for marketers 2022. *Medium.* https://medium.com/@atuljakhar_/the-science-of-marketing-5-ultimate-consumer-behavior-theories-for-marketers-ee43be570203

Jang, J., Ko, J., & Lashari, Z. A (2021). Consumers' intention to purchase electric vehicles: influences of user attitude and perception. *Sustainability, 13*. https://doi.org/10.3390/su13126778

Jansson, J., Annika, N., & Westin, K. (2017). Examining drivers of sustainable consumption: The influence of norms and opinion leadership on electric vehicle adoption in Sweden. *Journal of Cleaner Production, 154*. https://doi.org/10.1016/j.jclepro.2017.03.186

Jiao, J., Li J., & Tang, Y. (2020). Analysis of the impact of policies intervention on electric vehicles adoption considering information transmission - based on consumer network model. *Energy Policy, 144*. https://doi.org/10.1016/j.enpol.2020.111560

John-Mariadoss, B., Pomirleanu, N., Schibrowsky, J., Spence, C., & Velasco, C. (2022). Experiential marketing in an era of hyper-connectivity. *Cambridge Scholars Publishing.* Retrieved from https://www.cambridgescholars.com/resources/pdfs/978-1-5275-8034-3-sample.pdf

Jolley, D. (2022, December 6). *German sales rose 31% in November on EV demand.* Automotive news Europe. https://europe.autonews.com/sales-market/electric-cars-boost-german-registrations

Jones, D. G. B. & Shaw, E. H. (2005). A history of schools of marketing thought. *Marketing Theory*, *5*(3), 239-281. https://doi.org/10.1177/1470593105054898

Jones, M. A. (1999). Hedonic and utilitarian motivation for consumer behavior: Implications for the future of retailing. *Journal of Retailing*, *75*(3), 285-295.

Jurs, K. (2017). *Buying behavior toward electrical power tools. A study into the decision making and selection of power tools for purchase by Finnish construction professionals* (bachelor's thesis). Helsinki Metropolia University of Applied Sciences, Helsinki, Finland. https://www.theseus.fi/bitstream/handle/10024/130910/Jurs_Kaetlin.pdf

Kahn, M. E. (2007). Do greens drive hummers or hybrids? Environmental ideology as a determinant of consumer choice. *Journal of Environmental Economics and Management*, *54*(2), 129–145. https://doi:10.1016/j.jeem.2007.05.001

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *47*(2), 263–291. https://doi.org/10.2307/1914185

Kamguia, S. (2018). Factors influencing energy consumption and cost-competiveness of plug-in electric vehicles. *World Electric Vehicle Journal*, *9*(2), 23. https://doi.org/10.3390/wevj9020023

Kang, M. J., & Kim, S. Y. (2022). A study on the factors influencing the purchase of electric vehicles. Retrieved from http://www.koreascience.or.kr/article/JAKO202209156909998.pdf

Kantar. (2023). *Understanding Consumer Attitudes Towards Electric Vehicles.* https://www.kantar.com/inspiration/research-services/understanding-consumer-attitudes-towards-electric-vehicles-pf

Kato, T., & Yokote, R. (2023). Effect of driving sound of electric vehicle on product attractiveness. *Hum-Cent Intell Syst 3*, 416–424. https://doi.org/10.1007/s44230-023-00030-6

Kester, J., Noel, L., Zarazua de Rubens, G., Sovacool, B. K. (2018). The demographics of decarbonizing transport: The influence of gender, education, occupation, age, and household size on electric mobility preferences in the Nordic region. *Global Environmental Change, 52.* 86-100. https://doi.org/10.1016/j.gloenvcha.2018.06.008

Keynes, J. M. (1936). The general theory of employment, interest and money. Palgrave Macmillan, London.

Kotler, P., & Keller, K. L. (2006). Marketing management (12th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Kotler, P., & Lee, N. (2004). Corporate social responsibility: Doing the most good for your company and your cause. John Wiley & Sons.

Khan, S. H. (2014). Qualitative research method: grounded theory. *International Journal of Business and Management; Vol. 9, No. 11; 224-233, 2014*. http://dx.doi.org/10.5539/ijbm.v9n11p224

Kim, J., Rasouli, S., & Timmermans, H. (2014). Expanding scope of hybrid choice models allowing for mixture of social influences and latent attitudes: Application to intended purchase of electric cars. *Transportation Research Part A: Policy and Practice, 69*, 71–85.

Kotler, P., & Levy, S. J. (1969a). Broadening the concept of marketing. *Journal of Marketing, 33* (1), 10–15.

Kovar, S., Pankratz, D., & Willigmann, P. (2017). Framing the future of mobility. *Deloitte Review, 20*. Retrieved from https://www.deloitte.com/content/dam/Deloitte/nl/Documents/consumer-business/deloitte-nl-cb-ths-framing-the-future-of-mobility.pdf

Kruglanski, A. W., & Webster, D. M. (1996). Motivated closing of the mind: "Seizing" and "freezing." *Psychological Review, 103*(2), 263–283. https://doi.org/10.1037/0033-295X.103.2.263

Kumar, A. (2016). Factors influencing customers buying behavior. *Journal of marketing and consumer research. An international peer-reviewed journal, vol. 27*, 30-34. Retrieved from: https://core.ac.uk/download/pdf/234694193.pdf

Kumar, R., & Kumar, R. (2019). Impact of various demographic factors on consumer behavior - an empirical study of electronic products in rural Himachal (India). *Indian Journal of Economics & Business, 19*(1). Retrieved from https://www.researchgate.net/profile/Ramesh-Kumar-55/publication/332415405_IMPACT_OF_VARIOUS_DEMOGRAPHIC_FACTORS_ON_CONSUMER_BEHAVIOUR_-AN_EMPIRICAL_STUDY_OF_ELECTRONIC_PRODUCTS_IN_RURAL_HIMACHAL_INDIA/links/5cb46945a6fdcc1d4995ba03/IMPACT-OF-VARIOUS-DEMOGRAPHIC-FACTORS-ON-

CONSUMER-BEHAVIOUR-AN-EMPIRICAL-STUDY-OF-ELECTRONIC-PRODUCTS-IN-RURAL-HIMACHAL-INDIA.pdf

Kumar, S. P. (2014). Impact of educational qualification of consumers on information search: a study with reference to car. *International Journal on Global Business Management and Research, 2*(2). Retrieved from https://www.rajalakshmi.org/ijgbmr/downloads/IJGBMRMar14-Paper4.pdf

Kurz, C., Li, G., Vine, D. (2016). The young and the carless? The demographics of new vehicle purchases, FEDS notes. Washington: board of governors of the federal reserve system, June 24, 2016, http://dx.doi.org/10.17016/2380-7172.1798

Lachowetz, T., Clark, J. M., Irwin, R. & Cornwell, T. B. (2002). Cause-related sponsorship: A survey of consumer/ spectator beliefs, attitudes, behavioral intentions, and corporate image impressions. *American Marketing Associations Conference Proceedings, 13*, 14-20.

Lane, B., & Potter, S. (2007). The adoption of cleaner vehicles in the UK: exploring the consumer attitude-action gap. *Journal of Cleaner Production, 15.* https://doi.org/10.1016/j.jclepro.2006.05.026

Lanzendorf, M. (2003). Mobility biographies: A new perspective for understanding travel behaviour. *In Paper presented at the 10th International Conference on Travel Behaviour Research, Lucerne, August 2003.*

Lee, A. Y., & Ng, S. (2015). *Handbook of culture and consumer behavior*. Oxford University Press, Inc. https://doi.org/10.1093/acprof:oso/9780199388516.001.0001

Lee G. & Lee Y. J. (2015). Customer Regulatory Focus and Impulse Buying of Apparel. *Journal of Fashion Business 19*(6): 1–13. Retrieved from https://koreascience.kr/article/JAKO201505555186948.pdf

Lee, J. A., & Workman, J. E. (2004). Gender differences in consumer decision-making styles. *Journal of Consumer Research, 31*(4), 878-889. https://doi.org/10.1086/425104

Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. *Journal of Marketing*, *80*(6), 69-94.

Liang, B., & He, Y. (2012). The effect of culture on consumer choice: the need for conformity vs. the need for uniqueness. *International Journal of Consumer Studies 36*, 352-359. https://doi.org/10.1111/j.1470-6431.2011.01013.x

Liao, F., Molin, E., & van Wee, B. (2016). Consumer preferences for electric vehicles: a literature review. *Transport Reviews*, *37*(3), 252–275. https://doi.org/10.1080/01441647.2016.1230794

Liberman, N., Trope, Y., & Wakslak, C. (2007). Construal level theory and consumer behavior. *Journal of Consumer Psychology*, *17*(2), 113-117. https://doi.org/10.1016/S1057-7408(07)70017-7

Lii, Y. S., & Lee, M. (2012). The effects of corporate social responsibility on brand credibility and brand image. *Journal of Business Ethics, 105*(1), 1-15.

Linn, J., & Shen, C. (2021). The effect of income on vehicle demand: evidence from China's new vehicle market. *Journal of the Association of Environmental and Resource Economists, 11*. https://doi.org/10.1086/725910

Li, K., & Wang, L. (2023). Optimal electric vehicle subsidy and pricing decisions with consideration of EV anxiety and EV preference in green and non-green consumers. *Transportation Research Part E: Logistics and Transportation Review, 170* https://doi.org/10.1016/j.tre.2022.103010

Lofman, B. (1991). Elements of Experiential Consumption: an Exploratory Study. *ACR North American Advances*. Retrieved from https://www.acrwebsite.org/volumes/7243/volumes/v18/NA-18

Loudon, D. L., & Della Bitta, A. J. (1993). Consumer behavior: concepts and applications (4th ed.). New York: McGraw-Hill.

Ma, J.-J., Qing, S., She, Z.-Y., & Xie, B.-C. (2017). What are the barriers to widespread adoption of battery electric vehicles? A survey of public perception in Tianjin, China. *Transport Policy*, *Elsevier*, *56*(C), 29-40. https://doi.org/10.1016/j.tranpol.2017.03.001

Maccarrone-Eaglen, A., & Schofield, P. (2017). A cross-cultural and cross-gender analysis of compulsive buying behaviour's core dimensions. *International journal of consumer studies, 42*(1), 173-185.

Macintyre, S., Ellaway, A., Der, G., Ford, G., & Hunt, K. (1998). Do housing tenure and car access predict health because they are simply markers of income and self esteem? A Scottish study. *Journal of Epidemiology and Community Health*, *52*(10), 657-663.

Mackie, D. M., Smith, J., & Worth, L. T. (1992). Gender schematicity and preference for gender-typed products. *Psychology & Marketing*, *9*(1), 17-30.

Mandys, F. (2021). Electric Vehicles and Consumer Choices. *Renewable and Sustainable Energy Reviews, 142*. https://doi.org/10.1016/j.rser.2021.110874

Manashree, C. (n.d.). *Factors influencing consumer behavior: top 9 factors with examples.* Economics Discussion. https://www.economicsdiscussion.net/consumer-behaviour/factors-influencing-consumer-behaviour-top-9-factors-with-examples/31457

Markus, H. R., & Kitayama, S. (1991). Culture and the self: implications for cognition, emotion, and motivation. *Psychological Review, 98* (4), 224–53.

Marshall A. (1890). Principles of Economics, Macmillan, London, 8th rev. ed. 1952.

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review, 50*, 370-396. https://doi.apa.org/doi/10.1037/h0054346

McKinsey & Company. (2020, July 17). *McKinsey Electric Vehicle Index: Europe cushions a global plunge in EV sales.* https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/mckinsey-electric-vehicle-index-europe-cushions-a-global-plunge-in-ev-sales

Merriam-Webster. (n.d.). *Webster's New World dictionary* (4th ed.). Houghton Mifflin Harcourt.

Meyer, A. G. (2015). Does education increase pro-environmental behavior? Evidence from Europe. *Economics Faculty Research and Publications, 116*, 108–121. Retrieved from https://epublications.marquette.edu/econ_fac/529

Mo. H. F., & Wong, W. M. (2012). Purchase intention of consumers for an automobile in the United States: A hierarchical regression model. *Journal of Marketing Development and Competitiveness, 6*(4), 26-34. Retrieved from https://www.researchgate.net/publication/341069766_Purchase_Intention_of_Consumers_for_an_Automobile_in_the_United_States_A_Hierarchical_Regression_Model

Modigliani, F., & Brumberg, R. (1954). Utility analysis and the consumption function: An interpretation of cross-section data. In K. K. Kurihara (Ed.), *Post-Keynesian Economics* (pp. 388-436). New Brunswick, NJ: Rutgers University Press.

Mohsin, M. (2023, November 14). *10 social media statistics you need to know in 2022.* https://www.oberlo.com/blog/social-media-marketing-statistics

Mollen, A., & Wilson, H. (2010). Engagement, telepresence and interactivity in online consumer experience: Reconciling scholastic and managerial perspectives. *Journal of business research*, *63*(9-10), 919-925.

Montoya, R. (2023). *Top electric car companies of 2023.* Edmunds. https://www.edmunds.com/electric-car/articles/top-electric-car-companies.html

Mowen, J. C. & Minor, M. (1998). Consumer Behavior. Upper Saddle River, NJ: Pearson Prentice Hall.

National Centre for Charging Infrastructure. (2024). *National charging infrastructure data and reports.* Retrieved from https://nationale-leitstelle.de/

Nickel Institute. (2020, December 11). *The shift from pump to plug - consumer readiness and EVs.* https://nickelinstitute.org/en/blog/2020%E5%B9%B4/december/the-shift-from-pump-to-plug-consumer-readiness-and-evs/

Niosi, A. (2021). Introduction to consumer behavior. BCcampus. https://collection.bccampus.ca/textbooks/introduction-to-consumer-behaviour-bccampus-174/

Nwankwo, S., Hamelin, N., & Khaled, M. (2014). Consumer Values, Motivation and Purchase Intention for Luxury Goods. *Journal of Retailing and Consumer Services, 21*, 735-744. https://doi.org/10.1016/j.jretconser.2014.05.003

Oakil, A. T. M., Ettema, D., Arentze, T., & Timmermans, H. (2014). Changing household car ownership level and life cycle events: an action in anticipation or an action on occurrence. *Transportation, 41*, 889-904.

Oakil, A. T. M., Manting, D., & Nijland, H. (2016). Determinants of car ownership among young households in the Netherlands: The role of urbanisation and demographic and economic characteristics. *Journal of Transport Geography, 51*, 229–235. https://doi.org/10.1016/j.jtrangeo.2016.01.010

Orsato, R. J., & Wells, P .U. (2007). The Rise and Demise of the Automobile Industry. Journal of Cleaner Production, 15, 994-1006. http://dx.doi.org/10.1016/j.jclepro.2006.05.019

Ozdemir, E., & Akcay, G. (2019). The effect of gender identity on consumers' impulse buying behavior and the moderating role of biological sex. *Business and Economics Research Journal*, *10*(5), 1109–1125. https://doi.org/10.20409/berj.2019.218

Pandit, A. (2016). Disruptive innovations in the automotive industry: Electric vehicles and beyond. *Technology Innovation Management Review, 6*(12), 29-35.

Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). SAGE Publications. Retrieved from https://aulasvirtuales.wordpress.com/wp-content/uploads/2014/02/qualitative-research-evaluation-methods-by-michael-patton.pdf

Peng, Y., & Bai, X. (2024). Identifying social tipping point through perceived peer effect. *Environmental Innovation and Societal Transitions, 51*. https://doi.org/10.1016/j.eist.2024.100847

Pfeffer, J. (1981). Power in organizations. Marshfield, MA: Pitman Publishing.

Pine II, B. J. and Gilmore, J. H. (1999). The experience economy. Harvard Business School Press, Boston.

Porter, M. E. (1980). Competitive strategy: Techniques for analyzing industries and competitors. The Free Press, Harvard Business Publishing, New York.

Pradipta, D. B., Triwijayati, A., & Wijayanti, D. (2019). The role of social class vs income in the purchase of consumer products in Jawa Timur. *Wacana Journal*, *22*(4), 305–316. https://wacana.ub.ac.id/index.php/wacana/article/view/592/473

Prieto, M., & Caemmerer, B. (2013). An exploration of factors influencing car purchasing decisions. *International Journal of Retail and Distribution Management, 44*(10), 738- 764.

Porter, M.E. (1980). Competitive strategy: techniques for analyzing industries and competitors. The Free Press, Harvard Business Publishing, New York.

Punnakitikashem, P., Rakthin, S., Thananusak, T., & Tavewatanaphan, T. (2017). Factors affecting the intention to buy electric vehicles: empirical evidence from Thailand. *International Journal of Electric and Hybrid Vehicles*, *9*(4), 361–381. https://doi.org/10.1504/IJEHV.2017.089875

Rabontu, C. I. & Boncea, A. G. (2007). Concepts and theories regarding the behavior of the consumer of products and services. *Munich Personal RePEc Archive*, 1-8. https://mpra.ub.uni-

muenchen.de/7853/1/CONCEPTS_AND_THEORIES_REGARDING_THE_BEHAVIOR_OF_THE_CONSUMER_OF_PRODUCTS_AND_SERVICES.pdf

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 Spatial Economics*, *13*, 1–32. https://doi:10.1007/s11067-012-9171-5

Ratneshwar, S., Mick, D. G., & Huffman, C. (2000). The motivational implications of the endowment effect and loss aversion. *Journal of Consumer Research, 27*(4), 431-447.

Rawlings, D., Boldero, J., & Wiseman, F. (1995). The interaction of age with impulsiveness and venturesomeness in the prediction of adolescent sexual behaviour. *Personality and Individual Differences*, *19*(1), 117–120. https://doi.org/10.1016/0191-8869(95)00024-Z

Reinartz, W. J., Wichmann, J. R. K., & Wiegand, N. (2022). Building your own brand platform: To sidestep the big online marketplaces, consider these four approaches. *Harvard business review*, *100*(9-10), 47-53. Retrieved from https://research.tilburguniversity.edu/en/publications/building-your-own-brand-platform-to-sidestep-the-big-online-marke

Rogers, E. M. (1995). Diffusion of innovations: modifications of a model for telecommunications. In M.-W. Stoetzer & A. Mahler (éds.), Die Diffusion von Innovationen in der Telekommunikation. *Springer*, 25-38. https://doi.org/10.1007/978-3-642-79868-9_2

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

Romani, S., Grappi, S., & Bagozzi, R.P. (2013). Explaining consumer reactions to corporate social responsibility: the role of gratitude and altruistic values. *Journal of Business Ethics, 114*, 193-206.

Rosenberg M. J., & Hovland C. I. (1960). Cognitive, affective, and behavioral components of attitudes. In: Rosenberg, M.J. and Hovland, C.I., Eds., Attitude Organization and Change: An Analysis of Consistency among Attitude Components, Yale University Press, New Haven.

Sachon, M. (2024, May 15). *Electric cars, now and in the future.* IESE Business School | University of Navarra. https://www.iese.edu/insight/articles/electric-cars-future/

Salgues, B. (2016). Acceptability and Diffusion. Health Industrialization, 53-69.

Same, S. (2012). Understanding experience marketing: Conceptual insights and differences from experiential marketing. In International Marketing Trends Conference (Vol. 1, p. 24). Venice, Italy. Retrieved from http://archives.marketing-trends-congress.com/2012/Materials/Papers/Marketing%20Strategy/Same.pdf

Sangalang, R. A., Siochi, J., & Plaza, M. (2017). Factors influencing consumers' impulse buying behavior in the fifth district of Cavite. DLSU Research Congress 2017, June, 1-6.

Sangarathas, D. & Shanmugathas, S. (2017). Exploring the model for consumer characteristics linked with technology marketing. *Int. J. Bus. Soc. Sci. Res. 6*(1): 27-36. Retrieved from http://www.ijbssr.com/currentissueview/14013237

Scarpi, D. (2021). A construal-level approach to hedonic and utilitarian shopping orientation. *Marketing Letters, 32*(2), 261-271. Retrieved from https://link.springer.com/content/pdf/10.1007/s11002-021-09558-8.pdf

Schiffman, L. G., & Kanuk, L. L. (2007). Consumer Behavior. 9th ed. New Jersey: Prentice Hall.

Schiffman, L. G., & Wisenblit, J. L. (2015). Consumer Behavior (11th). Boston: Pearson Education.

Schmitt, B., & Zarantonello, L. (2013). Consumer experience and experiential marketing: a critical review, *Review of Marketing Research, 10*, Emerald Group Publishing Limited, Leeds, pp. 25-61. https://doi.org/10.1108/S1548-6435(2013)0000010006

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology, 25*, 1–65. https://doi.org/10.1016/S0065-2601(08)60281-6

Sharma, S & Mehta, S. (2012). Where do we go from here? Viewing Corporate Social Responsibility through a Sustainability Lens. *Journal of Contemporary Management Research, 6*(2), 69-76.

Sheller, M. (2004). Automotive emotions: Feeling the car. *Theory, Culture & Society, 21* (4/5), 221-242.

Simon, H. A. (1957). Models of man: Social and rational. New York: Wiley.

Simonson, I. (2016). The Construction of the Consumer Decision Making Field by Jim Bettman – The Case of Preference Construction. *Legends in Consumer Behavior*. Retrieved from https://www.gsb.stanford.edu/faculty-research/publications/construction-consumer-decision-making-field-jim-bettman-case

Simsekoglu, Ö. (2018). Socio-demographic characteristics, psychological factors and knowledge related to electric car use: A comparison between electric and conventional car drivers. *Transport Policy 72*, 180-186. https://doi.org/10.1016/j.tranpol.2018.03.009

Shackle, G. L. S. (1951). Income, saving, and the theory of consumer behavior. *The Economic Journal*, *61*(241), 131–134, https://doi.org/10.2307/2226615

Shao, C., Sun, M., Wang, P., Wang, S. Yang, X., & Zhunge, C. (2021). Exploring the potential of rental electric vehicles for vehicle-to-grid: A data-driven approach. *Resources, Conservation and Recycling.* https://doi.org/10.1016/j.resconrec.2021.105841

Sheth, J. (1985, July 1). History of consumer behavior, a marketing perspective. Retrieved from https://www.jagsheth.com/marketing-theory/history-of-consumer-behavior-a-marketing-perspective/

Skinner, B.F. (1938). The behavior of organisms: an experimental analysis. B.F. Skinner Foundation, Cambridge, MA.

Slabá, M. (2019). The impact of age on the customers buying behavior and attitude to price. *Littera Scripta*. https://doi.org/10.36708/Littera_Scripta2019/2/11

Social factors affecting consumer behavior. (n.d.). Management Study Guide. https://www.managementstudyguide.com/social-factors-affecting-consumer-behaviour.htm

Solomon, M. R. (2018). Consumer behavior: buying, having, and being (Ed. 12th). Boston: Pearson.

Solomon, M., Bamossy, G., & Askegaard, S. (2002). Consumer behavior: A European perspective. Edinburgh Gate: Pearson Education Ltd. 36-49.

Statista. (2023). *Share of global mobile website traffic 2015-2022.* https://www.statista.com/statistics/277125/share-of-website-traffic-coming-from-mobile-devices/

Steenkamp, J., Gielens, K. (2003). Consumer and market drivers of the trial probability of new consumer packaged goods. *Journal of Consumer Research, 30,* 368-384.

Steg, L. (2005). Car use: lust and must. Instrumental, symbolic and affective motives for car use. *Transportation Research Part A: Policy and Practice*, *39*(2-3), 147-162.

Stern, H. (1962). The significance of impulse buying today. *Journal of Marketing*, *26*(2), 59–62. https://doi.org/10.2307/1248439

Sternthal, B., & Zaltman, G. (1975). Broadening the Concept of Consumer Behavior. In G. Zaltman, & B. Sternthal (Eds.). *Broadening the Concept of Consumer Behavior* (pp. 1-7). Association for Consumer Research.

Stigler, G. J. (1954). The Early History of Empirical Studies of Consumer Behaviour. *Journal of Political Economy, 62*(2), 95–113.

S & P Global Mobility. (2023, November 8). *Affordability tops charging and range concerns in slowing EV demand, 2023.* Retrieved from https://www.spglobal.com/mobility/en/research-analysis/affordability-tops-charging-and-range-concerns-in-slowing-ev-d.html

Tadajewski, M. (2009). Editing the history of marketing thought. *Journal of Historical Research in Marketing, 1(*2), 318-329.

Tellis, G. J., Yin, E., & Bell, S. (2009). Global consumer innovativeness: Cross-country differences and demographic commonalities. *Journal of International Marketing, 17*, 1-22.

Tesla. (2023, January, 2). *Tesla Vehicle Production & Deliveries and Date for Financial Results & Webcast for Fourth Quarter 2022*. https://ir.tesla.com/press-release/tesla-vehicle-production-deliveries-and-date-financial-results-webcast-fourth-quarter

Thaler, R. H. (2015). Misbehaving: The making of behavioral economics. W. W. Norton & Co.

The Impact of Technology on Consumer Behaviour. (2023, September, 18). The Keenfolks. https://thekeenfolks.com/the-impact-of-technology-on-consumer-behaviour/

The White House. (2021). *Fact sheet: Biden-Harris administration announces new targets to reduce greenhouse gas emissions, including a goal for 50% electric vehicle sales by 2030.* Retrieved from https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-biden-harris-administration-announces-new-targets-to-reduce-greenhouse-gas-emissions-including-a-goal-for-50-electric-vehicle-sales-by-2030/

Thinking of getting an EV? Your neighbor just might convince you. (2020, September 23). Generation 180. https://generation180.org/thinking-of-getting-an-ev-your-neighbor-just-might-convince-you/

Thøgersen, J. (2006). How may consumer policy empower consumers to act in environmentally friendly ways? *Journal of Consumer Policy, 29*(2), 179-202. https://doi.org/10.1007/s10603-006-9005-2

Thøgersen, J. (2006). Understanding repetitive travel mode choices in a stable context: A panel study approach. *Transportation Research Part A: Policy and Practice, 40*(8), 621-638. https://doi.org/10.1016/j.tra.2005.11.002

Törőcsik, M., & Szűcs, K. (2015). How Generations Think : Research on Generation Z. Retrieved from https://grupespsichoterapija.lt/wp-content/uploads/2017/09/comm1-3.pdf

Towne, T. R. (2020). *The effects of consumer buying habits in the automotive industry* (Doctoral dissertation, Liberty University). Liberty University Digital Commons. https://digitalcommons.liberty.edu/doctoral/2753

Triandis, H. C. (1977). *Interpersonal behavior*. Monterey, CA: Brooks/Cole.

Trope, Y., & Liberman, N. (2010). Construal levels and psychological distance: Effects on representation, prediction, evaluation, and behavior. *Psychological Review, 117*(2), 440-463.

Ukraine's BEV market nearly triples in 2023. (2024). Kallanish commodities. https://www.kallanish.com/en/news/power-materials/market-reports/article-details/ukraines-bev-market-nearly-triples-in-2023-0124/

Understanding consumer behavior: the four factors, 2018. (2018, May 7). QuickBooks. https://quickbooks.intuit.com/ca/resources/marketing/four-factors-consumer-behaviormarketing/

United Nations in Ukraine. (2021, August, 3). *In bold commitment to Paris Agreement, Ukraine pledges further reduction in emissions.* https://ukraine.un.org/en/139917-bold-commitment-paris-agreement-ukraine-pledges-further-reduction-emissions

U.S. Energy Information Administration. (2024, August 7). *Combined U.S. sales of hybrid and electric vehicles double their share of total light-duty vehicle sales from 2020 to 2023*. https://www.eia.gov/todayinenergy/detail.php?id=62924

U.S. Department of Energy. (2024). *Electric vehicle charging infrastructure trends from 2024*. https://www.energy.gov/eere/electricvehicles/electric-vehicle-charging-infrastructure

Urry, J. (2004). The 'system'of automobility. *Theory, culture & society*, *21*(4-5), 25–39.

Van Acker, V., Van Wee, B., & Witlox, F. (2010). When transport geography meets social psychology: toward a conceptual model of travel behaviour. *Transport Reviews*, *30*(2), 219-240.

Vaniyan, R. (2023, January 11). *EV sales up 50% to 13,600 in 2022.* Ukrainian News. https://ukranews.com/en/news/907816-ev-sales-up-50-to-13-600-in-2022

Veblen, T. (1899). The theory of the leisure class. New York, NY: Macmillan.

von Bertalanffy, L. (1968). General system theory: Foundations, development, applications. New York: Braziller.

Walters, C. G. (1979). Consumer behavior: An appraisal. *Journal of the Academy of Marketing Science*, *7*(3), 273-284. https://doi.org/10.1177/009207037900700301

Wang, S., Li, J., and Zhao, D. (2017). The impact of policy measures on consumer intention to adopt electric vehicles: evidence from China. *Transp. Res. A Policy Pract. 105*, 14–26. https://doi.org/10.1016/j.tra.2017.08.013

Ward, S. (1978). Contributions of Socialization Theory to Consumer Behavior Research. *American Behavioral Scientist*, *21*(4), 501-514. https://doi.org/10.1177/000276427802100404

Watson, J. B. (1913). Psychology as the behaviorist views it. *Psychological Review*, *20*, 158-177. https://doi.apa.org/doi/10.1037/h0074428

Wendering, S. (2024). Current state of public charging infrastructure. *Navit.* https://www.navit.com/blog/the-future-of-e-mobility-what-is-the-charging-infrastructure-like-in-

germany#:~:text=The%20National%20Charging%20Infrastructure%20Coordination,20%2C000%20from%20the%20previous%20year

Werth, L., & Förster, J. (2007). Regulatory Focus and the Evaluation of Consumer Products. *Journal of Consumer Research, 33*(3), 314-324.

Winton, N. (2022, November 29). *Next electric car sales phase could expose european neglect of affordable vehicles.* Forbes. https://www.forbes.com/sites/neilwinton/2022/11/29/next-electric-car-sales-phase-could-expose-european-neglect-of--affordable-vehicles/?sh=286ad0c53d4b

World Economic Forum. (2022, December 12). *3 challenges en route to electric vehicle batteries driving the circular economy*. https://www.weforum.org/agenda/2022/12/electric-vehicle-battery-circular-economy/

Wright, C. & Egan, J. (2000). De-marketing the car. *Transport Policy. 7,* 287- 294.

Zhang, Y., & Gelb, B. D. (1996). Matching advertising appeals to culture: The influence of executional factors on consumer responses. *Journal of Marketing, 60*(3), 37-49.

Zhang, Y., & Schrum, L. J. (2009). The influence of culture on impulse buying. *Journal of Consumer Research, 36*(5), 789-799.

105 years of the first Ukrainian vehicle: photos and interesting facts. (2024, May 16). Apostrophe. https://apostrophe.ua/en/news/society/avto/2024-05-16/105-let-pervomu-ukrainskomu-avto-foto-i-interesnyie-faktyi/321523

Özer, G., & Yilmaz, E. (2010). Comparison of the Theory of Reasoned Action and the Theory of Planned Behavior: An Application on Accountants' Information Technology Usage. *African Journal of Business Management, 5*(1), 50-58, Retrieved from https://ssrn.com/abstract=1923022

В Україні зросла частка гібридів та електромобілів у продажах нових автомобілів. / In Ukraine, the share of hybrids and electric vehicles in new car sales has increased. (2024). Autoua.net.

https://autonews.autoua.net/uk/53823-v-ukrayini-zrosla-chastka-gibridiv-ta-elektromobiliv-u-prodazhah-novih-avtomobiliv.html

Огляд ринку електромобілів в Україні: тенденції та перспективи. / *Overview of the electric car market in Ukraine: trends and prospects.* (2024, April 26). Epravda. https://www.epravda.com.ua/publications/2024/04/26/712943/

Appendices

Appendix A: Pilot interview transcripts

Appendix A.1: Pilot interview transcript - German respondent

Bohdana (B.)

Alright, let's start.

Respondent (R.)

Hope you can see my screen.

B.

Yes.

R.

But should I read this also out loud or?

B.

No, it's pretty much for the information.

Also, there is this part of the text in Italic explaining a little bit that the electric vehicle is a general term but for specific types of electric vehicles there will be used specific terms. This is maybe something to consider.

R.

OK, then let's start.

“In which country are you living?”

I lived in Germany and I am living in Germany here. So it's a clear question here.

So my age is now. I'm 35, so I should choose this option here.

My marital status is “I'm married”.

“How many people are currently living in your household?”

I'm married with my wife and we have one child, so three people are living in my house.

“What is the highest level of school you have completed?”

I made my diploma, which should be the same as a master's degree. I'm not sure if a high school grade diploma is the same as a master's degree?

B.

No, it's different.

So for the master level, it's "Master's degree", it's better to click on this.

Then maybe I will just make a note for myself that it will make sense to add this option with a diploma for the German market.

R.

So, "You are currently…"

I'm full-time employed at BMW. Maybe just one hint, if someone works on two jobs or something like that, or has company, maybe it's possible to make a multiselect here. If he's working, part-time and also working in another company or something like that.

B.

That's also a good point. Thank you.

R.

"Which of the following best describes your personal income last year?"

So we are…Is it for me only or for a household?

B.

For you only, yeah.

R.

So we are at 100,000 and plus, yeah.

B.

I'm also making a note when you are commenting or asking something about questions, it's good for me to write it down.

R.

"Do you currently have an electric vehicle?"

Yes, we have a BEV. We have 2 BEVs, but I'm not sure if this is interesting or if one is necessary.

B.
It's in general a question.

R.
Okay.

“Which type do you have?” It’s a BEV.

“Which form of BEV ownership/usage does apply to you?” I bought it.

“Which brand of BEV do you use?” Now we use a BMW. We have both a BMW and a Mini which relate both to the BMW concern. So it's a BMWIX one and MINI.

Is this what you expected from the question?

B.
Yes. Do you have some other thoughts about that question, if something else should be answered?

R.
No. Just wasn't sure if you wanted to have the real model name or...

B.
Yes.

R.
“Do you consider your BEV safe and reliable?” Yes. What does the word “reliable” mean?

B.
It's pretty much a synonym to “safe”, but in a different way.

R.
I will use the translator to see what it means. …Okay, then absolutely Yes.

B.
Does it in your opinion make sense to say safe and reliable? Or is it better to say just safe …?

R.

Maybe you should split it, because safety and reliability are different topics. This can also help when you don't have a BEV, when you use a normal combustion engine. Then most people think it's safe, but some cars are not reliable because they break up often or something like that.

B.

OK, thank you.

R.

“Are you feeling satisfied with the BEV you use?” Yes, absolutely yes, with both.

“How do you usually use your BEV?” I’m using it: “only around the areas I live”, both inside and outside or for trips outside the area.” I'm using them for both. There is a little bit of difference between the both cars because the Mini is for short trips because it has only 200 kilometers. And the BMW has a lot more, therefore, we can use it for all the trips. Maybe it's a special question because we have two vehicles, but I'm not sure if it's a normal case here.

B.

I will think if it makes sense for me to also do something with this question.

R.

But I think the question is okay, because it was not difficult for me to choose it. Here I took the most confident answer here.

B.

Okay.

R. “How do you usually charge your BEV?” I'm using a charging station at home, it's mostly used, maybe 99%.

B.

Okay, do you think it will make sense to do a multiselect here? In general my goal is to get the most used option. However, I'm also thinking if people may have difficulty.

R.

I think it's a good thing to say “How do you usually charge” so you choose the option you use the most.

Maybe you can add something like that down there and say “Which option do you use when you don't usually use it or something like?”.

B.
Okay.

R.
“What was the main reason for you to get started using a BEV instead of a vehicle with a combustion engine?” Ok, let's have a look at it.

“Low/no fuel costs, less/no dependency on fossil fuel supplies, elimination of greenhouse emissions, tax credits and incentives from the government, maintenance: less expensive and less frequent, quiet running, prestigious status.”

For me, it's difficult to choose one option here. I think it's a mix of all. I didn't choose it (my vehicle) really because of a low fuel cost, and not because of the greenhouse effect. All this works in a combination for us. It was a good idea to start it and test it because it was two years ago when we started using electric vehicles. It was just a model test: if it's possible, if it's good. A lot of people discussed electric vehicles and we wanted to feel how it really is and how it is in daily life to use them.

So maybe here a multiselect would be good.

B.
Alright.

R.
Because I couldn't say usually or most things, I think it's a really big mix for me.

B.
Okay, that's a good point. I think there is an option to do a multiselect out of three options. So this is maybe what I will do because I also don't want to give people all the varieties since then it will be also difficult for me to understand the ratio. But I think it's also good to hear that multiselect is the best in this case.

R.
I think it's a good opinion to say “choose the best three” or something like that, yeah.

So, should I choose one or should I write something down?

B.
Maybe you could write in “Other” that it's a mix of many factors for you or something like that.

R.
I will use the translator if It's OK for you. “What is the biggest inconvenience for you as a BEV owner / user?” “Driving range, charging infrastructure, complexity of charging the vehicle at home, service and maintenance costs, electricity costs, tax payments, inconvenience to have a vehicle serviced, no inconveniences…”

So most of the topics here are not really inconveniences... The biggest inconvenience is the driving range here. It's not really a problem in daily living, but in some situations, you have to plan that the vehicle is charged the next day and so on. It's a topic here, yes.

B.
Okay, but in this question would you suggest also to do a multiselect or is it straightforward?

R.
When we have a look at the question deck, maybe we should also add the multiselect because in my opinion I have more options as more conveniences or good things. So I want to select more good things. I don't have bad things here, but maybe other people do have more bad things here. Maybe it should be the same, “choose 1/3 of the given answers here.”

B.
Alright, thank you.

R.
“For me, driving a BEV…helps eliminate greenhouse gas emissions and address climate change, is prestigious, is cost efficient, and is a common means of transport…”

For me it's also these two things here. I would say it is cost efficient but here also maybe to better do a multiselect. But I understand that when you want to make an analyzer and everything is selected, it's very complicated.

B.
That's one of the fears because then the percentages can be equally split in between different options.

R.
It’s just my opinion when I'm working on the survey, But I understand what you want to say. It's easier then to get a real analysis on it.

“Does anyone in your family or among your friends/colleagues have a BEV?” No, at the moment, no one. One friend had one, but he sold it. Not sure this year or last year. But at the moment, I'm not sure if they really have one now.

B.
Is it more that hybrid vehicles are popular or more common?

R.
I'm not sure. A lot of people have problems starting a new journey. And at the moment it's a new journey, it's not the standard. Also many people have older cars which means that cars are more than three 4-5 years old and so they don't want to change it and they (electric vehicles) are not so cheap. I think this is the most common reason why people don't change to electric vehicles.

In my old work with old colleagues there were four or five guys who also had BEVs and there we had a lot of more. Maybe here it's also the Munich thing. When I worked in Regensburg, they had more houses, their own houses, it's easier to charge. In Munich it's complicated. More complicated maybe? It's this thing here.

B.
And do you sometimes also use these public chargers or you just mainly use the home charging stations?

R.
99% will use the home charging station, so I also can charge the cars in the public station, but it's not necessary because we also have solar panels on our house and so it's the cheapest way to go by car at the moment, yeah.

B.
Yeah, it's efficient in this case.

R.
Yeah, for sure. I would recommend getting a BEV. My wife was not so happy about starting with BEV and now she loves it. It's the thing to start.

“Would you like to have another electric vehicle in the next 5-15 years (as a replacement second vehicle)?”

B.
Or third, or fourth?

R.
Yeah, or fourth. Maybe as a BEV here because the MINI which has only 150 in the winter and 220 milliwatt is good for a second vehicle, but maybe we should also bring it to a bigger vehicle here, maybe also then the bigger BEV here.

B.
Alright.

R.
“Which form of ownership would you consider?” Because of the possibility of buying it here directly at BMW, at the moment I'm buying it and selling it one year later. And so at the moment we don't really spend money on it. And so it's okay for us, but it's a special case of being a BMW employee here. So I would consider buying or financing a vehicle here.

B.
OK.

R.
“What will be the main motivation for you to have another electric vehicle in the future?”

B.
It's the same as before but for the future, so probably I will also do a multiselect.

R.
A multiselect, yes.

B.

So in which form are you the owner of the vehicle?

R.

I'm the owner. I bought it. I bought it with a discount of 20% or something like that and one year later it's possible to sell it at around 20% from the start and so it's getting no cost for us. It's a good possibility at the moment. It always takes some time but at the moment we have a new car for no cost.

B.

It's interesting. And then are you selling the car in this used car market or how is it?

R.

Yeah, So, in history there were also some Norwegian or Danish customers who wanted to buy it. At the moment they don't want to, but we are selling it in the normal used market.

B.

It's good.

R.

“What is the main reason preventing you from having another electric vehicle?” ”...Purchase costs, driving range, charging infrastructure, service and maintenance electricity costs, tax payments, inconvenience to have a vehicle serviced, to charge a vehicle at home…uncertain safety and reliability”…you explain it…”fear of not being able to sell a vehicle in the used car marketplace and no need.” Does “no need” mean I don't need the car or…?

B.

Yeah, so it's probably also good to add here something like “no reason.”

R.

“No reason”, yes. “Would you consider having another electric vehicle if someone from your family or friends/ colleagues recommended it to you?”

I'm an early adopter, so it's difficult for me to answer this question here. But I think, yeah, it was for me like that. My colleagues had it first and then we discussed it and so it was (a recommendation) for me.

B.

It started as a recommendation in a way.

R.

Yes, right. “Do you see a rise in the usage of electric vehicles in your country?” Yes, for sure.

“With more affordable BEVs/HEVs/PHEVs, better charging infrastructure and other developed innovative solutions, will you be more willing to make your choice towards BEVs/HEVs/PHEVs during the next 5-10-15 years?”

B.

If there are in general good conditions for buying, for having, owning electric vehicles.

R.

I'm sure there will be. It's always about the cost and so on. And when it's getting cheaper, and in the last few years there were also some offers from the government and so on to get it cheaper, a lot of people bought electric vehicles.

B. …And we’re already finished here.

R.

Just one opinion. I know it's not so easy, but maybe you should make a decision tree when you start the journey: for those who have an electric vehicle and for those who don't have electric vehicles because the answers are a little bit different. Also maybe when you ask those who have one, you maybe should ask why he or she already has a vehicle. And in the other opinion, for those who don't have an electric vehicle, you should ask why they don't have an electric vehicle. Maybe there should be the decision tree starting the journey of the survey.

B.

So potentially or theoretically if you would have clicked on the option that you don't have an electric vehicle, then it would take you to another journey asking specific questions about that, for example, what is preventing you from having and so on. There would be less questions because the person doesn't have the electric vehicle. And I also have this separate section for people who have hybrid or plug-in hybrid vehicles because maybe there can be some different answers. So I would say that I have

these three different journeys for the moment. I'm not sure if there is something else to consider from your opinion.

R.
I'm not sure what the special aim of your thesis here is but it’s also important to know about costs and so on. Maybe you should add some questions regarding which costs are preventing you from getting an electric vehicle: is it buying the vehicle, is it the fuel costs?

And when you have fuel costs, there's a big difference between using an electric vehicle in a public charger and having it charged at home from the solar panel or something like that. When I buy it from the net I have to pay $0.26 and when I get it from my house, I have about $0.08 because of the installation of the solar panels. And when I'm charging it via a public charger, I have to pay $0.40 or something like that. And it's a big difference in getting the fuel costs here. But I'm not sure if you're interested in this topic in your thesis.

B.
In general, I'm curious to know that. But I will go through the survey again to see if it makes sense for me to add some of these questions. Is there something else that you would recommend?

R.
No, I think it's a good survey. I think it's okay that the answers are not so long and it's very good to see which all the possibilities are there. It's clean and with a good structure, the questions are not too long. I think it's really okay.

B.
Were there some other confusing questions for you, besides what we discussed?

R.
No, I don't think so. The only things we discussed here. Let me think if I forgot something… No, I think that’s it.

B.
All right, then I will stop recording. Thank you!

Appendix A.2: Pilot interview transcript - US respondent

Bohdana (B.)

Please let me know if you can see my screen.

Respondent (R.)

Yes, yes.

R.

USA, of course. And what I'm guessing is that for each country you will have different questions, right?

B.

So pretty much the USA and Germany have in general similar questions. Of course there is a language matter. For Ukraine the questions are in Ukrainian, for the USA and Germany they are in English. And there are just some maybe market specific differences in questions, but other than that they are the same.

R.

My age... Basically two kids with my wife...

Do I have to select this? ...I can say “Prefer not to answer”.

B.

Do you think this question with the salary is sensitive?

R.

The thing is, what I was thinking is that some people will answer honestly, while some might just give you a wrong number because you are giving them the option to select a number. So depending on the person, they may not want you to document the right number. What I'm trying to say is that I’m not sure whether the information accuracy will be there or not.

B.

Alright.

R.

Is it possible to go back and see them?

B.

No, unfortunately not.

R.

Maybe what I will do is the following. You have four different options. What I will do is simplify them like lower than 50,000 or higher than 50,000.

B.

Okay.

R.

Unless you in your PhD need to find out a certain type of salary for a household and it helps with your marketing, then it's a different story. As I saw, you had only a $20,000 window I think, or $10,000.

B.

Right, I mean in general it would be important for me when people are answering and selecting some specific numbers for this since then the purpose is to understand then some correlations between answers. It's not really a matter for the moment, but in general, that was the idea.

R.

But in the future, it can be helpful. If you have these many household groups, then you can market the luxury product versus the basement. So maybe you can keep it that way. What I was trying to say is that the information can be with a little bit of less accuracy. Don't consider that as a 100% honest and accurate number.

B.

Alright.

R.

Okay… “Do you currently have an electric vehicle?” “Yes”.

“Which type of electric vehicle do you have?” Of course, “BEV”. Actually, I have a lot of BEVs in my family as well. My cousins have a BEV as well as a plug-in hybrid. My cousin has a X5 plug-in hybrid.

B.

Alright. And do you personally have one BEV, or do you have a few electric vehicles? Also, I don't

know if you have paid attention at the beginning - there was a small note that during the survey there can be mentioned specific terms for electric vehicles as you can see this now. And whenever there is just the wording “electric vehicle” without specification, then it means an electric vehicle in general, or it can be referring to your personal electric vehicle. So if it's specified, then it means a specific type, and if not, then it means any type.

R.
So to be honest, when we bought the vehicle, my wife did not know the difference between the plug-in hybrid and the BEV. So I had to explain because she thought that it was only a hybrid or a BEV. But there is also a plug-in hybrid that most people don't even know what it is. Maybe having pictures or something like that will help in this case. And you can kind of show them a car with a full battery (a BEV) or a hybrid, just to visualize.

B.
Alright.

R.
“Which form of BEV ownership / usage does apply to you?” I also had another BEV before this, but you're only asking about my current one, right?

B.
Yes, exactly.

R.
I had a different experience with my BEV before, that's why I was asking a question. My current one is good but the reason why I sold my previous one was because there was a big safety problem.

B.
Yeah, it's also a good point, let me just make a note.

R.
That’s why I decided to sell that car and buy a new one.

B.
And has this safety issue in the previous car not made you step away from the electric vehicle?

R.

That's what I am trying to say. Because I'm in the automotive field, I know enough about it to be a little bit more confident. But if this were my wife, she would have never bought an electric vehicle again. That's what I was trying to explain. The previous vehicle had a huge safety issue, we had to leave our car outside the house and she was not even able to drive it. And we had to fight with the dealer to buy it back. But right now it's fine. So I will answer it that way, but I thought I should have given you that input.

B.

Thank you for telling me. And sorry, a question. Considering the previous question, which is combining both safety and reliability: in your opinion, is it something to put together in one question, or does it make sense for you to separate safety and reliability (in two different questions)?

R.

Separate. There was a problem with the safety, and there were also problems with the reliability and also with the range. They promised a certain range, but we never received it.

B.

Alright.

R.

There are three big topics, in my opinion, with BEV only. If they advertise 290 miles and you get 250, it's a big difference. We know after that experience, we don't take our car even outside of the city. So, it's basically our second car. Anytime we need a big family trip, we no longer use BEV anymore because of that and because of the experience we had with the charging network.

B.

Okay, and for some longer trips, do you use a normal car?

R.

Yes, a normal one.

B.

So may I ask whether the electric vehicle that you currently have is your second car?

R.

Yes, it's a second car. It will be good to have a question about the BEV, whether it's your primary or a secondary vehicle.

B.

Alright, thank you.

R.

Okay, I have a question here.

B.

Yes. So standard outlet and charging.

R.

So this is then a high speed like 240-volt.

B.

Yes, special charging outlets for cars, for electric vehicles.

R.

I would also describe charging at home with some kind of 110-volt because in the US there is a special WallBox for 240-volt. And I would also add 110-volt versus 240-volt.

B.

Do you mean to specify this?

R.

Specify, yes, because most people know that this is something special that you need (a WallBox or a 240-volt outlet) or maybe you can say "Level 2". We call it "Level 2 charging" versus "Level 1". And the DC charging is "Level 3".

B.

Alright.

R.

I have two options. Can I select two? I was thinking about what to do. We got the tax credit as well.

There was a good reason to buy it. When we bought it we also got a really good tax benefit, but also at the same time we wanted to do both (a driving range).

B.

Alright. So at the moment it's just one option, one choice, but maybe you could just write it down. Would you say that in these types of questions it's better to do the multiselect?

R.

Yes. Let me copy this. “Range and charging…”.

B.

It's also the same, so therefore I will have to change.

R.

“...Inconvenience to have a vehicle serviced.” It’s not a big deal because Tesla service comes to your house unless you have a big problem. Electricity cost was not an inconvenience. I don't know about maintenance costs yet because it's a fairly new car. It's hard to answer that right now. And charging at home is very easy once we have got that box. I'm thinking about your options here...

What was the decision behind making those options? What was the criteria from your side? Why did you select a tax payment as the biggest inconvenience? That's what I'm trying to understand.

B.

Alright. So, imagining some other market, there can be some issue with tax payments or some specific taxes for getting the electric vehicle can be higher, so it can be an inconvenience. Therefore, I was trying to cover as many options as possible to let people choose. But the only issue I see now is that it's more common for people to choose at least a few options here and not just one.

R.

This is definitely.

B.

Do you think with tax payments it's not such a big inconvenience?

R.

At least not in my case in America. It's a little bit confusing I would say because instead of tax

payments, it could be the tax refund. The reason why I was asking that question is because once you file your taxes, you get the refund or you don't, you don't pay that much tax. So how easy it was for you to file - that's the question. But I guess from this year on, that problem is not there anymore because in the US market now, once you buy the vehicle, the tax is automatically reduced from the price at the point of sale. So that's no longer on topic anymore.

B.
Okay, I understood.

R.
So that's why I was asking the question.

B.
And may I ask, how big is the tax refund actually?

R.
So the federal government tax is $7,500 and then now, on top of that if you are in a state of California, for example, you can have another from $5,000 up to $7500 refund. So together it's up to $15,000. But in my state there is only a federal tax.

B.
And just out of curiosity, we are talking now about South Carolina, right?

R.
Yes. "For me, driving a BEV…" "... helps eliminate greenhouse gas emissions…" - for sure…and it's also definitely "cost efficient". It's actually cheaper to charge it.

"Does anyone in your family or among your friends/colleagues have a BEV? Yes, I do have a family member who has it.

"Would you recommend getting a BEV?" Yes, but my problem is that I would add another box. I would say I would only recommend specific ones. I mean, the reason why we went with Tesla is because of their charging network and because they have this battery called LFP. And the reason why I bought this car with LFP battery is because my previous battery had a lot of problems. So, we decided to use LFP because then you can charge it every day 100%. And you don't have to worry about

degradation of the battery because you can only charge the other battery up to 80% and whenever we did 80% we never received the range they promised.

But anyway, I would say yes or no is a clear answer in this case, right?

B.
Yes.

R.
Oh, that's a question…I don't know. That's a tricky one. I hope in 15 years, yes. But hopefully this will be in 5-10 years at least. In the future we will stay with the BEV because I hope that by then they will have a solid-state battery and it will be even better.

B.
That's what I wanted to ask if you still prefer a BEV or would you prefer some different type?

R.
But again as a second car, I will not buy that as a main car. So maybe you could ask the question: "In the next 5 to 10 years, would you still consider that as a secondary vehicle or as a primary vehicle?"

B.
Yes, that's a good point, thank you.

R.
You see, with my experience with Tesla - I don't know if you know this or not - but after I bought the car, they have reduced in price a lot. I have actually lost some money because when we bought it, the Tesla reduced the price. So I don't know. I was actually thinking about leasing instead, then I would not have lost that kind of money. So maybe next time, - again I don't know - but because of my current experience, I may not consider buying it because if the market is still fluctuating, I will change my decision. But today, if I have to buy another one today, I will probably lease it then just to avoid that loss of value.

But I was told by whoever had a lease, they had to pay the same price and then you're still stuck with your lease payment, so I don't know. So I would say I'm not sure at the moment.

B.

Alright.

R.

What was the reason for this option?

B.

Well, maybe someone after having the experience of using a BEV now, would say okay, it will be enough for me to use just some family member's vehicle in the future.

R.

Or a rental.

B.

Right.

R.

Or a rental: "Would you rent a BEV or not?"

B.

Or do you think it could also be something different there?

R.

I would say a family member or rent, "Would you rent it for a week or two during your vacation?"

Having another electric vehicle… the environment and hopefully tax benefit and then a low fuel cost. So again, multiselection there.

B.

Alright.

R.

"What is the main reason preventing you from having another electric vehicle?" Ah, driving range and charging. I will never have my first car as an electric vehicle yet.

B.

And sorry, what did you choose in the previous question? It was about the main motivation for another vehicle in the future.

R.

Greenhouse and the tax. But I only selected the greenhouse. But yeah, I think tax payments are already available there.

B.

Okay.

R.

“Would you consider having another electric vehicle if someone from your family or friends/colleagues recommended it to you?” As a primary vehicle or as a secondary vehicle?

B.

As another one, not as a primary.

R.

My answer is no. The reason why I'm saying “no” is because I already have one and I don't want the second one.

“Yes”.

B.

Okay. And I have a specifying question in regards to this trend of people using more and more electric vehicles. Would you say it's different between rural and non-rural areas?

R.

Definitely. And the reason why I would say that is because they have that small area to cover in their day-to-day time frame. I don't see that many in a rural area, especially in South Carolina. We have a lot of rural areas and there's no even charging network. We have a charging network in Greenville, then the next one is in Atlanta or Columbia. So good luck in between.

B.

Alright, okay.

R.

With Tesla, they have more. But with another vehicle I have had before, they don’t have many charging stations.

B.

And I understood it was a reason for you to choose a Tesla now, right?

R.

Yes. And the second problem was that even though you would find the charging network, the cables were broken…and when you plug them in, they promised you 150 kilowatt but I barely got 50 and it was just not working smoothly. And now I have a Tesla for one year. Every single time it was working and it was working at high speed. I was really impressed. It was really amazing. I mean, I had zero failures with Tesla. And you don't have to do anything. You don't have to open up your credit card, put a bunch of numbers. All you have to do is go to the charger, take the cord, plug it in and you're done. It's charging. That's all you have to do. That's very smart. At BMW, I'm glad they are adapting it. That's really smart.

Yes, of course. This is a very lengthy question, in my opinion. Maybe we can simplify that.

B.

Okay. And I think this is it. Before I stop recording, if you have some more comments on this survey, if in your opinion something has to be added or changed.

R.

I think that's with multiple options that we’ve discussed. There are a couple of things that I told you about then. What else? I would say it would be nice to have a question: “How is the user experience inside the car?” It was also very nice that when we were charging Tesla there are some games inside the vehicle and that was very entertaining for my kids. Having a second row screen… you want that screen because you were charging the vehicle for 30 minutes and so it was very nice to have some kind of a game or something like that to keep your kids entertained. Otherwise, they want your phone.

B.

Alright. I think I should have had this in some of my questions regarding technologies and some infotainment in electric vehicles, if that could be a sort of motivation for you to get an electric vehicle or not really?

R.

Well, I would add two things. One is definitely about the charging experience at the charging station. I don't know if that's your focus or not, but it is a part of this survey. That's the bottleneck because people will not buy it once they have that bad experience or multiple bad experiences. Then they may not buy the next product. Maybe they will write that down in your comment, but maybe in one of the multiple options you can also have the charging network. And I would also add a charging speed quality or something like that.

B.

Honestly, it was really interesting and useful to hear your opinion, so thank you a lot.

R.

I'm happy to help. I'm glad I was able to help.

Appendix A.3: Pilot interview transcript - Ukrainian respondent

Bohdana (B.)

OK, so now I'm opening the survey. Now you should see my screen. I will read the questions, but you will tell me what to choose.

So, in which country do you live?

Respondent (R.)

Ukraine.

B.

How old are you?

R.

67.

B.

What is your marital status?

R.

I’m married.

B.

How many people, including you, live in your household?

R.

Two.

B.

What is the highest level of education you have? If you are currently studying, please indicate the highest degree obtained.

R.

Doctor of Philosophy in the field of international relations.

B.

Then we choose “Doctoral studies.”

“Are you currently working full-time, working part-time, unemployed, self-employed, a homemaker, a student, a military, retired, or other?”

R.
Other - a business owner.

B.
Alright. “Which of the following best describes your personal income for the past year? Here we can also choose the answer "I wish not to answer".

R.
The latter, 90,000 +.

B.
Alright. “Do you currently use an electric car?”

R.
Yes.

B.
Which type of electric vehicle do you use? Battery electric vehicle, a hybrid or a plug-in hybrid?

R.
BEV.

B.
“Which form of BEV ownership / usage does apply to you?”

"I have bought it; I use leasing; I am renting it, using a subscription; I use the electric car of the company I work for; I use the electric car of one of the family members or Other."

R.
"I have bought it."

B.
"Which brand of BEV do you use?"

R.

Tesla.

B.

What is the model of your BEV?

R.

Model 3. Standard range plus.

B.

Do you think your battery electric car is safe and reliable?

R.

Yes.

B.

In your opinion, are safety and reliability different concepts, is it better for me to distinguish them and create 2 different questions? Or can it remain as one question?

R.

It can be one.

B.

Alright, thank you. Are you satisfied with the BEV you use?

R.

Yes.

B.

“Where do you usually use your battery electric car?

"I use it only around the area/city where I live"; "I use it both in the area/city where I live and outside of it"; or "I use it mainly for trips outside the area/city where I live."

R.

"I use it only in the city where I live."

B.

“How do you usually charge your vehicle?”

R.

"I use a special charger at home." In particular, it is a Tesla charger.

B.

Alright, I'll make a note of it.

R.

I have a special case. Although I live in an apartment building, there is an underground parking lot with an EV charging station there. And the vehicle charges like a phone: it turns on at night, and that's it.

B.

I understood. And around the city, there are no problems with chargers, aren’t there?

R.

In Kyiv - yes. This is what I can already tell you: if you are going to conduct this study for Ukraine, then you can immediately note that in Ukraine this car is only for the city and as a second vehicle in the family. It cannot be used to its full extent on our Ukrainian market for trips outside of populated areas.

And as the war has shown, when we had to leave, we went in my wife’s Mercedes. Although I later met the same cars in the Carpathians, I think that people drove 2-3 days in such cars in order to reach the Carpathians. Therefore, our market is very different from the Western market. And the war interrupted the development process. And one more point: this is the position of Tesla and Musk in regards to our market. As such, there is no official market for them in Ukraine.

B.

I have realized. And how is it with Tesla chargers?

R.

They are official, because the company that supplied and sold me the car brought it from Germany. This car is produced in a European factory for the European market, and they also provide Tesla chargers. And my account is registered, as far as I understand, in Germany. When I open it, everything there, e.g. my guarantees - both on the battery and on the vehicle - will last for a very long time, they

are all valid. I have a new vehicle, unlike other vehicles in our market - they are mainly used cars from the American market.

Although, by the way, VW is gaining momentum now - I looked at the statistics for the past year - it is in 1st place in terms of sales among new electric cars. This is the smallest crossover that they produce and it is almost 2 times cheaper than Tesla. It certainly appeals to people.

B.
And what is the situation with Chinese manufacturers of BEVs, and not only BEVs? Are they filling the market?

R.
Everything depends here. Last year in Russia, the Chinese manufacturers surpassed the Japanese in terms of sales. Why? Because it is simply a closed market for suppliers. Here in Ukraine they are not so advanced. They exist, but the negative reputation of Chinese-made cars with ICEs, which we already had and which we received, also spreads to electric vehicles. Therefore, in terms of sales, they occupy a very modest place in the list.

B.
Understood. And, by the way, thank you for your comment that an electric vehicle is the 2nd for the family and is mainly for the city, because I don't have such a question. Therefore, I will even add a separate question about whether the electric car is the first or certain in number after the ICE car? Now I also see that the trend not only for Ukraine, but also for other markets is that the electric vehicle is at least the 2nd means of transport in the household.

Next question. "What was the main reason for you to buy or switch to using a battery electric car instead of a car with only an ICE?"

R.
Here I see “low or no fuel costs; less dependence on fuel supply; reduction of negative impact on the environment; tax benefits; cheaper and less regular maintenance..." There can also be... it must be formulated somehow... "The desire to join innovative trends, to gain new experience in this".

B.
Thank you, I will add this option as well, it is also relevant. I now give the opportunity to choose only

one answer in such questions. But I have realized that it is necessary to add an option to choose several answers.

R.

Yes. If it were possible to choose several options and "innovative technologies", then I would choose that and, for example, "reduction of negative impact on the environment and cheaper, less regular maintenance". It's all relevant.

B.

Let me write a comment here now... And you have also mentioned cheaper and less regular service, right?

R.

Yes. I would choose it now, but it does not fit the whole complex.

B.

Alright. And you have also talked about innovative technologies…

R.

Yes. Modern technologies that you want to join and try what they really are.

B.

So... "What is the biggest inconvenience for you in using a BEV?"

R.

"Driving range."

B.

Are you choosing only one option here, or will there be several?

R.

Yes, only one. I have nothing else. I don't have a problem with limited access to charging stations, although they may exist in Ukraine. I have a charging station at home. It removes all problems. I don't have any complications of charging the vehicle at home... "Service and maintenance costs" are minimal. I do not notice the electricity costs with the night rate at all. I just pay by the meter, because the charger (station) is connected to the meter, and everything, everything is convenient. I have not

been serviced yet. Now it has become clear that the brake pads need to be changed. But this is relevant for any car - if it is electric or if it is not electric, you need to change it. Therefore, everything is normal.

B.
Alright, then here I choose "Driving range".

R.
Yes. Then we'll talk more, I'll tell you some more nuances for you to know. The things that the manufacturers claim do not correspond to reality. For example, they explain that "this is calculated according to one principle, and this - according to another" and so on.

"How important is driving to you?" Here, "it is prestigious."

B.
"It is prestigious", and would you add something else?

R.
Yes. It is necessary to somehow combine it again with the latest technologies. If there were such an answer here, for example, "It allows you to be in touch with the latest technologies", I would choose it. Everything else, for example, prestige is a very ephemeral thing. For this, you have to buy a Maybach… "Helps reduce emissions into the environment" - maybe for Germany it will be important, but for us, in the situation in which we are now, it is not economically and financially beneficial. The operation of this vehicle - yes, it is possible. But sorry, almost 60,000 euros I have paid for the car will never pay for itself compared to a petrol engined car of the same class.

B.
Yes, that’s understood. Alright, can we move on to the next question?

R.
Yes, I have chosen the economic and financial benefit.

B.
Fine. “Are there any users of battery electric vehicles in your family or among your friends/colleagues?”

R.

Yes.

B.

"Would you recommend buying a battery electric car?"

R.

This question - I am speaking only for our market - is also quite difficult. So imagine that I advise someone to buy electric cars. Here you have to run away from the killers, and he/she has one (electric) vehicle in his family. It is very difficult. So yes, I would but there are some limitations. Here, for example, you can add "Yes, but taking into account the specifics of a country."

B.

Fine. Why I am actually having these conversations now is because I will take these comments into account. So it is very helpful for me to hear your answer.

R.

"Would you like to buy another electric car... within the next 5-15 years?"

For me, 15 years is such a prospect... Anyways, I hope that it will be possible. Besides, given the state of the market, now I would even think about a Mercedes plug-in hybrid. They have released a very good model of the E-class which provides movement on batteries for somewhere between 50 and 100 kilometers. Gasoline consumption is about 1.8 liters per 100 kilometers. This is very acceptable. And it charges, if I'm not mistaken, from a simple outlet. This is a very interesting option.

Therefore, here I will select "Yes, plug-in hybrid".

B.

Speaking of this plug-in hybrid option, "How would you like to buy/own it?"

R.

When I previously considered this issue for our market - leasing, other options - we studied it in great detail. In our market with our dictatorial banking system, this is still unprofitable and almost impossible. The payments are huge, the interest on loans is crazy. And yes, I am well aware of the leasing system that exists, for example, in Germany or America - it is the most developed there. In fact,

it is beneficial. If you have a stable income, then you can not worry about payments, about the future of this car.

B.
Alright, then would you choose leasing here or another option, taking into account our Ukrainian conditions?

R.
I have already chosen leasing, but in reality buying would be the best.

B.
Fine. What will serve as the main motivation for you to purchase another vehicle?

R.
"Cheaper and less regular maintenance."

Given that we can add one more answer option here, it would be fine. First, now I have driven 14,562 kilometers on my BEV, it's a new car and I don't need a new one. But if we were talking about buying again, then "Expenses" and "Driving range" would be my choice.

B.
Are there any other factors, or is this the main one?

R.
This is the main one. And the second factor is our market price of a car of the class I would like to have. Tesla or other cars of leading companies, where the mileage is declared 500-600 kilometers, have a price that greatly exceeds gasoline ones.

B.
Then there could still be an option "Expenses on its purchase", for example?

R.
Yes.

B.
Next question. “Would you consider buying another electric car if someone from your family or friends/colleagues recommended it?”

R.

Yes.

B.

"In your opinion, is the demand for battery electric vehicles growing in Ukraine?"

R.

Yes. And this is shown in last year's statistics in Ukraine.

B.

And the last question. This is the perfect situation: "With more affordable BEVs/HEVs/PHEVs, better charging infrastructure and other innovative solutions, would you choose buying them in the coming years?"

R.

Yes.

B.

We can end the survey because that was the last question. Would you like to add something?

R.

Yes. The first thing is about the economic benefits of using electric cars, especially in our market. When an electric vehicle costs about 60,000 euros, and the same car with a gasoline engine costs 40,000 euros, then we count. For how much 15,000 - 20,000 euros can be compensated, how much do you need to drive? You need to drive a lot to make it pay off. But this is not an argument. The argument is lower maintenance costs, and gasoline costs, but not in terms of the total cost but in terms of daily expenses. The next thing is about intangible things such as environmental protection and so on. But for me an important thing is to be tangential to innovative things, an opportunity to try what's in trend.

All the company's statements about driving range on a single charge regarding battery life are also a myth. And it's not nice. When I purchased the battery, it was charged up to 410 kilometers. After a year and a half, the battery degraded to 385 kilometers. This is a significant loss. And this happened without any explanation. I keep my software up to date. It comes to me automatically, it is updated, new functions appear, but there are many functions that we do not use in our market. For example, I have an

autopilot function. It is not connected now, in order to connect you have to pay a lot of money. But even if I pay, it is clear that I will not be able to use it with our road conditions.

Next: Tesla is a company that takes 30 percent just for the brand. But the times are passing. The Chinese companies are pushing. The pressure is crazy. The Germans with, for example, their Volkswagen. As far as I understand, Volkswagen was in 1st place in Ukraine last year. Thirdly, there is the American market with used cars. The most sold one is Nissan Leaf with the old modification. And for the Ukrainian market, there is definitely a driving range problem. For example, let's imagine that I need to get to Lviv from Kyiv. It is five hundred and fifty kilometers. I can recharge in Rivne, but I have to drive to Rivne. And then another 250 and fifty from Rivne to Lviv. There will be no problems with charging in Lviv because some hotels have installed chargers, and you can choose a hotel that has this charger.

Regarding the infrastructure, there were very big plans before the war, for the chargers construction. But now is not the right time.

B.
Alright. I have no more additional questions. If you still have something on your mind, we can talk additionally. Thank you very much.

Appendix B: Guides for interviews with automotive industry professionals (ENG, for Germany and USA)

Appendix B.1: Guide for interviews with automotive industry professionals (ENG, for Germany and USA)

Section of general questions on the current situation of the market of BEVs, HEVs and PHEVs

1. In your opinion, how would you evaluate the current state of the market of BEVs, HEVs and PHEVs? (different markets to ask about when asking respondents from Germany/USA/Ukraine)
    a. from the supply point of view?
    b. from the demand point of view?
2. How would you evaluate the availability of BEVs, HEVs and PHEVs at dealerships in Germany/USA/Ukraine? How has it changed during the last few years?
3. How would you evaluate the affordability of BEVs, HEVs and PHEVs and the tax advantages in Germany/USA/Ukraine? How has it changed during the last few years?
4. What is, in your opinion, the situation with the charging infrastructure at home, in the town/city and on the highways (autobahns) in Germany/USA/Ukraine? How is it in rural and not rural areas?
5. How did COVID-19 and now how do other economic and political circumstances (including war in Ukraine) influence/change the market of BEVs, HEVs or PHEVs in your opinion? Is it changing for better or for worse?
6. Can BEVs, HEVs or PHEVs fully replace vehicles with only a combustion engine? What are your arguments for/against this?

Section of questions on users of BEVs, HEVs and PHEVs - their beliefs, motives, emotions, habits & behavior

7. How would you describe typical groups of users of BEVs, HEVs or PHEVs? In your opinion, how would their beliefs, motives, emotions and values differ, depending on their age, income, marital status, education, occupation and other social and psychological factors?
8. What would you name as the main reasons for people to purchase a BEV, an HEV or a PHEV instead of a vehicle with only a combustion engine?
9. What beliefs, emotions, motives and habits can drive automobile consumers to make their choices towards BEVs, HEVs or PHEVs?

10. Do you think automotive users are willing to buy BEVs, HEVs or PHEVs to have a better impact on the environment (eliminate greenhouse gas emissions and address climate change) or for other reasons?
11. How can automotive customers be encouraged to switch to BEVs, HEVs or PHEVs? (e.g., with low purchasing costs, special state or local incentives bringing down the costs of buying or leasing electric cars compared to conventional cars with combustion engines etc.)
12. Do you think special innovative digital and customized tools and services can encourage automotive customers to buy BEVs, HEVs or PHEVs?
13. What, in your opinion, are the obstacles keeping automobile users away from buying BEVs, HEVs or PHEVs? Can it be a lack of charging infrastructure? Low driving range? Other inconveniences?
14. Should the automotive consumers question the safety and reliability of BEVs, HEVs or PHEVs to make their choice for electric cars? Do you consider BEVs, HEVs or PHEVs as safe and reliable means of transport?
15. How / Do you think personal preferences and values frame consumers' decisions and preferences towards EVs?

Section of general questions on the future situation of the market of BEVs, HEVs and PHEVs

16. In your opinion, what motives and choices are to be the most common across all groups of automotive and electric vehicle consumers in Germany/USA/Ukraine in the next 5-15 years? (as mentioned in the answer to the question #7)
17. Will the environmental concern be the top motivator for automobile consumers to switch to BEVs, HEVs or PHEVs? Or will there be other factors affecting their decision?
18. Do you think automotive users will be willing to switch to BEVs, HEVs or PHEVs for less dependence on fossil fuel supplies?
19. Do you think that with affordable BEVs, HEVs or PHEVs, better charging infrastructure and other developed innovative solutions for BEVs, HEVs or PHEVs, automobile consumers will be more eager to make their choice towards BEVs, HEVs or PHEVs during the next 5-15 years?
20. In your opinion, which other factors lead to the changed consumers' buying behavior and habits in the automobile industry?

Appendix B.2: Guide for interview with automotive industry professional (UKR, for Ukraine)

Розділ загальних питань щодо поточної ситуації на ринку акумуляторних електромобілів (BEV), гібридних електромобілів (HEV) та плагін-гібридних електромобілів, або таких, що підключаються (PHEV)

1. Як Ви оцінюєте поточний стан українського ринку акумуляторних електромобілів (BEV), гібридних електромобілів (HEV) та плагін-гібридних електромобілів (PHEV):
    a. з точки зору пропозиції?
    b. з точки зору попиту?
2. Як Ви оцінюєте наявність BEV, HEV та PHEV у дилерських центрах в Україні? Як вона змінилася за останні кілька років?
3. Як Ви оцінюєте доступність BEV, HEV і PHEV та податкові переваги на них в Україні? Як ця ситуація змінилася за останні кілька років?
4. Як Ви оцінюєте зарядну інфраструктуру в домашніх умовах, у місті та на автомагістралях в Україні?
5. Як, на Вашу думку, COVID-19, а тепер і інші економічні та політичні обставини (зокрема, війна Росії в Україні) вплинули/впливають на ринок BEV, HEV або PHEV в Україні? Ситуація змінюється на краще чи на гірше?
6. Чи можуть BEV, HEV або PHEV повністю замінити транспортні засоби лише із двигуном внутрішнього згоряння? Які Ваші аргументи за та проти цього?

Розділ запитань про користувачів BEV, HEV і PHEV - їхні переконання, мотиви, емоції, звички та поведінку

7. Як би Ви описали типові групи користувачів BEV, HEV або PHEV? На Вашу думку, як можуть відрізнятися їхні переконання, мотиви, емоції та цінності залежно від віку, доходу, сімейного стану, освіти, професії та інших соціальних і психологічних факторів?
8. Які, на Вашу думку, основні причини того, що водії купують BEV, HEV або PHEV замість автомобілів лише із двигуном внутрішнього згоряння?
9. Які, на Вашу думку, переконання, емоції, мотиви та звички можуть спонукати користувачів автомобілів робити свій вибір на користь BEV, HEV або PHEV?

10. Як Ви вважаєте - водії купують BEV, HEV або PHEV, щоб позитивно впливати на навколишнє середовище (наприклад, зменшити викиди парникових газів і допомогти боротися зі зміною клімату)? Чи з інших причин - якщо інших, то яких?
11. Як заохотити користувачів автомобілів переходити на BEV, HEV або PHEV? Чи можуть цьому сприяти, наприклад, низькі ціни; спеціальні державні або місцеві пільги чи субсидії, що знижують витрати на купівлю; лізинг електромобілів тощо?
12. На Вашу думку, чи можуть спеціальні інноваційні цифрові та персоналізовані інструменти, функції та послуги в електромобілях заохочувати купувати BEV, HEV або PHEV?
13. Які, на Вашу думку, перешкоди стримують користувачів автомобілів від купівлі BEV, HEV або PHEV? Чи може це бути відсутність зарядної інфраструктури? Низький запас ходу? Інші незручності?
14. Чи повинні водії сумніватися в безпеці та надійності BEV, HEV або PHEV, щоб зробити свій вибір на користь електромобілів? Чи вважаєте Ви BEV, HEV або PHEV безпечними та надійними транспортними засобами?
15. На Вашу думку, особисті переваги та цінності впливають на рішення та переваги споживачів щодо електромобілів?

Розділ загальних питань щодо майбутньої ситуації на ринку BEV, HEV та PHEV

16. На Вашу думку, які мотиви та тенденції вибору будуть найпоширенішими серед усіх груп користувачів авто- та електромобілями в Україні в найближчі 5-15 років?
17. Чи залишатиметься турбота про навколишнє середовище основним мотиватором для водіїв переходити на BEV, HEV або PHEV? Чи на їхнє рішення впливатимуть інші фактори - якщо так, то які саме?
18. Як Ви вважаєте, чи будуть користувачі автомобілів переходити на BEV, HEV або PHEV з метою зменшення залежності від ситуації з бензином, дизелем та газом чи їхнього постачання?
19. З доступними BEV, HEV або PHEV, кращою зарядною інфраструктурою та іншими розробленими інноваційними рішеннями для BEV, HEV або PHEV - чи будуть користувачі автомобілів більш охоче робити свій вибір на користь BEV, HEV або PHEV протягом наступних 5-15 років?
20. Як Ви вважаєте, чи змінила війна Росії в Україні купівельну поведінку та звички споживачів в галузі автомобілів та електромобілів?

Appendix C: Transcript of interviews with automotive industry professional

Appendix C.1: Interview transcript – German respondent (1)

Bohdana (B.)
The first section is more with general questions on the current situation of the German market of electric vehicles (BEVs, HEVs and PHEVs).

And it is: “How would you evaluate the current state of the market of battery electric vehicles, hybrids and plug-in-hybrids in Germany from the supply point of view and from the demand point of view?

Respondent (R.)
Well, currently I think the perspective is that there's a huge challenge for the car manufacturers to manage the gap between the electric vehicles and the fuel powered vehicles. Currently the main state is that there are lots of electric vehicles across the whole world that could be supplied in each country and that make it a wide and open choice for the customer. So that the focus is not only or potentially depending on the brand itself, but on a lot of offers that are done on different types of content like having a frunk in a vehicle or not, having a higher mileage or not. And in European countries we tend to stick to the mileage we need. But potentially in other countries like the US or China, where the performance of the car itself due to speed or mileage is not the most critical point, there might be other topics like connectivity, interactivity or potential usage of the car as a living space that are dependent on the choice for a battery of an electric vehicle.

B.
And how would you say it's in Germany now? And how is it changing?

R.
In Germany there was a clear upgrade when the first F vehicles or the battery electric vehicles were launched and became available for the market. I think there was a clear hype around the cars. But now with more and more cars entering the market and being available for the customers, we tend to perceive that it's not just about driving an electric vehicle, but it's also about the infrastructure and connectivity to potentially pay systems that is changing.

I think we started with a clear bypass for battery electric vehicles. We offered the best parking slots in supermarkets. We offered free charge at the very beginning, we offered specific administrational benefits for battery electric vehicles and now this hype, this technology seems to be common. But now it seems to be reduced and that's why I think the attractivity or the drive to buy battery electric vehicles is lowering down also with that to note that the German state stops pushing them by lowering costs.

B.
And how is the industry reacting towards these changes?

R.
To be honest, the industry needs to have a clear plan from the very beginning. If it comes to the car manufacturers, they are four to six years ahead when they do their long-term planning. So if you as a car manufacturer have potentially made your choice to only produce battery electric vehicles, this will lead to closing days in the plants.

If you still have fuel powered vehicles in your portfolio, that makes it easier for you to supply the customers' needs, but you need to be in a way flexible that you also could do that. It's not just that you have the portfolio to supply battery electric vehicles and fuel powered vehicles; you also need to be flexible in your production system so that you can react.

So I think from my perspective it's a huge challenge to support the unknown future on the sales numbers of the battery electric vehicles.

B.
And when talking about hybrids or plug-in-hybrids, is it similar or different?

R.
A plug-in-hybrid is to my personal perspective just a security measure for customers that tend to not fully trust the BEVs. The PEV is a perfect car or PHEV is a perfect car for people that are driving to work and driving home in the mileage that the car can reach electric only. But it also has the effect that you need to be able to charge it at home as well as in your working space. So that means the hybrid itself is the most complex technique, it will only be a time wise technology to transfer either to a fully electric vehicle or to a potentially completely new technology.

B.

Interesting, interesting. Another question I have is about the situation at dealerships in Germany. Do you have any knowledge about that? How is the situation with the availability of BEVs, PEVs and PHEVs?

R.

To be honest I don't have any deep information on those. It depends on a specific model you're asking for. In general the battery electric vehicles should be available at dealerships. But if you want a specific model that would perfectly fit your needs or that you like design-wise, then it tends to take extra time or months to wait for the car until it's delivered. In Germany it's different from other countries.

In Germany we like to individualize our cars for the perfect needs. We have color rims, grain interior with all specific driving functions. So if we do that, we need to potentially wait longer for our cars. In other countries like in the US, where people tend to go to the dealership and just buy the car that's there, this might be different. But in Germany, where we take a car that is specifically configured to our needs, we may wait longer for a battery electric vehicle than for a fuel powered vehicle. And the need for a specific model might be much higher than on the other one. So in my opinion, the availability of BEVs, HEVs and PHEVs at dealerships is fine. Depending on the model, it can exceed the waiting time to get the car compared to pure power cars.

B.

Interesting. And would you say it's always been like this in Germany with the situation at dealerships for electric and let's say electrified vehicles? Or has it changed and become the way it is now?

R.

To be honest, I think that the enterprises, the brands have made the best techniques to reach a level at which they can produce them more easily than they could in former times. This means that they can produce more cars and keep up with the growing need or the growing needs of the customers. Now the production systems are ready to build more battery electric vehicles and potentially the needs for them are slightly decreasing. So the availability will be better than it was in former times. So I think the availability will perform better the more we go forward with developing and producing the new technique to reach a standard level like we have with fuel cell cars. So answering your question, I think it was worse at the very beginning because the needs for a really, really minimal amount of cars were

quite high. And the more we move forward, the more the brands get cars to production systems that allow a high number of units and the more the availability will be fine, right.

B.
Right. Then talking about tax advantages in Germany, we know the main change in this field happened last December. But maybe if you could, share your opinion on the tax advantages and how it is now and how it's going to be in your opinion in the future?

R.
So I think we need to divide between 2 topics of tax advantages. One: tax advantage was when buying a BEV. It was quite a good effect because not only the tax advantage was a benefit for the customer but sometimes also the brands themselves offered additional benefits if you would buy a battery electric car. And that was creating a huge push to make electrified vehicles available for the customers.

The second thing is that there were also not only the tax advantages when you already bought your car at the very beginning. The power is for free, charging is for free, you get better parking slots wherever you go, you have more space and so on and so on. All these changes I think had a quite cool effect at the very beginning. But now with the increased number of battery electric vehicles and at the same time with less tax advantages available, the initial benefits are lower. The initial benefits don't apply anymore, which means that the customers take potentially a disadvantage of the battery electric vehicle due to mileage or due to the continuous need of charging them. But they also tend to change their mindset and choose electric vehicles that are going for a fuel powered car again as the benefits and the boundary conditions do not keep up with the initial effort that was made to make battery electric cars interesting for customers.

B.
And when we talk about hybrids or plug-in-hybrids, how is it here?

R.
In my opinion, it is the same. Although the plug-in-hybrid was available prior to the battery vehicles, it did not have any major benefits regarding charging or parking lots, or tax advantages. Potentially only when you buy it and drive it as a company car, then the plug-in hybrid is not affected in that depth as the BEV vehicles are.

B.
And you've already mentioned, but if to go a bit deeper into the charging infrastructure topic - in your opinion, how is the situation with the charging infrastructure in Germany? Is there any difference between rural and not rural areas?

R.
I understand the question. I think when we come to the point of infrastructure then we need to differentiate between, as you said, rural and non rural areas.

In the cities, especially in Germany, it depends on the availability of public charging stations because they are the main lever to get the cars charged. If you come to this, you normally have it on the underground floor, let's say in a garage. And those garages are mostly linked to the responsibility limit. This means that all people who live in the house need to accept the fact that you can now charge in those lower areas. This means that you need to take the risks when you have a thermal event potentially on the car - that might have an effect on the general building. So at the end having the option to charge your vehicle wherever you live, be it in the cities or be it in the rural areas, is the core lever that will help getting the battery electric vehicles to the customers.

If you cannot charge your car at home, you are potentially living in a city and you need to find a charging station, this means that it is less comfortable for you to do it than just drive your car in your own garage and plug it in. So if the loss of comfort is linked to having a battery electric vehicle, be it in the cities or at home, then the infrastructure will have a negative effect on the sales numbers. And I think in that case the supply of public accessible infrastructure is a lot better in the cities than it is in the rural areas. But in the rural areas you have the benefit or the potential chance to privately install a charging station. So the performance of bringing better electric vehicles is dependent on the availability of public charging stations when it comes to the cities. Or when it comes to the areas outside the cities, we have the option of an additional charging station privately in your personal garage. And this effect is working when you install your private station, which you could do in your own house and potentially you couldn't do if you're part of a multi family house in the city. All that has an effect on the performance on the sales of a BEV.

But in the cities you might expect the infrastructure to be supplied by the state in your own house. And in the small villages you might tend to install your own private charging station.

B.

Right. And I've heard that, for example, in the US market, in many cases people say that the infrastructure barely exists outside the cities, which makes it very hard for people to charge and in general to own or to use the electric vehicles. Would you say it's a different case for Germany?

R.

Well in Germany it's a bit different as we have specific charging areas in our small villages but that's potentially mainly linked to state owned administrative buildings. There are parking slots anyway - if you go to a town hall or to any administrational building then they would be supplied also with electric power. In the US you may need your car to drive to your neighbor potentially for 20 to 30 miles and not each single area will be equipped with charging stations. So I think Germany is a bit better at that. But if you're living in a small village with around 500-600 people living there, then you might potentially need to drive to the village next to it where you can find a charging station that will help you charge your car. And the question is: would you do that?

B.

And it was interesting that you've mentioned these charging stations near the administrative buildings. But do I understand correctly that these stations are also available to the public or are they only available to people working there?

R.

No, they are available to the public. Normally in Germany they are available to the public, which makes it just as a benefit that the state owned areas can potentially easier install those charging stations as the land and the boundary conditions are owned by the state itself. So you don't need to ask someone else to build the charging station, it's already in the state's hands, and they can do whatever they want.

B.

That's nice.

R.

Normally they have parking slots there, which means that and this would also fit, so that's fine. If you go to a council or anything where people need to go there anyway, or potentially the parking slots are available overnight because people work there during the day. And it makes sense to apply those additional charging stations right in that area because it's not only a win-win of being the land owned

by the state. It's also a win-win because the parking slots are available when the people who work are at home and need to charge by night. So that's potentially a second or third effect.

B.
Another question I have is more about economic and political circumstances. For example, COVID-19 in the past and now some other factors like the war in Ukraine or some other conflicts - do you think they in some way influence or change the market of electric vehicles or not? And if changing, then are they changing it for better or for worse?

R.
The question is really interesting. To be honest, currently, in my opinion, the effect on the market is not visible in that detail as things like COVID or wars in the world might have an effect in the world because the brands and the enterprises can still manage to solve problems in different areas. They are currently that flexible and potentially have a second supplier or a second production area in a different country that they then need to ramp up quickly to compensate for the effects of local risks or local unavailability. That's what the enterprises, the car manufacturers can balance quite well. But I think those effects like COVID or wars do not directly have an impact on the customers but they have changed the way car manufacturers decide to set their supplier production areas or potentially tend to have the second or third sourcing strategy compared to having only a single sourcing strategy. So that is the change that happened in my opinion.

It's not directly linked to the customer, but it's the change that the car manufacturers have done to their internal processes to still support the needs of the customers.

B.
Alright. Then another question is: “Do you think that electric vehicles in general can fully replace vehicles with only a combustion engine?”

R.
If the infrastructure is keeping up with the speed or with the needs that we do and if the legalization things ramp up then I think that there is an option to do it. But it's not only the battery electric vehicles that are needed for that. It's primarily the infrastructure that's needed and also the complete switch from a fuel powered industry to electric industry which means that we will come to a limit out of the available electricity to just support the cars. So in theory the car manufacturers could do it if the

resources are available. But the question is whether the infrastructure in the cities and the legalization of potential charging areas in the lower basement of your building can meet the needs of the customers. So I think that the effect from the infrastructure, from the power supply, from the power of ability and from the whole electricity network have a bigger effect than just building electrified vehicles only.

B.
Alright. I think it's quite clear with these questions. Then I have another section of questions more related to consumers as I've mentioned before. So the next question is: “How would you describe typical groups of users of electric vehicles? And in your opinion, how do their beliefs, emotions or values differ or not differ depending on their age, income, social status, education and so on?”

R.
So I think a specific type of the group is just the ones that try to benefit either when they have a company car or from private reasons or the benefits that the state or the programs bring with them when you have an electric car. That's one group that is there.

Another group is the ones that are purely linked to sustainability that are driven by having the least possible footprint on the world, have solar powered modules on their houses, have a battery in their cellar that saves the power which then they bring to their car but only during the times when the sun is shining. So that is the second thing. And I think those people tend to be emotional about that because they really care about that, they keep this footprint on the world as small as possible.

And then there are just others that are potentially people who are linked to trying out the latest technical stuff. They want to experience themselves. They want to build their own mind and thoughts on this new technique and just want to try it out.

And there are others who potentially have let's say the money and the thought on a more economic way, who are driven by a more economic way to install a private charging station, to buy a battery electric car. They think more from the economic side of it, to be more efficient and to save money with it if you're driving a lot.

So this is something that can be basically driven by emotion as you are someone who thinks sustainable and cares about the less effect of your footprint on the world. Then the other group is potentially driven by economic means to actually save money, but based on also the ability of spending that money for

electric vehicles as they would spend the same amount for potentially highly powered fuel cars. And the others are just the ones who tend to benefit mostly from things like tax benefits.

B.
And do you think that those people who, for example, buy an electric vehicle and install solar panels on their house, are only driven by environmental reasons or they are also considering some cost efficiency?

R.
I think that will also be a link to it. Those people tend to also evaluate quite properly what they do. It's not that they just buy a battery electric vehicle because they want to try it out. It's mainly driven by the general effect. And as I said having the least, the smallest possible footprint is also linked then to having an economic and budget optimized offer. So it's not about optimizing only your footprint but also about optimizing economics linked to it and its side effect. But I think they're mainly driven by their footprint and if it has a positive effect on economics and the money they need to spend, then that's something they accept as a positive side effect too.

B.
And are there other factors in your opinion that could encourage automotive users to switch from the cars with the ICE to electric vehicles, hybrids or plug-in-hybrids?

R.
Well, there are tax measures. I think that the biggest encouragement would for German people would be mileage that is exceeding the mileage of a fuel power car, the speed of recharging and the boundary conditions on electric powered vehicles so that we can keep to the time needed for the car to power up, to find a charging place and whatever, to the minimum possible. So this will change as soon as those who are creating solutions do their best to have the vehicles quickly rechargeable at any place and at any time as you could do with a fuel powered car. If we come close to that, then this might be the core measure to increase the sales of a BEV compared to a fuel car powered car. Because we as people have been used to the processes for 100 years that the car is a tool to drive around and to be a transport mechanism that only needs very little time to keep it running, by 5 minutes, fueling it up. And if those things that we have been used to for years, change: for example, we need to drive the car somewhere to charge it up, wait there for 30 minutes and drive it home or we need to drive home, park the car at the central area and then walk home again to get it back after two hours - that's something, which we I

think as people, Germans or whoever would link to less luxury, less comfort. And that's why the wide acceptance might also be linked to effects like this, making the BEV cars performing like fuel cars not on power, because power is not the problem of the car itself, but on the conditions to deal with the car.

B.
Alright. And when talking about safety and reliability, can it be something that people question or can question, is it something that keeps people still thinking of, you know, whether to start using BEVs, hybrids or plug-in-hybrids, or not?

R.
Well, there might be people who link the risk of thermal events of the cars, but it’s only very little that is published. And when it's published, it's like a hype that is made out of it, even though we know that fuel powered cars, when you're misusing them, might start to burn. But with battery electric vehicles, potential explosions and things like that might be more restrictive for people. And also from the German or from the worldwide legislation side, the BEV car is more critical than a fuel power car in terms of safety. So it's on the one hand, the mindset, but on the other hand, it's also the legislation that does not allow you to charge your battery electric car in your basement garage, which you share with others.

B.
Right. And do you consider electric vehicles safe and reliable?

R.
Yes.

B.
Good. Then when talking about some innovations and digital technologies, you've mentioned them as some also one of the factors that can interest people in getting the electric vehicles. But how do you think these innovative, digital and customized tools and services can attract and encourage people to start using more electric vehicles?

R.
It could be potentially using the car as a living space with the battery that they have. They tend to attract people by having technical features in the car that allow a quick defreezing of the car or a quicker defreezing of the car. And electric battery vehicles, if they are designed properly, allow more

space due to technical conditions. So it's also affected that the feeling in the car is different to a comparable car of the same size with a fuel power. There are a lot of things besides the electricity itself that could attract people to buy a BEV.

B.
Okay, and when talking about some obstacles that keep users away from buying electric vehicles, what are these obstacles, in your opinion?

R.
It's the missing infrastructure. It's potentially also the effect of reselling the car with a lower performance than you bought the car and potential thoughts on having the guarantee that all the parts are working properly in the same condition over years with the risk of losing power or performance. That could be a risk that the customers have.

B.
And would you say some things have changed for the better recently or not really? For example, when we talk about the internal parts or the lack of awareness of the user about the state of that internal part.

R.
I think the ones who have used the first electric cars and have made the experience of the first battery electric cars, have made the experience and now are using a second or third one, will have a different mindset as things have improved on charging time, on mileage, on performance, service and so on. So that development was increasing massively to have a better feeling for these customers. But those, the different group that has never used the battery electric vehicle and is now starting to use one expecting it to be the same performance as a fuel powered car, on mileage, on service, etc. they might still need to have a bit of time until they get to the point that the boundary conditions of a BEV are potentially not that different from a fuel car, and that you can get along with it by charging it for 20 minutes and drinking coffee. So I think for those who have had the first electric cars available for them, it has improved a lot. And that group of people who have been potentially waiting for the 1st 5-10 years to pass and then to buy a BEV because they come from a different mindset and compare it directly to a fuel power car, they will need another generation or other 3-5 years the cars to have reached a technical standard that it is really the same or comparable as a fuel power car.

B.

And do you think some personal preferences and values influence or frame the decisions and preferences towards electric vehicles? Do you think they somehow influence the decisions and if yes, then how the decisions?

R.

The thing is that the battery electric car itself is mainly also linked to a specific group of interest. If it comes to the point that you buy the electric car, it's not only money that are potentially linked to the car. It's different from a fuel powered car. And sometimes you also need to prepare for the boundary conditions of a battery electric car. Potentially people need a push for a battery electric car. And it is different if you have enough money to be also prepared for the boundary condition for the BEV car to be on the same comfort level as a fuel powered car. On the other side, there might be a preference for having a car with the minimal possible footprint and an effect on sustainability. This would also be a premise why you would prefer a battery electric power car prior to a fuel powered car. So my answer would be that one premise or value could be comfort and the other one could be sustainability and an effect of the footprint.

B.

Right. And now, when we are talking, for example, about the future, in your opinion, what motives and choices will be the most common across all groups of users of electric vehicles in Germany in some 5-10-15 years?

R.

What would make customers buy? This is the question. What will be the game changer?

B.

Yes. And how, how will the choice then change from the user or the customer point of view, do you think?

R.

I think it's the same as we talked about a bit before: the infrastructure, the legislation things need to change as well as availability of charging stations at any time anywhere. That would affect the sales numbers of BEV vehicles, and would have a positive effect.

On the other hand, the technical preparation of the cars: charging quicker with higher mileage will also affect the market itself because what we are used to when we buy fuel powered cars is related to power and kilowatts. This is what we link the engine to when we are buying them.

In the electric world power is not an issue. It's just there, and the smallest engine has enough of it for everyone. So that's what we are, that's what will change.So if the infrastructure, the boundary conditions and the technical preparation of the car brings us to a level of performance, to a level of comfort as well as to the to the known luxury that we have, then the sales numbers will will increase even in the next 5-10 years. These conditions will not be ready because they're not supplied by the automotive industry, they are potentially supplied by the state. And there will be a gap in the supply of the boundary conditions compared to the technical offers that cars are having. And as these boundary conditions will not be able to keep up with the technical changes and the technical speed, and the cars will be increasing their performance, in my opinion, the sales growth will come to a plateau, to a specific level. And then people will go on and carry on also buying fuel powered cars. So in 5-10 years we will not only drive BEV vehicles, we will still have a significant number of fuel powered cars.

B.
Right. So would you say that, for example, those people who care about the environmental footprint, when they don't meet their personal needs in terms of comfort or some technical standards in the electric vehicle, they will not switch to the electric vehicle regardless of their environmental beliefs?

R.
No, there's really a question with a lot of chances for interpretation because it depends on their mindset. If they are really out on the footprint, on the environmental footprint, they would potentially also take a negative effect on their comfort into account, even though they have less comfort than they know from the fuel powered cars. They might take this negative effect on their comfort much easier than other groups.

B.
Right. But do you believe that this environmental footprint will remain a top motivator for consumers to switch to electric vehicles in the future?

R.
No. It is one of the core effects now. But in future, when the supply chain behind battery electric

vehicles will also come to a point when it's more green, green-ish, when it's sustainable, then this effect might pass away.

B.
And another question concerns dependence on fossil fuel supplies. Do you think this can be a reason for people to start thinking of switching to electric vehicles for less dependence on fossil fuel supplies? Or is it not such a big issue?

R.
I think even though the prices for fuel have increased, there's only a smaller amount of people who tend to buy BEVs because of fuel power. It's not in our minds now that the time when we run out of fuel will be that close. So that's why people tend to stick to their common values and go on with fuel cost, even though a minor group have understood that we may run out of fuel at any time and we'll switch to battery electric vehicles. So I think the mindset is not there yet that we are really running out of fuel at a specific time, which still keeps us sticking to our known radius and boundary conditions and to potentially further buying fuel costs. Not in the number we have done in the past but there will still be a significant amount of people buying fuel powered cars.

B.
Right. In general we've discussed many things, but I have a question more as a summary of what we've discussed: it's about the future. Do you think that with affordable battery electric cars, hybrids or plug-in-hybrids, better charging infrastructure and other developed innovative solutions for the electric vehicles, the automobile consumers will be more eager to make their choice towards electric vehicles during the next years?

R.
Yes. If the techniques get more and more comparable also to the boundary effects, then this will happen, and customers will be more flexible in their choice.

B.
And this is pretty much the last question. In your opinion, what are other factors that maybe we have not discussed yet can change the consumer buyer buying behavior and habits in the industry towards the electric vehicles? Are there some other factors or issues that we have not discussed?

R.

There are other potential factors like raw materials that are linked to either easily accessible or difficult to access places where we need to clearly think of the effort that it takes to get those raw materials for production of batteries and so on. So whether this is possible to do in a sustainable and non nature damaging way and how easy it is to get the specific amount of raw materials - that could be one effect. And another effect could be just that potentially there's a tax claim for fuel powered cars in the future. For example, when you buy a fuel powered car, you need to pay extra because it is not green and it is harming nature. So that could be an effect if you think about the future.

We started with having benefits for the BEVs, and now we are reducing benefits for the BEVs which might lead us to a point where we have disadvantages for fuel powered cars in some time. And this can also have an effect on BEV sales.

B.

And for instance, when talking about the prices for vehicles, for example, in the past it was easier for consumers to buy electric vehicles with some tax benefits and so on but, for example, the vehicles themselves are not so cheap in price. If the situation with the price for the electric vehicles will change, can it also somehow influence buying behavior, that people will be more eager to buy? Or do you think it's not really realistic that electric vehicles will become more affordable?

R.

Well as soon as the technique and the production systems grow, and the car manufacturers work on them, they will come to a point when producing electric power vehicles gets more efficient also from their perspective. But with that switch of the total technology that they currently all do, they have to do massive investments at the current state which they need to regain by selling their electric cars. So currently, if those production systems are running in the next few years and the building process of electric cars gets cheaper by having all those investments done and keeping them running, I think there will also be an effect on the pricing of the electric vehicles by a better production system that the suppliers have and that the car manufacturers have. And if cars get more affordable and connected to the performance that they have, that will also improve their chargeability and power. Then I think the customers will at least take an additional thought on potentially buying or trying out an electric car.

B.

Right. Then these are all questions from my side, but if you have something else to add, I will be happy to hear.

R.

Thank you, Bohdana. Thank you for the time that you had for me, it was quite interesting for me. During my PhD thesis I also used to do questionnaires and interviews, and so I also tried to answer in a way that you hopefully can deal with it. Unfortunately, I'm already 2 minutes late for my next meeting. So I would say thank you for the time and for choosing me. And it was a pleasure to join this interview.

B.

Thank you for your time. I'm sorry for keeping you this long.

R.

No worries, no worries.

B.

Thank you so much and have a nice day.

R.

Thank you.

Appendix C.2: Interview transcript – German respondent (2)

Bohdana (B.)

Let's start. So the first question: “In your opinion, how would you evaluate the current state of the market of battery electric vehicles, hybrid electric vehicles and plug-in-hybrids in Germany from the supply point of view and from the demand point of view?”

Respondent (R.)

Maybe let's start with the supply part. From my perspective, during the last couple of years the range of vehicles offered to customers increased a lot by German car manufacturers, by typical Western car manufacturers, but also to a certain degree by Asian, especially Chinese market participants. So I think the supply side altogether got a lot more interesting to customers because they can choose from a much bigger range than a couple of years ago for sure. The waiting period still exists to a certain degree. And the prices of all types of electric vehicles are still fairly high compared to combustion engine vehicles. But nonetheless the prices decrease. So the supply side is there, prices got more attractive, more affordable over time. Even though they're still on a fairly high level.

Talking about the demand side, I just checked it earlier today - in January in Germany the battery electric vehicle market was 25% stronger than a year ago. So there were more sales. Even though you read a lot about that now the subsidies changed this year, there was this big fear that the demand would drop drastically. Apparently it didn’t. So even though, as I said, the subsidies overall changed this year. So there is still a demand, it's not as big as it could be or should be depending on who's making the legislative regulatory decisions. But I think the demand is still there, it is growing, not to a super high level, but we could do worse.

B.

In general I have the questions concerning the future trends more as the last part of the conversation. But out of curiosity to continue this topic, do you think that this demand will drop within this year or next years considering these changes with government support?

R.

Actually, I don't think so, no. It's not going to change a lot because my expectation is that more and more people understand that also battery electric vehicles, purely battery electric vehicles are a real alternative to combustion engines. And therefore, more and more people will get convinced. And even

though the subsidies got reduced, there are still some subsidies there, but even though they got reduced, the demand will still be there. That would be my expectation.

B.
Alright.

R.
Sorry, one addition - regarding the political targets of how many vehicles we want to have in Germany, battery electric vehicles. I am not sure that we're going to reach them within time without these subsidies. I think we will still sell battery electric vehicles and it's going to increase. But the increase won't be as deep as it would be needed to reach the political targets for battery electric vehicles in Germany.

B.
Okay. And would you say it's the same for hybrids and plug-in-hybrids or is it different?

R.
I can't speak about hybrid electric vehicles that much because actually, I'm actually not sure how many they are still out there. From my perspective or from the vehicles that are part of my expertise, it's battery electric vehicles or plug-in-hybrid electric vehicles. Therefore I'm actually not sure about HEVs. And talking about plug-in-hybrids, it’s basically the same.

B.
Alright. And considering the availability at dealerships, do you know something about that, about how the situation is now and how it has changed?

R.
I think it's very derivative with the supply chain issues altogether being there. It can be tricky so that you still have some type of longer waiting period. But this is from my perspective, it really depends on the specific vehicle you want to have and because there is a fairly broad spectrum of different vehicles there. I think it's okay, but it could be better for sure.

On the other hand, car manufacturers also complain if there are too many vehicles in the dealerships, and they do not get sold to customers. Therefore, I guess it's okay out there from what I see.

B.

Okay. And when talking about affordability, I think you have mentioned a little bit the prices and affordability topic at the very beginning. But if to talk a bit more about it, how do you think it is changing (if it is changing)?

R.

It is changing for sure. Batteries, which are the most expensive part of the battery electric vehicles, of the plug-in-hybrid vehicles, get more affordable. But they're still more expensive than having simply a tank in your combustion engine vehicle. And therefore it just makes buying a vehicle a little bit more expensive because usually customers are not willing to drop other features. They want to have a vehicle with the comfort and features they know and have plus being it a plug-in-hybrid or better electric vehicle. And that makes it all together a little bit more expensive than having the same vehicle as a combustion engine vehicle. So yes, it is a little bit more expensive today. It's gonna get better. But especially in the case of plug-in-hybrid electric vehicles, you'll always have the situation that you have to have both in the vehicle: a combustion engine and a battery. And therefore that's going to be a little bit more expensive for the time being.

B.

Right. Then I have another question which is about the charging infrastructure. How would you describe the charging infrastructure in Germany? And then there is the next question: are there any differences when we talk about rural and not rural areas?

R.

It's a super, super important topic. And unfortunately it's not an easy one to answer because let me start with the urban one maybe. Looking at Munich, I think the existing charging infrastructure is okay at the moment because it was built up a lot during the last couple of years. So for the number of battery electric and plug-in-hybrid electric vehicles, it's okay for the moment. But as soon as there are more vehicles coming into the market and that is what we all hope for or may hope for, there's going to be a shortage of available public infrastructure again. And at least in the city like Munich, only very few people have the opportunity to charge at home or at work.

So I think for the moment it's okay, for the moment there is infrastructure available and usable to people who are not even capable of charging the vehicle at home or at work. But it's going to be a shortage fairly soon.

It's also my personal experience from last year and a half. Charging was super, super easy a year and a half ago. It's still okay in public infrastructure. But you need a little bit more luck or some good timing to actually get a charging spot that is fairly close to home. So this is public charging infrastructure which is okay at the moment but needs to be built up in the near future. So that you don't get into the situation where people want to buy and use a better electric vehicle or a better electric plug-in-hybrid electric vehicle in the city but can't do so because they can't charge their car.

And also perhaps it's super interesting to drive electrically in the city because you don't have these local emissions and everything. It would be a shame if that would happen.

B.
Sorry, so the question is: are there special conditions from the state supporting or providing some more affordable or cheaper options for public charging? What is the situation?

R.
I haven't talked about prices yet, but that's another good point you're making there. It's just the availability of charging stations. And in the course with that it’s the parking space that needs to be reserved for that. So I think, as an example, the city of Munich is working on it to provide more spots where you can build infrastructure that can be used for charging your vehicle and not to park your combustion engine vehicle. But this is a very time-consuming process. So they're working on it, and I hope they'll do it at some point, there's a need for it.

Talking about prices for public charging, from my perspective, it's too expensive. Also, the AC charging because in the end you're not going to drive cheaper than with a combustion engine. And then where's your financial motivation to use the battery that is in your battery electric vehicle or plug-in-hybrid vehicle, if it's cheaper to drive with petrol? So I think that it is an issue that it's actually not cheaper to drive a battery electric vehicle. So it's more expensive to buy one and then also it's more expensive to charge it in this case compared to just a gas or petrol vehicle.

Getting to the availability of public charging infrastructure in the more rural areas, there's less public infrastructure. On the other hand, you do have more houses where you can charge at home, so it's a different situation altogether. For sure, it's also not cheap to have a private charging infrastructure at home. But I guess it's getting more and more attractive, also combining it for example with a photovoltaic infrastructure at home, so that you can charge your car with the energy that is provided by

your house and the sun. Therefore, I guess it's going in the right direction there. But therefore, as I was saying, it's a different situation.

And then you have a third type of fast charging infrastructure for longer trips on the autobahn. From my perspective, it's a little bit like in the city. For now, the availability is okay. Even with your battery electric vehicle, if you want to drive from Munich to Hamburg, you have plenty of options to get this done. But again, if more and more vehicles come into the market, there's a risk there's going to be a shortage again, because it took us 10 years to get this infrastructure in place now that is actually working okay. There's a risk that it will take too long again. And then therefore that it's going to be a dip in the overall market because people will be disappointed if they can't charge or if they must wait for an hour before they can start charging or, I don't know, another half an hour before they can continue their trip. And this is something that we really must avoid.

Therefore, if we want to have electric mobility as a success story. Therefore, the urban charging infrastructure is good for now, it is expensive, needs to be built up more, rural - needs to have a basic infrastructure as well. But there's much more opportunity to charge at home. Autobahn - long, a little bit like in the city center. For now, it's okay. There's a risk that it's going to be too little and maybe also then again too late in the foreseeable future.

B.
Right. But would you say that the industry is working on making this gap between demand and supply smaller or is it still a difficult situation?

R.
It's still tricky because it's super expensive to build this fast-charging infrastructure. But there are programs in place from the European Union and also from national institutions to keep on building up that infrastructure. And we've come a long way. I really want to stress that. 10 years ago, I don't know, we had maybe 5 to 10 DC chargers in the whole of Germany. That was really, really, really the beginning. And fast charging was considered to be 50 kilowatt. Now we're charging 150 or even more, and there are lots and lots of slots available to do so. But it took us 10 years to get here. And now we really have to continue to have this infrastructure in place so that customers can make use of it. And then we'll still need some support from the European Union or local German or even smaller entities.

B.

But was there some breaking point that somehow sped up this development of the infrastructure? And maybe this is also then a bridging question for the next question regarding different political or economic circumstances influencing the situation - was there maybe some breaking point in the past 10 years?

R.

I can't recall it anymore. It's actually too long ago that there were several plans in place supporting the building of infrastructure. And I think once all involved parties understood that electric mobility is coming to stay and that it's actually going to happen, more and more people, more and more companies also jumped on board and were part of this big infrastructure building. But that was paid with millions and millions and millions of subsidies.

This is a risk in the current situation, in the current economic situation that the government cannot or will not support this future build up to the same degree because currently Germany is in kind of a recession. There are still plenty of leftovers so to say from Corona. And in the context of your dissertation, of Ukraine, of the war, they supported Ukraine with lots of money. And then you have other regions in the world. Money is a little bit tight at the moment, at least that is how the government puts it right now. Therefore, there's a risk. And maybe that also explains why subsidies for buying vehicles or having or leasing electric vehicles are lower than they could have been. I think one program got shortened. So actually there was supposed to be a higher subsidy still for at least parts of 2024. But that got cut on fairly short notice due to this tightening the belt approach by the current government. Let's see how this continues. Investing in infrastructure is actually a good thing, something that the government should do. There might be other subsidies that are not that needed that could be cut down. Subsidizing and supporting infrastructure - if it's roads, if it's bridges, if it's railroads or if it's charging infrastructure - I think rather good subsidies should be in place and should not be cut down.

B.

Are there some other circumstances, in your opinion, that influence or continue influencing now the market, the industry?

R.

I think they are the main ones. If something comes to mind, I'll let you know.

B.

And then if we talk about some future, do you think that the electric vehicles, as in general, can fully replace the ICEVs?

R.

From my perspective they can. There were really big issues at the beginning, some range anxiety: will I get from A to B or not? With an infrastructure in place and now these 400 or 500 kilometers of range and the ability to recharge your vehicle within 15 to 20 minutes so that you can have another 300 kilometers of range in your vehicle is sufficient, is more than sufficient for the private needs of almost everyone. For sure, maybe it forces you to take a break after three hours of driving on the Autobahn for 15 minutes. But maybe it's also a good thing that you do take a short break after driving on the Autobahn for three or four hours, get a coffee, stretch your legs, whatever, and continue your drive for another 304 hundred kilometers, another two to three to four hours after this 15-minute break. Therefore, I understand this “range anxiety.” It was there in the beginning because it didn't feel great.

I was doing a trip of 250 kilometers with an I3 in 2013. I still remember that because the range of this vehicle was with a range extender about 280 kilometers. And there wasn't much of or there wasn't any public infrastructure in place there. So I was driving 80 on the autobahn with this I3 so that I could yeah get there in one stretch to actually make it happen, and it worked. But that was 10 years ago and the range of these vehicles was really, really limited to 200-250 kilometers. Now it's different. And from my perspective, even if you drive longer distances once in a while it's okay. And for all the short-term trips, all the short trips within the city, it works anyway. So that's not an issue, and infrastructure is in place.

B.

And what about some other public concerns, for example safety or reliability? Do you think that at some point people will be able to stop questioning these different things with electric vehicles?

R.

I think you're right. There is still some concern out there in the public. But from my perspective it's getting smaller and smaller because basically everybody knows at least one person who's driving a plug-in hybrid or a battery electric vehicle, and it works. Everybody now, or at least living in the South of Germany, knows someone who drove to Italy or to Croatia for a vacation with a battery electric vehicle. And it worked. They even came back (laughing). So all this fear that is still out there or the

concern that is still out there, is going to get demystified by people taking this leap of faith and doing it. And now it's actually lots of people having this faith in electric mobility. And therefore, I think it will take time for sure, because it takes time to change opinions. But I think we're on a good track there. And I'm not sure if this “range anxiety” or the reliability of electric vehicles is still a major concern or if it's another issue that for many people it's really, really expensive to buy a vehicle. It's a huge investment for people. And therefore, if these vehicles are too expensive, and people can find a cheaper combustion engine alternative, they will pick that one I guess due to really, really understandable reasons because if money is tight then you don't spend another €5000 on top of what you want to afford or can afford just to have a better electric vehicle right now. I think this is the bigger issue at the moment.

B.
All right. And now when coming to the topic of consumers or electric vehicles users, how would you describe typical groups of users of battery electric vehicles, hybrids, plug-in-hybrids? When talking about their beliefs, motives, values, how do they differ or not?

R.
I don't know any studies on that one and I'm sure there are some. I can just talk about my bubble that I live in. And the motivation is to avoid emissions for sure, at least avoid local emissions. So if people do have electric vehicles, they also tend to make sure that they charge it with green energy if possible to take that step as well. If it's a plug-in-hybrid - to drive in the electric mode within the city and if it's a battery electric vehicle, then they use it anyway. Motivation is that they don't want to miss any feature or anything in their vehicle that they're having at the moment. They are not that electric mobility enthusiasts that they would say: “I don't care if my car doesn't have connectivity anymore as long as it's an electric vehicle.” No, it's not like that. They want to have their features. They want to have the comfort that they know from their vehicles at the moment or that they had in the past. It's just that now they have a different type of engine in their vehicle. And that is so, that is also a part of reality - people still want to have all the features that their combustion engine vehicles have at the same time.

B.
But in your opinion, would you say some younger, older people, more educated, less educated choose electric vehicles? Do these factors play a role or not really?

R.

I guess they do play a role. You have to have the financial needs to actually afford it. Therefore, either you're young and you have a well paid job and you can afford one of these vehicles. In Germany, and not only in Germany, you do have these people born around the year of 1968 or they were young in those years, were educated in around this time when there was Woodstock and everything. And they, or at least some of them, do have this intrinsic set of values that they want to do good. And now they are maybe already retired, but they can still afford it. They don't want to drive from Stuttgart to Berlin twice a week, but they drive in their area, they do nice little trips. They enjoy their life, and battery electric vehicles are also there, they're part of doing good by contributing to a better future from an environmental perspective. So I think you do have these types of groups. ButI think what they have in common is that they can afford it, and most likely also that they are fairly well educated.

B.

And you have mentioned reduction in environmental pollution and emissions. Are there some other reasons from the user or consumer point of view?

R.

It is good fun to drive an electric vehicle because just of the type of vehicle, acceleration is great. It is actually good fun to drive an electric vehicle. For sure, it's a different sound. If you are a sound enthusiast and you like or you need to have your combustion engine roaring, then it's not gonna make you happy. But if you think about acceleration, then driving an electric vehicle is good fun, and it's much cheaper than driving a Porsche. And at the lights, traffic lights you're usually quicker than a Porsche, at least for the first meters. If it's not an electric Porsche just out there as well.

B.

All right. And when we talk about some innovative sides, technologies as one group and cost efficiency as another group of factors, do you think these factors are also important or some are more important, less important compared to others? Or are they just different and or not playing a role at all?

R.

They are different aspects. Affordability has to be given to a certain degree. If you can't afford it, then you can be as much of an innovator as you want to, or as a tech savvy person. If you can't afford it, then you can't drive it.

B.
So this is like the first condition, right?

R.
From my perspective, for sure. And then you have these people being more of innovators and then these early adopter groups - those were the people driving, using electric mobility first.

B.
But now it's different.

R.
Now it's getting broader. I think we have passed that. Electric mobility now is for around 10 years or on a broader scale for 10 years. I think it was the i3 box line E-Up back in 2013 in Germany that were the first ones from German car manufacturers that were actually there on a bigger scale. And now you have so many different vehicles in place. Looking, for example, into the BMW portfolio of vehicles, even though there is this overall power of choice, I think this is how it's called, the customers can really choose. They can choose, if they still want to have a combustion engine or they want to have a plug-in-hybrid, or if they want to have a battery electric vehicle. And for example, last year the new 5 Series came out, and customers could choose and they could do whatever they wanted. And more and more people, not only the innovators and the early adopters are actually picking a battery electric or at least a plug-in-hybrid vehicle. So this changed.

B.
And now, considering nowadays, how can consumers be encouraged to switch to electric vehicles? Maybe considering that the government will not support it as much as it used to. What can play a role here?

R.
I think the supply side has a big role in that one, and to a certain degree - also governmental decisions. For example, in the European Union, I think it's 2035 when you're not allowed to sell any new combustion engines anymore. So there's a big transformation going on in the automotive industry anyway towards battery electric vehicles. Also we can talk here about hydrogen vehicles, for example, not combustion engine vehicles. So there's a transformation going on at the moment. And at a certain point in time, the supply side will change or shift significantly towards battery electric vehicles. And

it's just become more and more tricky. And maybe it will get more expensive to buy a combustion engine because the companies have to change their whole plant infrastructure, how and where to build vehicles and which type of vehicles. And that's going to change over time. So the supply chain supply side is going to change. The supply side is going to get cheaper because if you are on bigger scales, then usually you can make things more affordable. And I think that this change of mindset that has already started will prevail.

People will understand that it doesn't come with any bigger limitations or boundaries or issues to drive a battery electric vehicle, that it works and therefore why not to do it?

B.
We've talked about some of the opportunities and obstacles, but if we talk about more obstacles that are keeping the users away from buying or using or starting using the electric vehicles, what main obstacles would you name at the moment?

R.
Descent costs and infrastructure. Even though from an objective perspective it’s okay at the moment, it's the fear that goes with it. So it's a little bit also in people's minds.

B.
But in your opinion, should the users question safety and reliability?

R.
No. And also, for example, this fact that there's not that much infrastructure for charging in place is compensated with features. For example, with BMW you have the so-called E route, the electric route, which plans charging stops for you. If you do these trips, for example, from Munich to Hamburg, it gives you the plan for your vehicle where it makes sense to have a charging stop. So that every factor that plays a role, from the vehicle itself to the availability of infrastructure to the forecast of where that will be available or not, is taken into consideration. And the car offers you a plan of how to get in this case, in this example, to Hamburg, as convenient as possible and as fast as possible. This is just one example of how other technologies, connectivity for example, can take some out of some risk out of this equation. And electric vehicles themselves are super safe just like any other vehicle. I don't see any issue there.

B.

And do you personally not see any issues here, right?

R.

No, no. If you have an accident, then your car is as safe as any other. There's just one thing that is still out there: if your car starts burning, then it's not that easy to take the fire out. That is still out there, yes, but that is something I think that all the fire departments right now also started to deal with. And if you have the fear that your vehicle might start burning or that your battery has an issue, then just don't stop below bridges. I think that is a good thing to do because it's tricky if a car burns for hours under a bridge. But that's the only thing. And that has nothing to do with a personal risk of you driving an electric vehicle because there is no other risk than driving any other car.

B.

Okay. And if we move into some future topic, what choices do you think people will make, what choices will be the most common across all groups of consumers in Germany in the next 5 or 15 years? What motives will they have?

R.

I think for the next few years plug-in-hybrids will still get sold quite a bit, but overall it's going to move to battery electric vehicles rather fast. As I said earlier, range is not that much of an issue anymore. And therefore it doesn't help. It's going to be most likely more expensive to have a plug-in-hybrid than to have a battery electric vehicle. Therefore, why not go for the battery electric vehicle right away?

B.

But do you think people who buy the plug-in hybrids have some fears or personal preferences in terms of not being fully ready to switch to the battery electric vehicle? What is your opinion about that?

R.

I think the main point for that would be range anxiety, the ability to drive with a combustion engine, to go to a gas station to have these 5 minutes stop for getting gas instead of 15 to 20 minutes stop for charging your battery. That and maybe also the fear that the range of a battery electric vehicle is not enough. Therefore they want to do it differently. So I think this is still there and it's going to be there for a few years to come, only for a few. I think it's a fear that is out there but I'm not sure if it's a real one. It just takes time. You hear these good stories about people driving with a battery electric vehicle

to Hamburg or to Croatia, or to France, or to wherever and seeing, understanding that it works - that it will overcome plug-in-hybrids at some point.

B.
Do you think the environmental concern will remain a motivator or there will be some other motivators influencing the behavior of consumers in the future towards electric vehicles?

R.
I think as long as the customer has the choice because as I said earlier, it's going to change over time anyway that you can't buy any combustion engines anymore anyway. But as long as the customer has a choice, then it's going to be our environmental decision, that's it. Even though battery electric vehicles and plug-in-hybrids will not be more expensive than combustion engines, I don't think that they will get cheaper than combustion engines. Therefore, price is not a big argument. I think all of these vehicles besides the engine part will also have more or less the same technology. If it's connectivity or if it's automatic driving, it's just the engine type that is going to be different. So I think the environmental factor will be the key decision to decide.

B.
Are there some more technologies to look forward to that can also dramatically change the electric vehicles - talking about, for example, some infotainment features? Could it also be some of the factors? Or would people choose electric vehicles mainly for practical reasons?

R.
For sure there are a few features that only battery electric vehicles or plug-in-hybrids usually have. For example, it's the pre-conditioning of your vehicle, so that you start the conditioning of your vehicle from your app. So if you can in winter enter a warm and cozy car that's parked on the street. So there are features like that. But I don't think that those features all together will be as much of a motivation to buy a vehicle. I don't think that those features are nice and they are convenient. And if you already do have this kind of intrinsic motivation to do it, but you're not quite sure yet, then it might be the tipping point to say: “Okay, I'll actually do it.” But if you're not already there, and you really, really consider buying a plug-in-hybrid or a battery electric vehicle, I don't think that these features are strong enough to actually convince people not to buy a combustion engine vehicle. That would be nice but it's not like that from my perspective. It's the same with watching YouTube in your car, for example while charging. It's convenient to do it, and it's nice and it's really good fun. And there are also some games

you can play, for example, during your charging, during these 15 minutes of charging. It exists today. It's something that helps to make something out of this charging time. It's not a selling point that will make you say: “Now it's out there, now I'm going to buy a battery electric vehicle.” I don't think that it's like that. Even though I'm working with the domain now, I wish it would be different. But I'm realistic enough to say no.

B.
So what will be the selling point or selling points in your opinion?

R.
The vehicle is at least as good as a combustion engine. And if all other things are equal then doing something good is a nice thing. At some point people deciding to buy a combustion engine vehicle are going to be the minority. I think it's going to turn around. These people will have to explain why they did not buy a battery electric vehicle but a combustion engine vehicle. So I think this is going to change over time in a few years. It's not going to be about making the conscious decision to buy a battery electric vehicle. It's going to be the other way around. People who will make a conscious decision to buy an ICEV will explain to their peers, to their family and friends why they decided not to buy a battery electric vehicle. So I think this mindset shift will be there in a few years. It's not there yet. Nowadays you explain what is the motivation to buy a battery electric vehicle. I think that's going to change dramatically into “why did you not buy a battery electric vehicle?” “What got you there to still buy a combustion engine?” So I think that's how it's going to be in the not so far future.

B.
Do you think fossil fuel supplies can play a role in the decision making or is it going to be the same as it is now?

R.
I wish it would be like that. But unfortunately, apparently we are not as conscious people as we sometimes think we are. I think right after the start of the invasion of Russia into Ukraine, people got really concerned about petrol, gas, everything. People started to drive much slower on the autobahn to consume less fuel. Two years later, I don't see much of that anymore. Basically, we're back to normal. People are not concerned about fuel prices anymore. There is no shortage that people feel. So unfortunately, somehow the market, the flows of gas and petrol in this case shifted on a global scale.

Russia is still exporting oil, and we use the oil from different parts of the world and we get our petrol and fuel. Therefore, I’m not sure that this is unfortunately a big factor.

B.

And will people make their choice not depending on these fossil fuel supplies, right?

R.

It's going to be a price decision at the end. There is no shortage of fossil fuel for the years to come because there are still many regions in the world where there's oil and technology gets better and better. So the oil supply is not really getting smaller in the near future. Therefore, no, I don't think that this is going to be a big factor in the next 5 to 10 years.

B.

Alright. And then there is the last question.I already know your answer but to summarize it in a way. Do you think that with affordable, better electric vehicles, hybrids or plug-in-hybrids, better charging infrastructure and other developed innovative solutions for the electric vehicles, automobile consumers will be more eager to make their choice towards electric vehicles in the next years?

R.

Yes, it's going to become normal. You're going to be the odd one out if you don't buy one.

B.

Okay. So from my side, it was the last question.I have some more questions but I think we've covered all of them unless you have maybe something to add that I didn't ask about.

R.

No, I don't have anything to add. I think we covered many, many different areas. Thanks for all the questions.

B.

Thank you!

Appendix C.3: Interview transcript – US respondent

Bohdana (B.)

The recording has started.

The first question: in your opinion, how would you evaluate the current state of the market of electric vehicles considering the market in the United States?

Respondent (R.)

I mean considering the market, I think there are quite a few options. It's still kind of limited. But I do know that what many manufacturers like BMW offer is plug-in hybrids and electric vehicles as well as the other manufacturers like Tesla and Rivian. I think there are quite a few different electric vehicles available, but there are not as many options as there are with an ICE.

B.

O'kay. And can you maybe specify the market situation from the supply point of view and from the demand point of view?

R.

I'm not sure there is a huge demand yet for electric vehicles, especially because of the kinks and the fact that you don't have a long driving range between charges. So for instance, I know I couldn't get a plug-in-hybrid and drive electric to work because I live too far away and it wouldn't really suffice for me. And I think the problem is still there because the US is so vast and because there're so many rural areas, there's not a huge demand. Only in the cities there is demand for electric vehicles because there's not availability for charging and things like that in other areas. So I don't think there's a huge demand in the US market yet, at least in the more rural areas, maybe in the city it's different, but otherwise I feel like, on the supply side for BMW I think we're good. I don't know how the other companies feel about their supply.

B.

And do you feel, do you see any difference comparing the way it is now and how it was maybe some years ago, if some people are buying more electric vehicles or less, or if you cannot really see much difference?

R.

I definitely think people are buying more. I know when I'm out on the roads I see a lot more electric

vehicles. I do see more Teslas or more Rivians, or even more plug-in hybrids from BMW. I might definitely see more electric vehicles on the roadway than there were, you know, 5-10 years ago.

B.

O`kay, interesting. And considering the situation at dealerships, can you say how electric vehicles are available at dealerships in the US market, if they are more available than they used to be?

R.

I don't have any information about the dealerships. I wouldn't know what's available at the dealerships.

B.

Alright. And how would you evaluate the affordability of electric vehicles and the tax advantages in the US market? And again, has the situation somehow changed within the years?

R.

So I do know there's a tax, some tax break for electric vehicles. So I know that's always an incentive for getting them for affordability. I don't think they're the most affordable cars on the market. I think that's also going to eliminate, especially because you have to pay, I mean the car itself is expensive. I know there's been issues with even the upkeep of let’s say Tesla and things like that, as well as the charging of it. So I think that the affordability is still at a higher, higher price range than for an everyday person.

B.

Yeah, alright. And talking about these incentives or tax advantages, could you maybe explain more about how it's in the US market?

R.

I'm not sure. I just know that there is one, so I couldn't tell you details. I'd have to Google it.

I don't know exactly, but I know when I file my taxes that you see something like “Do you drive an electric vehicle?” But I don't know exactly the reward or the benefit of that. I just know that it exists.

B.

Okay.

R.

So talking about the charging infrastructure at home, also somewhere in the town or in the city/around

the cities/ on the highways in the US? In your opinion, how is the situation with this charging infrastructure?

R.
I really think it's lacking the charging infrastructure. When I think about it, I just did a long car ride and I'm not sure, I don't think I even saw a charging port. So I'm not sure about that. I mean, I didn't look for one, but they also didn't have any signs saying that they charge electric vehicles there. So I think that's definitely lacking. I think if we go to a more electric car world, we'll have to have the infrastructure because right now it's just not existing.

And I know you can get the things to do at your house, but if you live in an area where they have rolling blackouts or things like that, that's still not a viable option if you have to use your house to charge your car. And so, and I know I've read an article recently where a woman drove from New Orleans to Chicago in her electric vehicle. And she said she spent more time charging her car than actually driving. So the length of time it took her to stop and charge and wait for it to charge - she could have made the trip differently. So I think that's really interesting and I know that's lacking in our market.

B.
Yeah, and probably it's also different inside the cities and probably in some more areas outside.

R.
Exactly. I'm sure if you were talking to someone in a big city they would have different answers. But I am living in the rural area and I'm driving through rural areas - I didn't see any infrastructure to charge electric vehicles.

B.
Alright. In your opinion, how did COVID-19 and how maybe other economic or political circumstances influence or change the market of electric vehicles in recent years? Is it changing for better or for worse?

R.
So I think so COVID-19 definitely made things a little harder at the time just with supply issues as well as some of the chips and things we weren't able to get. So that had an impact. But for the political and economic factors, I know there are pushes to get more electric vehicles on the roadway in the future by

2030. And I think that is pushing for the development of electric vehicles, that's pushing for the infrastructure of electric vehicles. I'm not sure the exact stand of how the war impacts it. But I do know that the politicians are trying to get more electric vehicles, there's a definite push. And the development is starting for how we can get the infrastructure, how the vehicles can be better and things like that. And you see that in our lineup of cars coming.

B.
In your opinion, can electric vehicles fully replace vehicles with only a combustion engine? What are your arguments for and against this? And we are also talking about not only these fully electric vehicles but also about hybrids and plug-in hybrids and so on.

R.
No, I do not think that electric vehicles could fully replace ICEs. I definitely can just still use the argument of the rural areas. So just because of the amount of space you have between areas, you know, things on a farm, you can't expect them to always use an electric vehicle. Like they're going to use a gas engine, a gas powered vehicle.

And the people who commute really far, it's just going to be difficult for even long drives. Unless you have the infrastructure where you can charge your car in 5 minutes. If you want to go on a road trip and you take 4 hours to charge your car every time you stop, that would be miserable. So I don't think that it could ever really replace ICEs. But I do think that it could be maybe in the cities and places like that. I could see New York and everybody having an electric vehicle, but I definitely don't think it would be for places in the rural areas.

And then you have to think about the electric bonus. I know the grids already get overworked with heating sometimes. I know the Texas grid broke down one year in the ice storm. The California grid is always taxed, and then you don’t even have look at different countries. But just America. If you have a place that's already having real blackouts or already can't support what they have, how do you want to charge everybody's electric vehicle? I don't think it's ever going to work.

B.
Right, that's right. Now we will move on to this section of questions more about the consumer choices, beliefs and motives. So how would you, in your opinion, describe maybe typical groups of users of electric vehicles? This is one question.

And then the second part of the question is about their beliefs, motives, emotions - how in your opinion,do they differ depending on their age, income, social status and so on?

R.
I definitely think that users of electric vehicles are usually younger. They're usually either more accomplished. They live in a little bit bigger of cities than people who aren't buying them - I would think they are more rural, older and that's just a really big divide.

People who are a lot more conscious of the environment - they're the ones who are trying to buy the electric wheels, but also they have to have more money. They have to have a higher income. People with a lower income, they're not going to afford an electric vehicle, they're not going to want to buy an electric vehicle. And so I think that's really, again the divide is based on the money and the location.

So you know, if you don't make a lot of money, you live in a rural area, you're not buying an electric vehicle versus if you make a good living and you live in a city or somewhere in the place that has the infrastructure, then these people are more likely to buy.

B.
O'kay. So, what would you name as the main reasons for people to buy electric vehicles?

R.
I think one is most of the status. I know people buy Tesla for almost the status of having a Tesla and the things that the Tesla's hypothetically can do with autonomous driving, or for the way it looks. I think that would be the main reason why.

I'm not sure how many people actually buy for environmental reasons. I think more it's how they look or what they own versus saying like "I have an electric vehicle because I care about the environment." So I really think the features of the vehicle are still the selling point over the environmental impacts.

B.
O'kay, good. It's interesting because one of my questions was specifically formulated around this better impact on the environment and if people probably buy electric vehicles believing in some better impact. But it's interesting to know that, in your opinion, consumers are more attracted to other factors and things.

And which beliefs, emotions, motives and habits can drive automobile consumers to make their choices towards electric vehicles? What can be pros or benefits of electric vehicles?

R.
I think the benefits would be the options available on it. So how nice they are, the driving experience and things like that, as well as if they do get like the tax breaks and the incentives - that a driving factor could be to make it more affordable, to get the big tax break for having the electric vehicle. But then also the charging - once you have like the availability, how quick that is. For instance, if it's free to charge, I know some places where you pay to charge. If it's only free, then it's really less on you to have a vehicle that you can just buy, you drive it, charge it, things like that.

I really think that options driving people to buy are any affordability you know like at some point. There has to be a more affordable option to drive, and then people would get it. So if it really becomes less of a cost then an ICEs.

But it also has to be long lasting as well. You can have gas powered cars that last forever. I have one that is 16 years old that has 275,000 miles on it. Can an electric vehicle last that long? How is that? What is the cost to fix it, the upkeep? Can you repair it at home or do you have to take it to a shop?

All of those things are going to factor in because if it's you always have to take it to a shop, It's expensive to fix, it's expensive to upkeep, then there are people who are never going to get it. You want something that lasts.

B.
Alright. So to summarize, you would say that a range of different factors would influence and you would not specifically select one or two particular factors influencing the purchasing behavior.

R.
Yeah, that would be correct. So I think it would just be various factors based on the person or the location. I think that the factors of why “someone in the city would buy a vehicle” versus “someone who lives in a more rural area” buy the vehicle are different things.

There are people who have quite a bit of money and people who don't have a lot, they have different factors. So if you're in the city you make plenty of money, then it's very option driven, It's very status driven. You want the best options, you want the best car, that is what it would be.

But then for more rural or even people who have less income, they would want something that lasts longer. They would want something that's easier to repair, things that are more cost effective. So like if you have an electric vehicle, it saves you money somewhat. And I think they're so, like those are two different classes of people and why they would want to buy it in my opinion.

B.
That's interesting. And would you say some infotainment, special technical tools, features would also make a difference or not really?

R.
I mean, yes, I think always special options will make the difference depending on what they have and if it's something that's not been seen before, something better than other vehicles.

B.
And would you say there are some factors keeping people away from buying electric vehicles? Which of the main factors would you name?

R.
I think it's really the infrastructure and the price. I think there's a lot of people who are priced out of electric vehicles - just at the beginning they're expensive. But then I also think it's just not feasible to own an electric vehicle. It's the charging, the places between charging. Again, I'm pretty sure I didn't see any in the Mississippi, Alabama area I drove in yesterday. So I just say you can't own an electric vehicle if you don't have a place to charge it or if you can't drive it and charge it out. So I think that's really going to keep people from buying electric vehicles until the infrastructure is there

B.
Alright. And should people question safety and reliability in electric vehicles? And do you personally consider electric vehicles safe and reliable or not?

R.
Since I’ve not driven an electric vehicle,I can only say personal reasons of what you see on articles and things like that on the batteries causing fires. So when you think of that, it does get a little dangerous if you know you can't park your vehicle in your garage and think your house might burn down. I think that that gets pretty dangerous.

And talking about reliability, I think it's also up to the driver. If you think of these autonomous driving, you're still in control and you should still be the one paying attention once you're out on the roadway. So but for safety features, I don't know enough information to provide on, if they're just safe in general or how they'll protect you in a car wreck.

But I do think that issues with batteries causing fires - that would have to be a lot less or something would have to be put in if they do spark to extinguish them in the car itself before it got it out. Something would have to happen because that would be a deterrent for me buying it.

B.
And another question is: do you think personal preferences and values can frame consumers' decisions and behavior towards electric vehicles?

R.
I think especially someone who recycles, uses reusable bags - they would like more electric vehicles if it really helps the environment and there is an impact to it. But they still have to be affected, you have to have the infrastructure and they have to be affordable. You're not going to say: “Oh, I want to drive an electric vehicle, but you still have to spend $100,000 on it.” That seems wasteful as well. So I think there's a give and take and I do think if it became the norm and they were more affordable and everybody could get one, I do think those people who do care about the environment and do those things, would make those steps to go and buy an electric vehicle.

B.
And now there will be a bunch of questions on the future situation, how you could maybe describe or evaluate it. So in your opinion, which motives and choices can be the most common across all groups of automotive and electric vehicle consumers in the US market in the next 5-10-15 years?

R.
So when it comes to motives and choices, one: you still want the nicest vehicle, you want good options on it. I think that's always going to be something that has buyers going for it.

Affordability would also be another thing. As long as they're getting more affordable, like they're going to flood the market as well as the infrastructure is available. If you know that you can go out and buy a car, you can charge it, you can drive it wherever you want - that will be driving people. If it's more cost

effective and still works really well. I think those are going to be some of the bigger drivers. I'm trying to make sure I remember your whole question.

B.
All is good. Then the next question is about this environmental concern and some other motivators that will push consumers towards electric vehicles in the next few years. In your opinion, will it be similar to what it is now? Or will there be some other factors influencing the behavior?

R.
I really think it'll be similar to what it is now. I think it's almost going to be a forced thing in 5-15 years as there are less ICEVs and more electric vehicles. I think people are going to almost be forced into getting more electric vehicles. I don't think it's going to be necessarily sought after as much as it's going to be forced on us that there are going to be more electric vehicles and those are going to be your only options. Unless they're more affordable, even then I'm not sure that it's going to be a real big one in the next 5-10-15 years. I think it's going to be: “Oh, you have to switch to some type of an electric vehicle because that's what's available and that's what you know what you have to do.”

B.
Right. And talking about the fossil fuel supplies, can there be any issue that can be a reason for people to make their choice towards electric vehicles instead of vehicles with combustion engines for less dependence on the fossil fuel supplies?

R.
I definitely think that if the gas supply is low, gas prices are very high, and other things like that would lead to more electric vehicles.

But then again, I still very much feel like it's going to be the divide. So you live in the city and gas is very expensive. You can get away with an electric vehicle. I think that would be pushing it. Then yes, I would want an electric vehicle: I can plug it up at night, it'll charge or I can plug it up at work and it'll charge versus people who live in a whole rural area or that is very expensive, you don't have the availabilities to charge it all the time, things like that. They're still not going to buy the electric vehicle. Even with gas being expensive, you're still just not going to be able to buy - it as long as gas is available. If gas is really in short supply, then that's being forced into buying the electric vehicle by availability.

B.

And I think it will be the next and the final question. Let’s imagine this perfect situation with affordable electric vehicles, better charging infrastructure and all these other developed solutions for electric vehicles. In your opinion, will the consumers and people be more willing to make their choices towards electric vehicles in the next years?

R.

Yes, if everything gets better where it's the same as owning an ICEV, then I do think people would be willing to buy them. I think that the options are going to be there: how the vehicles are going to look, if they really try to make them look sporty, you're going to have some really cool things, autonomous driving, it's going to be really nice, emphasizing infrastructure and that it's affordable, then I do think people would buy them because it would be the same. It would not be such a huge hassle as it is now. It would be the same as having an ICE. Then I think people would be willing to buy them, people would tend to buy the electric vehicle, at least they will have the option where they are not forced. For instance, I can go and buy this really cool electric vehicle or buy some “okay-ish” ICEV. I think they would go towards the electric vehicle as long as the infrastructure is easy and the car is nice and things like that.

B.

Right. I had I think some other questions about factors influencing consumers buying behavior, but I think that we have talked pretty much about that. So, it's quite clear for me. I think this is it, unless you have something to add that we haven’t talked about.

R.

I think the infrastructure is actually where I've always said that till we get the infrastructure for electric vehicles, they just will not be the norm here, in the States, especially in the area where we live. So you had those questions and you already had that knowing that that's going to be a big point. But it's pretty much how I feel.

B.

Is this autopilot feature a big thing for the US market and for consumers? Is it something that is attracting people to buy electric vehicles?

R.

I'm not sure because I have not bought a vehicle in a while, and autonomous driving is still fairly new. But I do think that it would be attractive for people, especially on long trips. I do think people might enjoy autonomous driving or even just the availability of it, like just having a cool feature in your car, even if you don't use it that much. I do think that people are interested in autonomous driving and that it is a selling feature.

B.

Yeah, yeah. And we've talked about affordability. Would say there is a quite big gap in prices for the electric vehicles and other normal vehicles?

R.

Or as far as I know, electric vehicles are obviously luxury vehicles, and there are a lot of people who can't afford luxury vehicles. So they can't afford those electric vehicles. They go for more of the lower price and for more basic vehicles because that's what they can afford. And I think that electric vehicles don't have that market. I think there is a Tesla that may be priced in the $30,000 range. But again I don't have all the details, but my impression is that they're a lot more expensive. They are not much available in the lower price range.

B.

O’kay, that's interesting. Then this is it.

R.

I hope I helped a little.

B.

Yes, thank you! I will stop recording now.

Appendix C.4: Interview transcript – Ukrainian respondent (translated into English)

Bohdana (B.)
The recording will start now.

Respondent (R.)
Alright, it's already started.

B.
So, how do you assess the current state of the Ukrainian market for battery electric vehicles, hybrid, plug-in hybrid electric vehicles, or electric vehicles in general?

R.
Actually, the dynamics are positive. The question is, what factors are behind this. But if we look at the numbers - I can share them right now, or I can show the statistics later if you're interested, it's not a secret.

Let's start with our market (statistics for the first 11 months of 2023). This is the overall industry, specifically in the segment of electric vehicles. And if we look at the latest figure, the growth dynamics for the previous 11 months were as follows: there were 3,500 electric vehicles registered; for the 11 months of this year, it's 9,855. So, the growth is almost threefold, +180% in 11 months. And 9,855 electric vehicles, I emphasize electric vehicles, represent approximately 15% of the total market for the first 11 months, from the registration of all vehicles in Ukraine. So, the trend is very positive. The question is, what exactly is happening.

For the premium segment, we can also take a look, as we are more focused on the premium segment: all registrations for this year amount to 13,000; in the last month, 6,500 for the 11 months - a 97% increase. If we take engine-type electric vehicles, we see that 1,865 vehicles were registered. In principle, the dynamics repeat the growth dynamics of the premium market.

What conclusions can be drawn from this? We see that in the premium segment, the growth dynamics of electric vehicle registrations equal the growth of the premium market as a whole. So, there is no growth with leading attacks. At the same time, registrations in the overall market are growing much faster. There's an explanation for this. It's the significant increase in imports of grey Chinese electric vehicles. This is the main factor that significantly affects the market as a whole, the market's

development. And the undisputed leader with a huge lead over all others is the ID.4, which is manufactured in China. And what to do about it - even the official importer of Volkswagen in Ukraine doesn't know. They cannot afford to officially bring the ID.4 to the Ukrainian market because as an official importer, they are obliged to buy vehicles of European production. And this immediately makes them absolutely non-competitive compared to the same Chinese ID.4. There are many comparative studies in Ukraine, many videos on YouTube. If that's interesting, I can share them upon a separate request later.

These "early adopters" - people who are the first to enter, the first to test all these vehicles, even make comparisons: how the Chinese ID.4 differs from the European one. And sometimes the Chinese even win and cost half as much. For understanding: if the European ID.4 were officially imported to Ukraine, it would cost over 40,000 euros. The actual offer for Chinese electric vehicles today is $24,000, which is twice as cheap as European ID.4. This, in fact, is the main driver of the development of this market.

This is important, I think, in the context of understanding as a whole. I can guess what questions there will be, what context there will be in the dialogue in principle. And if we talk about the prospects for the development of this market, one of the answers is: as soon as the price of an electric vehicle equals the price of a vehicle with an ICE, more and more people will prefer electric vehicles.

Regarding the broader context of electrified vehicles. We do not include mild hybrids there, but classic hybrids, plug-in hybrids, and electric vehicles. This whole segment is called differently: electrified at Volvo, e-tech segment, or there's even a separate classification for cars with a plug (yes, there is even that). Accordingly, this is what's happening in this segment. If we talk about classic hybrids, the main representative of which is undoubtedly Lexus, which was the first to start developing classic hybrids - they have occupied a significant share of the market for quite some time. And I can't say that there are any global changes happening. This is in the premium segment.

Toyota (Lexus is a subsidiary brand of Toyota) started supplying hybrids to Ukraine later. We are now talking about Ukraine, it's clear, because hybrids and hybrid technologies several years ago were still significantly more expensive than vehicles with classic engines, gasoline, diesel. Now, when this difference is leveled, mass brands that are more price-sensitive can afford to start mass deliveries of hybrids. And one of the first was Toyota. And now in Ukraine, the price of a hybrid Toyota is either equal to the price of a diesel Toyota or even more attractive (than the price of a diesel Toyota).

Considering all the other advantages of a classic hybrid over diesel, it's primarily about perception, about the feeling from the car. After all, a diesel is still a diesel (well, you're researching the German market - it was probably the most diesel market at the time in the world, perhaps - I won't claim 100%, but I'm not far from the truth). So, of course, the feeling from driving hybrids (with all due respect to diesel) is significantly more pleasant. Yes, maybe there's a bit less dynamics with torque, but everything else has advantages and is on the side of the classic hybrid.

If we talk about plug-in hybrids (hybrids that recharge), this is a separate market. These cars in Ukraine are significantly more expensive than cars with a gasoline or diesel engine. Accordingly, plug-in hybrids in the mass market are a "dead product" because people are not willing to pay an additional 5,000 - 10,000 euros for a plug-in hybrid on the mass market. And in the premium segment, this is more interesting.

We, like Volvo, for example, are precisely one of the leaders in the plug-in hybrid market. But what exactly motivates customers to prefer plug-in hybrids? It's definitely not fuel economy. It's more about prestige, more about some kind of relevance to modern technologies. Above all, it's about power, because in our plug-in hybrids, the total output is 450 horsepower, 750 meters of torque. So, these are indicators that are unattainable for conventional engines, or if they are attainable for conventional engines, then their price will be approximately the same as for plug-in hybrids accordingly.

Accordingly, considering all these factors, people think: "Okay, if we can, if we want to have a car with 700 plus torque, 450 fifty horsepower, five seconds to a hundred, for a large SUV - fantastic numbers. And all this we can have in the range of 80,000-100,000 euros. And in principle, with a conventional engine, you need to pay no less, or even more. So why not?" There are certain advantages, as a bonus, you get a certain reserve, certain environmental friendliness, a certain range on electric traction, which is also nice, especially if you live outside the city or in a modern residential complex where some parking spaces are equipped or have the possibility to connect to the power grid to charge cars - these are all arguments that stimulate demand in this segment. So it's not about ecology, unfortunately. At the moment, it's more about prestige. About relevance to modern technologies.

B.
You've been talking more about electric cars, hybrids, plug-in hybrids on the Ukrainian market. I'm also interested in this question. If we look at, evaluate the motives, motivations of users in general

regarding electric vehicles - battery-powered, hybrids, etc. - from your point of view, certain consumer motivations are interesting. But we can come back to this question later.

At the beginning of the conversation, you interestingly talked about the figures in terms of demand for electric cars in the Ukrainian market. Speaking of supply, how can you assess certain changes, for example, taking the current, past, and previous years? What changes are there?

R.
The supply is definitely increasing. We, as official importers, representatives of brands in Ukraine, have a headquarters that pushes us. Sorry for the slang words, but it's easier for me. Of course, they push us very hard because for them, it's more about ecology, about reducing CO2 emissions.

If we talk about Volvo, I am sure - this is true to some extent for all brands - then ecology is not even mainstream. This is part of Volvo's DNA, and they always pay great attention to it. Half of their official press releases are not about new models. It's about ecology, what they have done in a specific quarter and so on and so forth. And this applies not only to electric cars, hybrids, or plug-in hybrids. This applies to the entire value chain, if we talk about Volvo. Starting from even the transportation of cars, especially by sea, Volvo is very proud that they have become the world's first car manufacturer to fully switch to biofuel for intercontinental transportation. And they pay more for this biofuel out of their pocket to reduce CO2 emissions. The same applies to the production cycle. They again became the world's first to switch to 100% renewable energy at their main plant in Gothenburg. This means that they use all available sources: wind power, solar stations, and so on. The plant completely provides itself with green fuel sources to fully cover the entire production cycle. This also applies to materials. A huge emphasis is placed on steel production: what is the carbon footprint of steel production; how can it be reduced there? And so on and so forth.

If we return more to the question itself, this is the reason why manufacturers are pushing us all. Demand is growing, but supply is growing even more. So now, in my opinion, we are in a situation where manufacturers a few years ago responded to the first sprouts of demand. The situation is different now. They are pushing this demand themselves with their supply. So the supply is large, the competition is huge, and the benchmark for everyone was and maybe still is Tesla as those who, let's say, stirred up the whole story. The brand power of Tesla is still significant for buyers. But, in my opinion, it's more of an inertial demand now, the brand's inertial force. Not that I don't believe in

Tesla's future - no, that's not true. But it can't be said that it's already unequivocally the benchmark in the market.

So demand is increasing. The strength of Chinese brands is growing very strong, the strength of their influence on clients, including. And this also applies in the context of motivations, we, I think, will return to this during the interview: what exactly drives clients? I'll talk about this a bit later.

In our case, speaking about the premium segment as a whole and the car market as a whole, I can't directly say in specific numbers, but according to my feelings, every year the supply of models increases by at least 2 times from year to year of electrified models. Focus is primarily on electric cars, the supply of hybrids, plug-in hybrids is growing at a slower pace, but it is growing.

B.
Alright. Speaking of dealerships, if you could assess the situation regarding the availability of electric vehicles and electrified cars? How is the situation changing?

R.
Let's go segment by segment. I'll start by commenting on our Volvo brand and then go further, it will be easier for me.

If we talk about electric cars, about the availability of electric cars, now all Volvo dealers across Ukraine have electric cars in stock, electric cars in showrooms, at least one electric car for demonstration, for test drives. This is our standard that we have implemented, which is mandatory for all dealers. Most premium brands are going the same way. They try to ensure that at least one electric car is mandatory in the demo fleet. Accordingly, if you, for example, are a potential customer, then you have the opportunity to consider a premium electric car for purchase. You will always be on equal terms as if you were buying a car with an ICE. You can take a test drive, practically in any premium brand and buy an electric car literally in stock.

If we're talking about the mass-market segment, the situation there is a bit more complicated. It's understandable why. Firstly, as I mentioned before, the mass-market in Ukraine is completely dominated by Chinese imports. So when we talk about official electric cars in the mass-market, it's very difficult. Most brands don't know what to do with it. They import them, put them in showrooms, with prices twice as high as Chinese cars, and they sit there "dead weight" in car dealerships. If we call things by their names. If you don't really bother much. Suppose you're a customer who doesn't

understand the difference between an official and unofficial electric car, or if you're a customer who knowingly is ready to take a risk and buy an unofficial electric car - regardless of the lack of warranty, potential risks associated with the battery, which accounts for 70% of the cost of the electric car, and so on - then you have a huge choice in Ukraine right now. We've returned to the times that I last observed, probably either at the beginning or in the middle of the 2000s. When there were masses of gray areas everywhere, not even car dealerships. Now, car dealerships are emerging nicely. But mostly they are areas filled with electric cars of any brand. Some of them, even their names, frankly, mean nothing to me. I stop by, passing by, to see what it is. And I'm embarrassed when I can't recognize what exactly is in front of me, but it looks very cool.

B.
Actually, I want to add as well. I live in Munich. And probably over the past few years, the trend of opening various showrooms of Chinese manufacturers is just skyrocketing. It's really interesting to observe this situation because, of course, there are well-known brands - BMW, Volkswagen, Audi, Porsche - but still, these showrooms with Chinese cars are growing right before our eyes.

R.
Yes, all of this is the result of the demand subsidy policy in China. And considering that Chinese brands do not have representation in the vast majority of Europe and the United States (now we're talking about Asian markets, Asian markets), then yes, in principle, there are no restrictions. If you don't have an official importer in this country, why would you, as a Chinese manufacturer, restrict your re-import to this country? There are no grounds for this.

B.
A clarifying question: when you talked about the situation, did you mean more Kiev, probably? Or geographically, all of Ukraine?

R.
All of Ukraine. Any city - not only even million-plus cities - any regional center in Ukraine. If we talk about premium electric cars and plug-in hybrids, they are now physically present in almost all official dealerships, in all regional centers. If we talk about Chinese mass-market electric cars, I haven't checked in villages. But I wouldn't be surprised if I found a small area in some village too. For understanding: a week ago, I was returning from a business trip from Odessa. It was already dark, I was approaching Kyiv, somewhere fifty kilometers to Kyiv, all these huge showrooms and service centers

of agricultural machinery begin in rural areas. John Deere and so on, where huge combines stand. And in front of them in a row, there are tiny showrooms with Chinese electric cars. Even like this, on the highway, and it's not even a city.

B.
Yes, interesting. Probably the main thing is for European and American manufacturers to keep up with the pace of the Chinese.

R.
Yes, but it's difficult for them.

B.
Alright. Then a question about tax incentives and various financial aids from the government. Wat's the current situation in Ukraine? I mean, is there anything that encourages users to switch to electric cars or not?

R.
In Ukraine, it's actually very simple with this. We don't have a system of tax benefits for buyers or any other complex systems present in Europe. We're not at that stage of development yet. At one time, we managed to push through government incentives for electric cars. And it's very simple, there's no VAT and no import duty. This is actually a huge saving because VAT in Ukraine is 20%. So that's immediately 20% off the price. If we're talking about duty, honestly, we would gladly return to it now. And it's something we're considering because in Ukraine, there's a basic duty of 10%. If it's not from EU countries, where there's a preferential duty rate. And it's something we're considering now because honestly, it would be better to bring back the duty on electric cars. Because then it would give us some additional protection. We would then import cars with preferential duty rates. And the current rate would be around 1-2% instead of 10%. And no VAT would be paid. This would give us at least 7-9% additional protection against China. But in fact, there's no duty, no 10%, no VAT. So, in reality, the advantage now - the incentive to purchase an electric car - is one-third off the price. In a big picture, in Ukraine compared to ICE cars.

If we talk about plug-in hybrids - zero preferences, no incentives, just regular taxation, the same as for ICE cars. This is one of the factors why plug-in hybrids in Ukraine are so expensive compared to electric cars. Buying a plug-in hybrid is more expensive than buying a similar electric car.

B.

And what about hybrids?

R.

Hybrids - also standard taxation. So, the benefits are exclusively for electric cars, period. Some cities have started to come up with something for customers, looking at what's happening in Europe. For example, free parking, something else. But even considering the cost of parking, in Kiev in the city center, it's 35 hryvnias per hour. So, with an electric car, you can save 30 hryvnias per hour. But that's how much, that's less than 1 euro. It's a kind of stimulus, so it's key.

B.

Moving on to charging infrastructure. How, in your opinion, is it developing or not? How is the situation changing?

R.

It's developing very actively, and that's one of the mysteries. On one hand, it's understandable, the fleet of electric cars is growing. Why, as I say, it's one of the mysteries? Considering the current situation related to the state of energy in Ukraine as a whole, due to mass bombardments, Russian missile attacks, and so on, we understand that compared to last year when 50-60% of generation was destroyed by various estimates, and restored to a level of minus 30% compared to pre-war conditions (meaning we have 30% less generation than before the war), accordingly, there's an electricity deficit across the country. And despite this, despite this factor, the market for charging stations is developing very strongly. There are several major operators. Among the largest, I would mention "TOCA", "AutoEnterprise Infinite", "GO TO-U".

This is if we're talking about stations primarily "DC Chargers", "AC chargers". There are still many "no-name" ones. If we're talking specifically about stations with at least 22 kilowatts, or better yet, 50+, then these are the main operators. And they focus on developing infrastructure, primarily between cities. Traveling from Kyiv to Lviv, Kyiv to Odessa - it's really not a question of recharging. You already have not just one charging hub, but several. Some of them are real hubs when you arrive. This is, for example, a partnership between "TOCA" and "OKKO". You arrive and there are 4-5 charging spots, station power at 120+ kilowatts. Some already install 160-180 kilowatts, there are even 300 kilowatt stations. It's ours and the only one so far, but it exists.

And industrial standards are becoming a minimum of 120 kilowatts. So, infrastructure is developing significantly. If a few years ago the question of where I would go with an electric car outside the city was really essential, now it has changed. There are still such thoughts among customers, but if a customer considers an electric car, then all these doubts can be quite easily dispelled by showing either a charging map or any reviews on YouTube (there are now many popular reviews, channels like "First Electric Train", etc.), which specifically examine the state of charging infrastructure. Customers who just Google something related to electric cars on YouTube will immediately find answers to their questions. Nowadays, traveling between cities in Ukraine is easy, charging happens really quickly. And thanks to the fact that it's 120 kilowatts, and if you have a modern electric car, you can really charge from 20 to 80 percent in 25 - maximum 30 minutes. And in reality, it's just the time for a "pit stop", to have a coffee, and so on.

B.
Interesting. Continuing on this topic, actually, the next question is about the economic, political circumstances. Considering the war in Ukraine, how do all these different factors affect the market for electric vehicles, hybrids, plug-in hybrids?

R.
They hardly affect the market for hybrids and plug-in hybrids because they are more versatile means of transportation. There is always the option to choose whether to ride on electric traction or on an engine. And this is one of the advantages, one of the factors that is significant for our clients in Ukraine. So, the market for hybrids and plug-in hybrids is growing, showing positive dynamics. And this is somewhat controversial compared to what is happening in Europe. In Europe, the share of plug-in hybrids has been decreasing over the past few months, the trend is downward. But for us, it is still going up, and this is one of the explanations: "I have both an electric car and a car with an ICE. Volvo has a global advertisement that I really like. And by the way, it helps to sell Volvo in Ukraine: it's an "electric car with a back-up plan." So, you have an electric car with a "backup plan," and it's actually cool. They don't position it as a plug-in hybrid. They say it's an electric car, but if anything, you always have an ICE. And this logic really helps to promote them.

When we talk about electric cars, seasonality is very pronounced here. It is associated with the fact that winters in Ukraine are not quite like the average in Europe. And these doubts and concerns of customers are constant: "What will happen this winter?" Everyone remembers very well what happened last winter. Everyone has actually forgotten that our winter started much earlier than the

calendar winter. The first massive terrible attacks were happening in November, and already in November, everyone was saying, "It's all over."

Now we are not far from the new year. All the mass attacks were repelled. Kyiv is generally considered the most defended city in the world in terms of air defense as of now. But people have accumulated this negativity; it still lives there under the skin constantly, it's discussed in jokes, Telegram channels, etc. Accordingly, these doubts: winter, "I might have bought an electric car, but I'd better wait"; "let's see how we survive the winter." It's not seasonality related to technical characteristics, but to the awareness of our buyers. Therefore, it is very pronounced: if during spring-summer, early autumn people buy electric cars with pleasure, then during this winter period, let's call it conditionally, demand significantly decreases. People just want to wait and see how it goes.

B.
Actually, a question considering your comment: do people buy electric cars already as the second or "nth" means of transportation, rather than when they buy it as the first means of transportation?

R.
Yes. If we talk about the premium segment, perhaps such clients exist, who have one premium electric car, but I haven't met them. No, it's always the 2nd, 3rd, 4th car in the family. When I say family, I mean it broadly. For example, you already have 2 cars. Then your son or daughter grows up, and you're like, "Okay, we live outside the city or I have 3 parking spaces, we equip one of them with a charger, here you go, son or daughter, an electric car. You'll be advanced, fashionable, and so on." If we talk about the mass segment, then yes, there are people who buy it as the main means of transportation, but unfortunately, I cannot objectively estimate what proportion of such people there is. By feelings, maybe no more than a third of the total demand. It seems to me, but I may be wrong. Unfortunately, as I say, there is no such study, but by feelings, maybe no more than a third, where it is the main means of transportation. The other two-thirds are the 2nd car in the family.

B.
Understood. In your opinion, can electric cars, hybrids, plug-in hybrids completely replace ICE cars? How likely is this to happen in the near future? Is it even possible?

R.
In the foreseeable future, let's put it this way: there is a factor that we have already mentioned today.

This is the factor when the price of an electric car is fair, without additional support incentives from the state, tax benefits, and everything else, when it at least equals the price of a car with an ICE. There are market factors, there are regulatory factors. We have already partially discussed regulatory factors. These are subsidies that exist now and will decrease over time, which is known to everyone. On the other hand, there are constant tightening of environmental requirements for ICE cars. That is, on the one hand, there is a trend towards reducing the cost of electric cars, and on the other hand, there is an artificially imposed trend towards increasing the cost of a car with an ICE due to tightening environmental requirements. So when these two trends at least equalize, this will be the pivotal moment, in my opinion. Because everything else speaks in favor of the electric car. Of course, there is a super separate segment: sports cars - we don't take them into account. There, despite the super-electric cars that appear, there will still be someone who will say, "an electric car is not a real sports car, give me a Porsche 3-5 Turbo, and that's it. I won't even consider anything else."

So, we talked about the first factor. And the second factor is the range. It has significantly increased over the past 2-3 years, but it is still insufficient in the minds of customers. For the customer, the benchmark is how far you can go on a regular car with an ICE. And on average, it is at least 500 kilometers, a range of 500-700 kilometers is an honest range, which is practically independent of weather conditions, 5-10% difference in fuel consumption compared to the average cycle or when it's super hot outside and the air conditioner is on full blast, or when it's very cold and the heating is on full blast - it's still up to 10%. In the case of electric cars, it's 30%. So, when this "gap" is reduced, and when people really trust that if the range of an electric car is, for example, 600 kilometers, then this WLTP cycle plus-minus corresponds to the WLTP cycle for an ICE. And for this fluctuation, the difference should be reduced from 30% to at least 15%. This is the next stage of technology development.

First of all, these are solid-state batteries, which are not as far away as we think. I think it's a matter of 4-5 years when they can become quite mass-produced. And these are also other technologies with batteries of the current generation but with significantly improved characteristics, which will be mass-produced in the market already in 2025-2026. In particular, Volvo is very actively working in this direction. We expect that already in 2026, we will have such electric cars on the market that will meet all the requirements I just mentioned.

B.

Interesting. Considering the time, I will move on to the next questions. Speaking about users, how

would you describe the typical groups of electric car users overall? And looking at their beliefs, motivations, emotions, values, different psychological nuances, in your opinion, what could shape them?

R.

I would formulate it like this. It is clear that there is a lot of research on this topic, so I won't repeat what you already know. It seems to me that the main factor, which, by the way, I haven't encountered in studies yet or maybe I missed, is that electric cars are bought by customers who see them as gadgets. It is important to understand this. What do I mean? When you buy a gadget, its technological aspect is the most important for you. Not even the name (we are now extending this to a separate category with Tesla and iPhone - iPhone is forever with us, I don't know if Tesla will be with us forever, I mean as a benchmark). For example, now there are iPhone buyers who never buy anything else in their life besides iPhone, no matter what it costs, and there are those who are oriented towards the brand. But if we talk about other smartphones, people are looking for the gadget itself: what does it give me, what are the advantages, what's interesting about it? They easily buy Chinese smartphones, experiment with them. Roughly the same thing happens with electric cars. So, when we talk about a gadget, the name or brand is not so important anymore. What matters is what you get: how progressive it is, how technological it is, how it meets your expectations, what features it has, and what you can boast about to your friends? I'm not joking, because this is a completely separate community where they have to prove to each other every day that their car is much cooler than others. It's like it was 10 years ago when the era of smartphones began, when everyone was proving to each other that their smartphone was cooler than their friend's. Now we are at that stage.

B.

Taking these characteristics into account, I don't want to generalize, but in your opinion, is there a certain age, educational, or social status category that mostly buys various types of electric cars? Can we generalize to some extent?

R.

Maybe I'll disappoint you, but no, there isn't. We also searched constantly, we analyze our clients. We always thought it was "Generation Z" (sorry for this letter, but it can't be removed from the international lexicon. We thought about how to rename this "Generation Z", but couldn't come up with anything. We thought at first that it was primarily them, then someone else would join them. Most interestingly, there were even global studies, and Volvo, when conducting its global study, was

shocked because they found that precisely the same "Generation Z" that everyone was targeting is less inclined to buy an electric car than traditional car buyers. And it was such an eye-opener for them. They shared this research. They say, "We checked it many times, but it's true." That's why it's like this right now. So no, there is currently no specific audience. And this is precisely because at the stage we have already reached, those electric cars were a compromise. Previous electric cars were like "Frankensteins" between ICE cars and electric cars. Because most manufacturers produced their first electric cars based on ICE cars. It concerns everyone: Volvo, Audi, absolutely everyone. And of course, they were at the initial level. Now, when electric cars are being launched on new platforms, which are designed specifically for electric cars. There, we will already find some insights, at least we hope so. For example, we are now launching the Volvo EX30 in Ukraine. I expect that this is an absolutely new electric car, a new platform, a new infotainment system, etc. Everything you can think of, it's all there. And there we will already focus on the audience that we consider our target. But I wouldn't be surprised if after a year of launching the model, we take off the rose-colored glasses, analyze the real clients, and see that in principle, they are classic car buyers, and there are no insights there.

B.
I still thought that if we are talking about certain technologies, buyers in terms of "infotainment", then maybe there will be some trends after all. Interesting.

R.
Honest answer - no. Actually, it's the same as with the iPhone. Who are iPhone buyers? They are ordinary people. Some of them don't even understand why they need the million functions that are in the iPhone. They never use them. But they buy them. So when you make a general cross-section, it turns out that the average iPhone buyer is the same as any other phone in terms of various characteristics.

The same situation arises with electric cars, hybrids, plug-in hybrids.

B.
Interesting. Well, we've discussed many different issues on this topic. But if we generalize, what are the main reasons why drivers buy electric cars instead of ICE cars? If we generalize, could you highlight such main reasons?

R.

One of the main drivers is still the desire to join future technologies. This is an important factor. Not everyone may realize it, but it is definitely one of the important factors.

The second factor is the operational characteristics. In any case, if we discard all potential troubles, risks associated with the current situation in Ukraine, the operation of an electric car is more pleasant from any point of view. Less noise in the cabin, less vibration, absolutely smooth acceleration, no delays, especially when we talk about mass-market, where customers have been suffocated by manufacturers lately. When instead of classic automatic transmissions, they started installing robotic gearboxes, which are not very pleasant to drive, to be honest. So here, an electric car solves all these issues. It's like a little trolleybus that rides nicely, has pleasant dynamics, everything is clear. The operational costs of an electric car are lower - this is objective, no regular maintenance, nothing at all. All you need is to change tires from time to time, windshield wipers, and that's it.

B.

If we're talking, for example, about costs, can it be one of the factors? If we compare European consumers, costs are one of the main factors driving the use of electric cars. Is the situation the same in Ukraine?

R.

For the Ukrainian mass market, this is definitely one of the main factors. It's an artificial situation. Whether everyone realizes it or not, we understand that the tariff in Ukraine is 2 hryvnias 64 kopiykas per 1 kilowatt. Just don't tell anyone in Europe. You live in Europe yourself, so you understand what it's like. We also have a night tariff, which is twice as low. Accordingly, if you just have the opportunity to charge your electric car even with the regular daytime tariff from a regular outlet or even a private WallBox that you bought (in Ukraine, you can buy a normal quality WallBox for $600-800. It will be a cool box that will charge any electric car qualitatively. If you install a WallBox, it charges quickly, and you still pay either 2.64 hryvnias during the day or 1.32 hryvnias at night. It's ridiculous. It's 5-10 times cheaper than buying fuel and refueling. So yes, it's an important factor.

When you go on the highway between cities, of course, at fast charging stations, the commercial rate applies, and the commercial rate for DC Charge is 15 hryvnias. There, the difference is practically zero with ICE cars, but electric cars are mostly used within the city, and the range is more than enough to charge them at home. And here, the factor of saving becomes really significant.

This is how it is happening now. Firstly, we understand that this situation cannot last long. At least now the commercial rate in Ukraine is already 6-8 hryvnias per kilowatt, which is closer to Europe. And accordingly, someday it will become like this for the population. And someday the fully functional single energy market, which already officially works with Europe, will really start working here, but due to physical limitations and subsidies currently provided in Ukraine for the population, it is not interesting for European operators now. But if we remove the subsidies and launch a fully-fledged market, and European electricity operators enter the electric power market, then our tariff will immediately become like in Europe. And in Europe, there is a trend towards increasing the cost of electricity because there are more and more electricity consumers, including electric cars. Therefore, in my opinion, the cost-saving factor will still remain one of the incentives for the development of electric cars, but this is a matter of 2, 3, 4 years. Probably not more. Then it will no longer matter at all because it will not correspond to reality.

B.
Good. Is the positive impact on the environment a motivation for consumers or not?

R.
In Ukraine - no. There is a part of the clients, but it's small, who think about it. It's a nice bonus. But it's definitely not for the mass market. Nobody thinks about ecology there, it's about saving.

In the premium segment, maybe there are some clients for whom it's a nice bonus, but unfortunately, it's not a buying motive. Of course, in communications, we constantly use this "message," somewhere it sticks, undoubtedly. But again, it's just a nice bonus for the client, definitely not a factor. If there were two cars side by side: one with an electric motor, and the other with an ICE, and they were absolutely equal in characteristics. But if the electric car cost 5,000 euros more, then the environmental factor definitely wouldn't play a role in favor of buying an electric car. Unfortunately, it's like this in Ukraine.

B.
What can encourage buyers to switch to electric cars? What factors? If we consider the segment of people who currently, for example, use regular cars - what can be offered to them?

R.
Actually, if we talk about economic incentives, they all exist. These are tax incentives. They are as

maximum as possible, in my opinion, it's impossible to come up with more. Infrastructure development is happening and going in the right direction. Accordingly, if this pace is maintained at least for the next 2 years, then we can confidently say that in terms of infrastructure, Ukraine will be ready for customers to perceive charging an electric car the same way as refueling at a gas station.

And the main factor, the key one, is technology. This is the next level of battery development, which will simultaneously solve two issues and they are directly related to each other. This is either the next level of development of current batteries or solid-state batteries, and at the same time, the cost of a kilowatt-hour or lower than $100 per kilowatt/hour battery capacity. And then it will essentially be a choice for the client what you really want to take: an electric car or an ICE. In that case, I think the majority of clients will prefer electric cars.

B.
Okay, and other innovative digital technologies?

R.
Yes, they are certainly important. Why didn't I highlight them separately? Because in reality, all efforts and investments of manufacturers are now exclusively directed towards electric cars. Take Volvo, for example - Volvo no longer produces ICEs at all. They stopped it, and invest 0 euros per year in the development of ICEs; all investments go into the development of electric motors and batteries. Consequently, it's clear that the production that Volvo had, they sold it to an external company, and now formally the engines that Volvo developed several years ago are purchased from an external company. Do you understand the situation?

This is the path most manufacturers are taking. So when we talk about innovation, it turns out that any innovations related to "infotainment," which are now being created, are automatically tied only to electric cars. That is, the current generation of ICE cars is alive, it now takes more from electric cars than it did before. Before, ICE cars gave something to electric cars. Now it's the opposite. The most progressive "infotainment" is being done for electric cars, and then it's adapted for the current generation of ICE cars.

And this is a super important factor. I'll repeat my opinion. I believe that the perception of electric cars is the attitude of customers toward them as gadgets. It has to be absolutely seamless - in terms of perception, how it works, how integrated it is into everyday life, how integrated it is with your

smartphone - it's super important. And customers who have felt this once, then can't imagine that it could be otherwise. For example, even in our cars, in Volvo, which is now working on the new iCUP system. And on the EX30 and EX90, there will already be a completely new system based on the Google automotive platform. It will be absolutely seamless. I have the Volvo app on my phone, from which I can do anything with my car. So if I go to Google Maps on my phone and "Google" where I want to go after our meeting in fifteen minutes, then when I get into my car, without connecting the car to anything at all, the first thing my Volvo will offer me is to go to the place I was looking for fifteen minutes ago. So when you get used to that and when you don't find it in another car, it becomes a significant factor for you. That's why demonstrating all the possibilities in terms of gadgets is very important now, and we're focusing dealers on that, because a person can't even imagine what's possible.

B.
That's cool.

R.
Yes, it's cool. Over-the-air updates are a super important thing that we also launched in Ukraine, and for customers, it's also a certain "open eye" that they need to go to the dealer more often, auto-updates are downloaded automatically, at a convenient time for the customer, and these things really work, on the psychology of the customer, among other things.

B.
Alright. What are the main obstacles preventing people from transitioning to different types of electric vehicles?

R.
In our case, the main obstacle is uncertainty about the future from the country's point of view as a whole. Unfortunately, that's true. And from the point of view of electric infrastructure, it's not about charging infrastructure, but about the potential shortage of electricity in the country as a whole - that's a very significant factor that affects decision-making. Because you can buy an electric car, you can have a super developed network of charging stations, but you'll come to this charging station somewhere between Kyiv and Lviv or even to a huge charging hub, and you won't be able to charge because there's no electricity in the grid as such - what do I do? That's what clients are seriously thinking about now.

B.

Alright. There will be a question about consumers now, and then a couple more questions about the future. So, a question about values. Is it possible to highlight values that are characteristic of users of different types of electric vehicles? Or is it still what we've already talked about?

R.

Yes, that's what we've already talked about. Currently, it's the brands' perception of these clients. But it doesn't match reality at the moment. That is, I can tell you a lot about what this client should look like, but there's no point in it because it doesn't correspond to reality. So let's leave it at that. That's just an honest answer.

B.

Okay. And speaking about the future, what do you think will be the most common motives and trends in choice among users of electric and conventional cars in Ukraine in the next 5-10-15 years? If it's possible to talk about this period.

R.

As I already mentioned, I believe that brand loyalty - hopefully not forever, - but at a certain stage, it will significantly decrease, it has already decreased. People are more willing to experiment, even buy "noname" cars - that's the first thing. Second: at the stage when the price of an electric car decreases to the level of an ICE car.

And by the way, what we haven't talked about yet, and this is a super important factor, is the "residual value". It's unpredictable. For example, with Tesla: when people bought a Model S for 100,000 euros new from the salon, assuming that in the worst case scenario it would lose 20-25% of its value in a year. And the next day Elon Musk lowers it from 100,000 to 75,000 euros. And you've just driven out of the salon, and it's already minus 25. Now your potential buyer in the secondary market will already be buying your car based on this current status. And now from the value of the electric car, which is now 75,000, you have to subtract 25%. You have to subtract not from the 100,000 you paid, but from 75,000. Such losses for the client are catastrophic.

So residual value is a super important factor. It's relevant in Ukraine too. I won't name brands, but for example, with the "early birds" who bought electric cars for astronomical sums, now they are regretting it to the dealerships. And they don't know what to do with them because their expectations regarding

the residual value are, to put it mildly, higher than the readiness of customers in the secondary market to buy electric cars at such prices. This factor is of great importance, so price stabilization in the future at some level is critically important in terms of customers' readiness to buy electric cars and consider them in the future. Now this factor is one through which many clients got "burned". And that's why we're seeing a situation now where the trend for the development of electric cars instead of such, at best, has become "flat", and sometimes even declining. People are willing to buy, but later, when the honest price for the car will be understood, and the honest "residual value" for this car in 2-3-5 years. If you study the US market, then you know very well that there are entire guides on cars where you can just go and see the residual value of the car after 2, 3, 4, 5 years of use before buying it. This is statistics accumulated over decades.

All this data from research is open. It's important for customers. There's nothing like this for electric cars. So this is a super important factor that now affects not only in Ukraine but globally on demand. When all these factors are removed, I think brand loyalty will still be lower than for conventional cars. The readiness to change cars more often will remain at the same level. So I don't expect the electric car replacement cycle to approach the smartphone replacement cycle, for example. But, nevertheless, the average ownership period will not be five years. It can easily be reduced to 2-3 years.

If the legends told by Elon Musk ever become reality, and the electric car can even make money because it has autopilot (he talked about it 4 years ago, he emphasized it at every annual meeting), your Tesla car will cost 85% more next year because we will launch our autopilot, it will drive and earn money. You know this if you've researched it. And in fact, it became 50% cheaper. So when all these legends become reality - and this won't happen very soon, I don't expect mass adoption of autopilot to happen sooner than in the next 10 years. I work for the Volvo brand, which is one of the most advanced brands in terms of "autonomous driving" development. They are more conscious about it. Our cars can do everything Tesla can. Only they don't call it "autopilot". And most functions are consciously limited by the manufacturer and used for safety, and nothing more. So in limited areas, Volvo can drive, but Volvo doesn't talk about it. It's in the brand's DNA. When Volvo is 100% sure it's safe in any situation, then we'll talk about it. So this factor also matters.

In summary, the cost at the level of ICEs - one. Brand loyalty will definitely be lower - 2. Technological sophistication and seamlessness: an electric car must be integrated into my life, and my life is my phone, my computer, my smart home, ideally, I should be able to charge my electric scooter

or electric car from it, give energy to the house, and so on. These are the things customers are already asking about. It's absolutely not necessary for them now, but they ask because they know it's possible.

B.
Ecology?

R.
Not at the moment. In Scandinavian countries - definitely, but if we're talking about Ukraine - not at the moment. Before the war, we felt the first shoots of this trend. But now it's not on the agenda at all. Not now.

B.
Understood. But if we talk about the future in the next few years, imagining that the situation with the war will end?

R.
I think it will be a factor. We saw the first shoots before the war because we invested a lot in communication, in environmental issues. Other brands did the same. And it created such a basic background. I can't say that customers used it as a significant argument. But we clearly understand that it created a basic background. Society as a whole was more positive. People were thinking about development, not survival. And when you think about development, you can't avoid the topic of ecology in any way, because this topic is everywhere. Accordingly, when ecology is a topic everywhere, and from the manufacturer you also hear about ecology, it all merges into one context. And maybe even prompts a conscious choice of an electric car, hybrid, or plug-in hybrid.

B.
And dependence on gasoline, diesel, etc. - how much of a factor is it in the choice?

R.
Unfortunately, we had the opportunity to test this in Ukraine. In May-June 2022, when, if you remember, there was a total shortage of any fuel in Ukraine. There was nothing. At first, one gas station would only fuel “in one hand,” with one gas tank of 5 liters. You couldn't buy more. And on that day in the network of these gas stations, you couldn't refuel anymore. Then they increased it to 10 liters. These were terrible times. For your understanding - it was like wartime. Within 3 weeks, we sold absolutely all electric cars and plug-in hybrids that we had in stock. And which, before the fuel crisis,

we didn't know where to put because of the war, demand was minimal. And we thought we had a two-year supply. But within 3 weeks, everything was sold. So, I think that's the answer to the question.

Let's imagine that tomorrow there will be a fuel crisis in the world, and this crisis will not affect the generation of electricity, then 3 seconds - and everyone will buy electric cars.

B.
Understood. And such a question - we've already discussed it, but summarizing, in your opinion, did the war change the purchasing behavior of users in the automotive and electric vehicle industry?

R.
Yes, we've already discussed this. It definitely changed. But unexpectedly, our Chinese friends supported the market with cheap imports. I don't know if this is a “plus” or a “minus.” From today's perspective, it definitely looks like a negative factor. But from the point of view of experience, because we've been through this before, I consider this factor positive. Because in the long term or even in the medium term, all customers who bought cheap Chinese electric cars are already electric car customers. And this part, with a probability of 90%, will not return to ICEs. I know the statistics are a bit different in the States. But in Ukraine, that's how it is. And these are our future customers. And in 3-5 years, we will even thank everyone who dealt with the gray market of electric vehicles for creating future customers, they raised them. When people buy more consciously, they will already look at all the characteristics. And when the price equals, these customers will return to us, including. We've already been through this with “gray” electric cars in the early 2000s. There was a huge gray import in the premium segment. 90% of all cars were on the gray market. And they formed a base for us, which now happily buys official and premium cars. Gray import now accounts for no more than 5%.

B.
Yes. And the last question. We've partially discussed it already, but I have to ask. With affordable electric cars, hybrids, plug-in hybrids, better infrastructure, and other innovative solutions - in your opinion, will car users be more inclined to choose various types of electric and electrified vehicles over the next 5-15 years?

R.
Yes, we've already thoroughly discussed electric cars, so I won't spend time on them now. As for plug-in hybrids, the answer is: “Definitely yes.” Now most plug-in hybrid manufacturers have conditionally

moved to the "second generation," when they increased the range on a single charge. So the first generation covered 30-40 km on one charge. Now the industrial standard is conditionally 70-90 km. And that's already a significant margin. I have a plug-in hybrid, and it's enough for city driving - only on electricity. And there's a powerful engine there, enough not to use the ICE at all. And now it's already going to the next level - 120-150 km range for a large SUV. When this level is reached - and it's already approaching it - then I believe it will be a very significant factor for many. Because then the perception of premium will be unequivocal – “yes, this is a car with a backup plan” as Volvo claims. And then it will be a significant factor, customers will already talk about the environmental friendliness to their friends. And it's nice, I feel it every day. When I'm stuck in traffic on my hybrid, I think, “I'm cool, I don't pollute anything.” And my expenses are practically “zero.”

B.

Yes, that's true. Well, that was the last question. Thank you for the conversation.

Appendix D: Survey answers

Appendix D.1: Survey answers – Germany & the USA

Electric Vehicles Survey 2023/2024 (in English) – link to the file.

Appendix D.2: Survey answers – Ukraine

Electric Vehicles Survey 2023/2024 (in Ukrainian) – link to the file.

Appendix E: Forums and social media platforms

USA	Name	Website	Number of members
1	InsideEVsForum	https://www.insideevsforum.com	24655
2	Electric vehicle forums	https://electricvehicleforums.com	61026
3	Electric Forum	https://community.electricforum.com	11600
4	My Electric Car Forums	https://forum.myelectriccarforums.com	265
5	Tesla Motors Club	https://teslamotorsclub.com/	240
6	MachEforum	https://www.macheforum.com	1748
7	LightningOwners.com	https://www.lightningowners.com	6300
8	GMForum.com	https://www.gmforum.com	33687
9	N-cars.net	https://n-cars.net/forums/	12886
10	BMW i Forums	https://bmwi.bimmerpost.com/forums/	479926
11	VW ID.4 Owners Club	https://www.facebook.com/groups/666960357264469	17600
12	Audi World	https://www.audiworld.com/forums/audi-e-tron-q8-e-tron-232/	4539
13	Porsche	https://www.taycanforum.com/forum/	9128
14	Mustang	https://www.mustang6g.com/forums	N/A
15	Nissanzclub	https://www.nissanzclub.com/forum	N/A
16	Nissan	https://www.mynissanleaf.com	33478
17	Volkswagen e-Golf Forum	https://www.myvwegolf.com/forum/	2597
18	BMW i4 Forum	https://bmwi.bimmerpost.com/forums/	481558
19	BMW i3 Forum	https://www.mybmwi3.com/forum/	8396
20	My B Class Electric Drive.com	https://www.mybclasselectricdrive.com/forum/app.php/help/faq?sid=b9b2986d76c5e0122268ddf283f68f0c	1253
21	Rivian Forums	https://www.rivianforums.com/forum/	11771

22	Lucid Owners	https://lucidowners.com/threads/welcome-to-lucidowners-com.4153/	3438
23	Electric Vehicle Association of North America - Cars EV	https://www.facebook.com/groups/EVAoNA.org/	7900
24	Electric Cars	https://www.facebook.com/groups/2210635829	8600
25	North American EV & PHEV Enthusiasts	https://www.facebook.com/groups/northamericanevandpheventhusiasts/	44
26	Plug-In Hybrids Are For Everyone	https://www.facebook.com/groups/1033357856818556	216
27	Electric vehicles	https://www.facebook.com/groups/148932752281422/	55200
28	Electric Vehicle Owners & Friends, Los Angeles, California	https://www.facebook.com/groups/1141831699945510/	39
29	NE Iowa Electric Vehicle (EV) Forum	https://www.facebook.com/groups/761398194590823/	79
30	New Jersey Electric Vehicle Association	https://www.facebook.com/groups/New.Jersey.Electric.Vehicle.Association/	2000
31	Electric autos	https://www.facebook.com/groups/electricautos/about	3100
32	Electric Vehicle Society	https://www.facebook.com/groups/835558566840595/	1100
33	Electric Vehicle Association of Central Coast California - EVACCC	https://www.facebook.com/groups/evaccc/	288
34	We Want Vehicle-to-Grid (V2G) Plug-in Electric E85 Hybrids...nothing less!	https://www.facebook.com/groups/146987595318	13
Germany			
1	Going Electric	https://www.goingelectric.de/forum/	74356
2	Elektroauto Forum	https://elektroauto-forum.de	8860

3	Motor Talk	https://www.motor-talk.de/forum/auto-b3.html	2772
4	elektroauto.community	https://www.elektroauto.community	2000
5	e-autoforum.de	https://www.e-autoforum.de	23
6	firstev	https://firstev.de/forum/	111
7	Autoextrem.de	https://www.autoextrem.de/forums/	81934
8	Mein ID	https://www.meinid.com	11153
9	id4-forum.de	https://www.id4-forum.de/dashboard/	N/A
10	EQB-Forum.de	https://www.eqb-forum.de/dynamic-forms-form-list/	N/A
11	TFF Forum	https://tff-forum.de	58535
12	7-forum.com	https://www.7-forum.com/forum/	760
13	BMW i3 - i3 - Allgemeine Themen	https://www.goingelectric.de/forum/viewforum.php?f=69	N/A
14	BMW-Forum	https://bmw-forum.de	28379
15	i4Forum.de	https://www.i4forum.de/forum/	N/A
16	e-trom Forum	https://www.e-tron-forum.de/forum/	N/A
17	Hyundai Kona und Kona Elektro Forum	https://www.kona-forum.de/forum/	N/A
18	Hyundai Forum - HyundaiBoard.de	https://www.hyundaiboard.de/board/89-hyundai-kona/	N/A
19	Seat Forum	https://www.seatforum.de/forums/151-aa-seat-mii	54456
20	Skoda Enyaq iV Forum - Skoda Enyaq Elektro Forum	https://www.enyaq-forum.de/forum/	N/A
21	Opel Corsa F Forum - Corsa-e Elektro Forum	https://www.corsa-f-forum.de/forum/	N/A
22	Fiat500-Forum/Fiat 500e	https://www.fiat500-forum.de/forum/thread/3476-geringere-reichweite-als-beworben/	4092
23	Kia EV6 Forum	https://www.ev6-forum.de/forum/thread/4-kia-ev6-forum-bestellung-und-wartesaal-bestellen-lieferzeit-2021-2022-2023-2024/?postID=13345	N/A

24	MG4 Electric Forum	https://www.mg4-forum.de/forum/	N/A
25	Renault Megane E	https://www.megane-e-forum.de/forum/	N/A
26	Peugeot e-208	https://www.e208-forum.de/forum/	N/A
27	Ford Explorer	https://www.explorer-electric-forum.de/forum/	N/A
28	Ford Kuga Mk1, Mk2, Mk3	https://www.kuga-forum.de/forum/	N/A
29	MINI F56	https://www.mini-f56-forum.de/forum/	N/A
30	Porsche Taycan	https://www.pff.de/board/307-porsche-taycan/	N/A
31	Forum für alternative Antriebe	https://forum-alternative-antriebe.de/index.php?action=register;sa=register2	N/A
Ukraine			
1	Клуб "Электро-автосам"	https://electroavtosam.com.ua/forums/	3500
2	"Країна майстрів"	https://krainamaystriv.com/forums/72/	1039
3	Львівський форум	https://forumlviv.at.ua	1570
4	Electrocars Club Ukraine	https://www.facebook.com/groups/electrocars.club/	1900
5	Club Hyundai	https://club-hyundai.com.ua/forums	9258
6	KIA-club Ukraine	https://www.facebook.com/groups/441356625986431/	7400
7	Ауді Клуб Україна	https://www.facebook.com/groups/audi14/?locale=ru_RU	29700
8	Mercedes-Benz Club of Ukraine - Український Mercedes-Benz Клуб	http://forum.benzua.com/index.php?sid=7dcf5f08a99a90a3a31cc4a73f6bf4de	17097
9	Mercedes-Benz Club Ukraine	https://mercedes-club.org/forum/index.php?/51-электрика/	54544
10	ID.4	https://id4.kiev.ua	3249
11	HONDA M-NV	http://forum.autoua.net/showflat.php?Cat=0&Number=12701585&Main=12698937	N/A

12	Tesla	https://forum.teslaservice.kiev.ua	3119
13	Renault Zoe Club Ukraine - RZOC-UA	https://www.facebook.com/groups/310774899471162/?locale=uk_UA	N/A
14	Електромобілі	https://www.facebook.com/groups/241651564596509/	2200
15	🚘 Авторинок / Автобазар ⚡ Електромобілів	https://www.facebook.com/groups/avtorynok.elektromobili/	1000
16	GM EV Ukraine (електромобілі концерну GM в Україні) Chevrolet Bolt EV EUV	https://www.facebook.com/groups/gm.ev.ua/	453
17	Електромобілі з Європи	https://www.facebook.com/groups/1433292880470739/	45
18	Водії електромобілів України / EV drivers of Ukraine	https://www.facebook.com/groups/1596955217035521/	1200
19	ElectroFuture - Електрокари та Сонячні станції	https://www.facebook.com/groups/164564774278201/	941

Table 44. A list of EV-related forums and social media platforms for sharing a survey

Appendix F: Tables to Chapter 5

	Germany		USA		Ukraine	
	EV drivers on current usage	**EV drivers on future usage**	**EV drivers on current usage**	**EV drivers on future usage**	**EV drivers on current usage**	**EV drivers on future usage**
EV owner-ship type	BEV users: • bought/ financed	BEV users: • buying/ financing	BEV users: • bought/ financed	BEV users: • buying/ financing	BEV users: • bought/ financed	BEV users: • buying/ financing
	HEV/PHEV users: • bought/ financed • using a company vehicle	HEV/PHEV users: • buying/ financing • using a company vehicle	HEV/PHEV users: • bought/ financed	HEV/PHEV users: • buying/ financing	HEV/PHEV users: • bought/ financed	HEV/PHEV users: • buying/ financing
EV usage	BEV users: • primary vehicle	BEV users: • primary vehicle – 50% yes and 50% no	BEV users: • primary vehicle	BEV users: • primary vehicle	BEV users: • primary vehicle	BEV users: • primary vehicle
	HEV/PHEV users: • not a primary vehicle	HEV/PHEV users: • primary vehicle	HEV/PHEV users: • not a primary vehicle	HEV/PHEV users: • primary vehicle	HEV/PHEV users: • primary vehicle	HEV/PHEV users: • primary vehicle
Motivat ors to EV adop-tion	BEV users: • low/no fuel costs • less/no dependency on fossil fuel supplies • elimination of greenhouse emissions • tax credits and incentives from the government • quiet running • innovative technologies	BEV users: • less/no dependency on fossil fuel supplies • elimination of greenhouse effect • quiet running • innovative technologies	BEV users: • low/no fuel costs • less/no dependency on fossil fuel supplies • elimination of greenhouse emissions • maintenance: less expensive and less frequent • quiet running	BEV users: • low/no fuel costs • less/no dependency on fossil fuel supplies • elimination of greenhouse emissions • maintenance : less expensive and less frequent • quiet running	BEV users: • low/no fuel costs • less/no dependency on fossil fuel supplies • elimination of greenhouse emissions • maintenance: less expensive and less frequent • innovative technologies	BEV users: • low/no fuel costs • less/no dependency on fossil fuel supplies • elimination of greenhouse emissions • maintenance: less expensive and less frequent • innovative technologies
	HEV/PHEV users: • quiet running • prestigious status • innovative technologies	HEV/PHEV users: • tax credits and incentives from the government • quiet running • innovative technologies	HEV/PHEV users: • elimination of greenhouse emissions	HEV/PHEV users: • innovative technologies	HEV/PHEV users: • low/no fuel costs • maintenance: less expensive and less frequent • quiet running • innovative technologies	HEV/PHEV users: • low/no fuel costs • maintenance: less expensive and less frequent • quiet running

Biggest incon-vinien-ces & barriers to EV adop-tion	BEV users: • no inconvenien ces • driving range • charging infrastructur e • electricity costs	BEV users: • purchase costs • no need • no reason	BEV users: • no inconvenience s • driving range • charging infrastructure • other	BEV users: • purchase costs • driving range • no need • no reason • other	BEV users: • driving range • charging infrastructure • no inconveniences • other	BEV users: • purchase costs • driving range • no need • no reason
	HEV/PHEV users: • no inconvenien ces	HEV/PHEV users: • no reason	HEV/PHEV users: • no inconvenience s	HEV/PHEV users: • purchase costs • other	HEV/PHEV users: • driving range • no inconveniences • other	HEV/PHEV users: • no reason • other

Table 45. Comparison of results on current and potential EV ownership type, usage, motivators and barriers to EV adoption among current EV users

	Germany		USA		Ukraine	
	EV users	**EV non-users**	**EV users**	**EV non-users**	**EV users**	**EV non-users**
Future EV ownership type	**Current BEV users:** • buying/ financing	Buying/ financing	**Current BEV users:** • buying/ financing	-	**Current BEV users:** • buying/ financing	Buying/ financing
	Current HEV/PHEV users: • buying/financing • using a company vehicle		**Current HEV/PHEV users:** • buying/financing		**Current HEV/PHEV users:** • buying/financing	
Future EV usage	**Current BEV users:** • primary vehicle – 50% yes and 50% no	Primary vehicle	**Current BEV users:** • primary vehicle	-	**Current BEV users:** • primary vehicle	Primary vehicle
	Current HEV/PHEV users: • primary vehicle		**Current HEV/PHEV users:** • primary vehicle		**Current HEV/PHEV users:** • primary vehicle	
Motivators to EV adoption in the future	**Current BEV users:** • less/no dependency on fossil fuel supplies • elimination of greenhouse effect • quiet running • innovative technologies	• Low/no fuel costs • Less/no dependency on fossil fuel supplies • Elimination of greenhouse emissions • Tax credits and incentives from the government • Quiet running	**Current BEV users:** • low/no fuel costs • less/no dependency on fossil fuel supplies • elimination of greenhouse emissions • maintenance: less expensive and less frequent • quiet running	-	**Current BEV users:** • low/no fuel costs • less/no dependency on fossil fuel supplies • elimination of greenhouse emissions • maintenance: less expensive and less frequent • innovative technologies	• Low/no fuel costs • Elimination of greenhouse emissions • Tax credits and incentives from the government • Maintenance: less expensive and less frequent • Quiet running • Innovative technologies • Other
	Current HEV/PHEV users: • tax credits and incentives from the government • quiet running • innovative technologies		**Current HEV/PHEV users:** • innovative technologies		**Current HEV/PHEV users:** • low/no fuel costs • maintenance: less expensive and less frequent • quiet running	
Barriers to EV	**Current BEV users:**	• Purchase costs	**Current BEV users:** • purchase costs	-	**Current BEV users:**	• Purchase costs

adoption in the future	• purchase costs • no need • no reason **Current HEV/PHEV users:** • no reason	• Driving range • Charging infrastructure	• driving range • no need • no reason • other **Current HEV/PHEV users:** • purchase costs • other		• purchase costs • driving range • no need • no reason **Current HEV/PHEV users:** • no reason • other	• Driving range • Inconvenience to have a vehicle serviced • No need
Social factors influencing potential EV usage	**Current BEV users:** • no **Current HEV/PHEV users:** • no	• No	**Current BEV users:** • no **Current HEV/PHEV users:** • no	-	**Current BEV users:** • no **Current HEV/PHEV users:** • yes	• No
Future trends	**Current BEV users:** • see a rise in usage of EVs • are eager to make choice towards EVs with them being more affordable, better charging infrastructure and other developed innovative solutions **Current HEV/PHEV users:** • 50% see a rise in usage of EVs and 50% don't see a rise in usage of EVs • are rather eager than not to make choice towards EVs with them being more affordable, better charging infrastructure and other developed innovative solutions	• See a rise in usage of EVs • Are eager to make choice towards EVs with them being more affordable, better charging infrastructure and other developed innovative solutions	**Current BEV users:** • see a rise in usage of EVs • are eager to make choice towards EVs with them being more affordable, better charging infrastructure and other developed innovative solutions **Current HEV/PHEV users:** • see a rise in usage of EVs	-	**Current BEV users:** • see a rise in usage of EVs • are eager to make choice towards EVs with them being more affordable, better charging infrastructure and other developed innovative solutions **Current HEV/PHEV users:** • see a rise in usage of EVs • are rather eager than not to make choice towards EVs with them being more affordable, better charging infrastructure and other developed innovative solutions	• See a rise in usage of electric vehicles • Are eager to make choice towards EVs with them being more affordable, better charging infrastructure and other developed innovative solutions

Table 46: Comparison of results on future EV usage between EV users and non-users