CATÓLICA LISBON
BUSINESS & ECONOMICS

Sustainability, Product Quality, and Consumer Behavior: Examining Purchase Intentions for Household Batteries

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Dissertation written under the supervision of Prof. Paulo Romeiro.

Dissertation submitted in partial fulfillment of requirements for the
MSc in Management with a specialization in strategic marketing
at the Universidade Católica Portuguesa

September 2024.

ABSTRACT

Title: Sustainability, Product Quality, and Consumer Behavior: Examining Purchase Intentions for Household Batteries

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The global use of batteries is increasing constantly. Several billion tons of batteries are produced every year. Thus, millions of tons of battery waste accrue, calling for urgent action to make that market more sustainable and properly manage the end of life of batteries.

This thesis aims to examine the impact of sustainability, being either sustainable or non-sustainable (RQ1), and the impact of product quality, being either high or low (RQ2), on purchase intention.

A quantitative research approach has been used in the form of an online survey, where 201 responses were collected and inside which four scenarios were presented randomly high quality and sustainable, high quality and non-sustainable, low quality and sustainable, and low quality and non-sustainable battery scenarios.

Through performing linear regression analyses in SPSS, this study concludes that neither sustainability nor product quality influences purchase intention in the battery market, and the full model does not do so as well.

Keywords: Sustainability; Product Quality; Purchase intention; Household Batteries; Environment

SUMÁRIO

Título: Sustentabilidade, qualidade do produto e comportamento do consumidor: Examinando as Intenções de Compra de Pilhas e Baterias Domésticas

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A utilização global de pilhas está a aumentar constantemente. Todos os anos são produzidos vários milhares de milhões de toneladas de pilhas. Assim, acumulam-se milhões de toneladas de resíduos de pilhas, o que exige uma ação urgente para tornar esse mercado mais sustentável e gerir adequadamente o fim de vida das pilhas.

Esta tese tem como objetivo analisar o impacto da sustentabilidade, ser sustentável ou não sustentável (RQ1), e o impacto da qualidade do produto, ser alta ou baixa (RQ2), na intenção de compra.

Foi utilizada uma abordagem de investigação quantitativa sob a forma de um inquérito em linha, no qual foram recolhidas 201 respostas e no âmbito do qual foram apresentados aleatoriamente quatro cenários de alta qualidade e sustentável, alta qualidade e não sustentável, baixa qualidade e sustentável e baixa qualidade e cenários de bateria não sustentável.

Através da realização de análises de regressão linear no SPSS, este estudo conclui que nem a sustentabilidade nem a qualidade do produto influenciam a intenção de compra no mercado das pilhas, e o modelo completo também não o faz.

Palavras-chave: Sustentabilidade; Qualidade do produto; Intenção de compra; Pilhas domésticas; Ambiente

ACKNOWLEDGEMENTS

Presenting this thesis marks a very important milestone in my academic career, this being the final work of my master's program at Católica Lisbon School of Business and Economics. Two remarkable years at this special University have just passed and will soon come to an end, which gave me the chance to gain lots of valuable knowledge and experience for my future professional career as well as personal life. Additionally, the internship semester at Energizer Germany has given me additional chances to gain further practical knowledge in the field of marketing. On top of that, working for this company led to the choice of using the household battery market for my dissertation, giving me the opportunity to further extend my knowledge in that specific market.

At this point, I would like to dedicate a special thank you to everyone who supported me on this journey throughout the master's program. Firstly, a very special thank you goes to my family, who provided unconditional support throughout every stage of my life and made it possible for me to even reach this important milestone. A further thank you goes to all my friends who constantly supported me and which I had the chance to make memories in and around Lisbon that I will keep for the rest of my life.

Moreover, thanks to all the professors and employees at Católica who were part of this experience. A special thanks in that sense goes to my thesis supervisor Professor Paulo Romeiro, providing great support until the last minute, being patient with me, and guiding me throughout the process of this thesis.

Lastly, I would like to thank everyone who took the time and participated in the survey and thus helped me to gain a sufficient amount of data in order to analyze and find conclusions to the topic chosen.

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

TABLE OF APPENDICES

CHAPTER 1: INTRODUCTION

1.1 Background and problem statement

From year to year, global battery use is increasing, and hence, dealing with its end-of-life becomes of increased importance, especially given the fact that sustainability and environmental friendliness are crucial aspects more than ever. Batteries are electronic devices that have the ability to convert chemical energy into electrical energy, but at the same time they consist of hazardous materials that can potentially harm the environment. Thus, in an optimal case a battery is long living and should pose the least harm to the environment possible. Basically, there are two types of batteries, specifically primary and secondary batteries. While primary batteries can only be used once and are discarded afterward, secondary batteries are rechargeable and thus have a longer life span as well as pose less harm to the environment. (Adebambo & Owen, 2017)

In today's world, there are hardly any individuals who do not use batteries in their everyday lives, which are useful for diverse applications such as toys, mobiles, speakers, watches, calculators, flashlights, cameras, and so on. Every year, several billions of new batteries are being produced, meaning that at the same time several millions of tons of battery waste accrue (Kuchhal et al., 2019). Especially in developing countries, batteries are usually not disposed of accurately, and the control of the consequences from that is a serious matter (Yousefi et al., 2023). To mitigate that, especially in Europe the use of rechargeable batteries is strongly promoted due to their decreased waste generation and environmental friendliness (Dolci et al., 2016). Thus, Zhuang et al. (2021) suggest that enterprises should increase their focus on that matter and increase the green perceived value to consumers, by, for example, providing elucidation about the benefits of green products. Especially in a market like the battery market which is considered the low-involvement product category where consumers are usually not well informed about the product and buy products simply for their purpose of fulfilling a need. Resulting from that, if those enterprises meet this requirement of increasing the perceived value of environmentally friendly batteries, the purchase intention will increase accordingly, indicating that perceived quality has a positive impact on consumer purchase intention (Zhuang et al., 2021).

Since one of the most challenging goals and concerns all over the world is the mitigation of climate change to achieve carbon neutrality to the highest degree possible, battery reuse is considered a promising strategy (Li et al., 2022). CO2 neutrality must be reached by 2050 according to the Paris Agreement, which limits global warming to 1.5 degrees Celsius above

pre-industrial levels. To achieve that goal, it is therefore also a key goal of the battery market to reach carbon neutrality, instead of incorporating problem shifting where the obligation to act environmentally friendly is shifted to other industries or individuals (Scheller et al., 2023).

Having these issues in mind, the purpose of this thesis is to gain a deeper understanding of consumer behavior regarding the household battery market. It is to be tested whether their investigations in sustainability also apply to that market, and whether these increase their purchase intention if battery companies effectively set their focus on it and incorporate such investigations in their procedures throughout the battery lifecycle. A further field of interest is the effect of product quality on purchase intention, which is to be examined in this thesis as well. Thus, this research provides investigations into how the incorporation of sustainability throughout the battery lifecycle as well as the product quality level, being of either high or low quality, influences consumer purchase intentions.

1.2 Problem Statement

The purpose of this thesis is to examine the impact of sustainability as well as the impact of product quality on consumer purchase intention to buy that product in the context of the household battery market. More accurately, the aim of this dissertation is to deal with the incorporation of sustainability features throughout the battery life cycle and the quality level of the battery, being either premium or non-premium quality, and how that influences purchase intention. With the example of the battery market at hand, this study examines consumer behavior patterns towards sustainability in products of the low-involvement product category, and the overall effect of product quality on purchase intentions to buy such products.

Therefore, the following problem statement has been formulated:

How do the quality of a product and the degree of sustainability of that product influence consumer purchase intention in the household battery market?

Accordingly, the following research questions have been developed:

RQ1: What is the impact of incorporating sustainability throughout the lifecycle of household batteries on consumer purchase intention of the product?

RQ2: What is the impact of the quality given to specific household batteries by consumers on their purchase intention?

1.3 Relevance

The research at hand is of high relevance in an academic and managerial sense. Academically speaking, it contributes to the existing literature in the field of consumer behavior and sustainable consumption in the low-involvement product category, of which household batteries are a part. As already described in the section about the background of this study, the overall use of batteries is constantly increasing and the aspect of sustainability in the battery market is crucially important as environmental concerns are increasing as well. By inspecting the further impact of product quality on purchase intention, this study aims to provide explanations and deeper insights into the decision-making process when buying batteries and their focus on specific attributes. Regarding the managerial relevance of this study, the implications provide a guideline for enterprises on the focus that needs to be set as well as certain marketing strategies and guidelines on what to communicate to win consumers over and get their attention even in the low-involvement product market. Overall, the aim of this research is to set new foundations for the effective incorporation of a sustainable and environmental focus throughout the battery lifecycle, getting companies more involved in that matter and effectively communicating it, creating a win-win situation for companies, consumers, and the environment.

1.4 Research methods

Firstly, a thorough literature review was performed to build a foundation for this research and to define and analyze the desired variables of purchase intention, sustainability, and product quality separately from each other. Based on the findings there, three hypotheses were developed throughout the process of the literature review. To test those hypotheses and research questions formed before, primary data was collected in the form of an online survey, which was distributed using non-probability sampling. This survey contained several question blocks with answer options on seven-point Likert scales. Firstly, general questions on sustainability and quality perceptions of the overall battery market were asked. In the second part of the survey, questions on product quality and purchase intention, based on four created scenarios that were randomly presented to the participants and evenly distributed to them,

were asked. These scenarios each represented one of the four cases for household battery products: high quality and sustainable, high quality and non-sustainable, low quality and sustainable, low quality and non-sustainable.

1.5 Dissertation outline

This first chapter has now given an introduction to the topic of the household battery market and has provided an overview of the purpose as well as the relevance of this topic to academic research. The upcoming chapter will present a literature review of existing studies and academic papers, presenting definitions and deeper insights into the three variables included in the conceptual framework, which will also be presented at the end of chapter two. Thirdly, the methodology of this research is explained, including the research approach, survey development, data collection, and data analysis approaches used to answer the research questions and hypotheses. Following that, the fourth section will disclose the analysis and results, showing whether the hypotheses could be validated or not. Lastly, this thesis will conclude with the findings of this research, and managerial implications, and finishes with limitations and recommendations for further research.

CHAPTER 2: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

This chapter focuses on knowledge and findings gained through previous research studies and literature, focusing on topics relevant to this thesis to better understand its background and purpose. It forms a mix of summaries, contrasts, and critical views on the key variables and aspects. The literature review starts with an overview of purchase intention as the dependent variable of the conceptual model. Secondly, the sustainability concept as the first independent variable is addressed and further defined, followed by the second independent variable of product quality, with a focus on the consumer perspective. In addition to the overall definition of the variables, the insights presented a focus on the low-involvement product category, more specifically the household battery market, and embedded this into the variable definitions and explanations. The chapter finishes by presenting the conceptual framework of this research.

2.1 Purchase Intention

The concept of purchase intention is crucial in the field of studying consumer behavior, representing the consumer preference or tendency to choose a specific product or service after evaluation and complete that purchase (Younus et al., 2015). It is a type of decision where the reasoning behind a purchase of that particular product of a specific brand is studied, which in turn is strongly impacted by a brand's image as well as the consumer's attitude towards that brand (Shah et al., 2012). Zhuang et al. (2021) further define it as "a prerequisite for stimulating and pushing consumers to actually purchase products and services". Overall, it is considered the buyer's prediction of the company choice from which he/she selects to buy, and is thus recognized as a reflection of its real purchase behavior (Nasermoadeli et al., 2013).

As already touched upon, brand perception plays a significant role in purchase intention, since a positive brand personality automatically correlates with an increased consumer purchase intention towards that brand (Toldos-Romero & Orozco-Gomez, 2015). This perception and the value given to a product through that perception are considered key factors in making a purchasing decision, while customer knowledge and product packaging are additional but indirect factors influencing purchase intention. These two factors lead to the perceived value of a product, which then further results in an increased purchase intention (Shafiq et al., 2011).

Furthermore, Mirabi et al. (2015) and Younus et al. (2015) found further indicators influencing purchase intention, namely price, perceived quality, value, and external factors such as demographics, group dynamics, or geographic location. After a consumer forms his/her opinion through the brand's actions and the product's features to meet his preferences, a mental organization in the consumer mind is formed, leading to a greater purchase intention and in turn a stronger desire to buy the product from that brand (Nasermoadeli et al., 2013). However, it is important to keep in mind that purchase intention does not mean that a consumer will actually end up buying that product; instead, it is a tension towards buying that product. In fact, the majority of purchasers, especially in the low-involvement product category, are non-intenders, where the true compliance with a purchase intention is comparably low (Wright & MacRae, 2007).

Generally, "people's behavior is dominated and controlled by their psychological activities" (Zhuang et al., 2021). Thus, it should be a brand's goal to emotionally touch the consumer, because under real product promotion scenarios it has been found that positive emotions towards a product and brand enhance purchase intentions, while, opposing that, negative emotions deter them (Bagozzi et al., 2016). Baumgartner et al. (2008) further identified the concept of anticipated emotions, addressing the feelings after completing a purchase as a key predictor of purchase intentions.

Especially through the evolution of the digital environment throughout the past two decades, online factors have gained increased importance in shaping purchase intentions. On top of traditional word-of-mouth, electronic word of mouth has taken over to significantly influence purchase intentions through reviews being easily accessible, where anonymous online reviews even outperform friends' recommendations (Erkan & Evans, 2016). A further factor is social media marketing initiatives, which enhance online engagement with a product or brand and seem to positively affect purchase intention too (Yadav & Rahman, 2017). However, it is unsure whether this affects the battery industry, too.

From a marketing perspective in general, managers use purchase intention data to make strategic decisions and forecast future demand, both regarding new and existing products. However, it is easier to forecast future demand for existing products since purchase intentions have a higher correlation with purchases of existing than new products. That is due to the consumer's familiarity with a product or brand, the clarity of product description, and the

message that should be brought across to the consumer for a product that is already accessible. (Morwitz et al., 2007)

2.2 Sustainability

The term 'sustainability' is a major global concern that has shaped the previous decades and that occurs frequently in our daily lives. It has become a boundary term, an intersection of science and politics (Scoones, 2007). The most prevalent definition of sustainable development used in literature is the one introduced by Brundland (1987), where it was stated that sustainable development is the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". This specific concept also known as the Triple Bottom Line framework, measures organizational performance and success along three lines: economic, social, and environmental (Alhaddi, 2015). In the business world, these three lines refer to profit, people, and the planet, respectively (Alhaddi, 2015).

However, there is no single definition and thus no common understanding of the term sustainability among experts. Sustainability can also be defined as a condition of balance, resilience, and interconnectedness allowing one to satisfy his/her needs while respecting the ecosystems and protecting biological diversity (Morelli, 2011). Furthermore, environmental sustainability is referred to as the maintenance of natural capital, seeking to improve human welfare through the protection and retrenchment of raw materials as well as minimizing pollution, to prevent overall harm to humans, especially those of future generations (Goodland, 1995). It is the goal to maintain qualities highly valued in the environment, and it needs immediate action whenever there is a risk that there is an irreversible loss of things that are of high value to society (Sutton, 2004).

Over time, the publicity of sustainability as well as the high consumer demand for companies to act environmentally responsible caused a shift in the business environment to focus on environmental impacts and adapt product development to meet those consumer demands (Barber et al., 2012). Therefore, companies increased their environmental focus by forming diverse networks, building alliances, and investing heavily in sustainability-related innovations (Scoones, 2007).

A concept relevant to the household battery market in that regard is the circular economy concept, focusing on designing out waste and pollution, keeping products and materials in use, and regenerating ecological systems (MacArthur, 2013).

Sustainability concepts are of high importance in the household battery industry because batteries contain hazardous materials that can potentially cause critical environmental and health effects (Adebambo & Owen, 2017). Due to the containment of those materials, it is of high importance to collect used batteries and dispose of them accurately in order to minimize leakage of hazardous materials into the ground, thereby harming the environment (Adebambo & Owen, 2017). This is of immense importance since simply dumping used batteries into landfills might result in dangerous materials leaking into soil and groundwater, further polluting water and food supplies and putting humans as well as wildlife at risk (Kuchhal & Sharma, 2019).

The collection, however, is the most challenging phase of the recycling process, since it is dependent on user support and help to return used batteries to make it possible to properly collect and recycle them (Adebambo & Owen, 2017). Thus, it should be made as convenient as possible for the public to access such battery collection spots by providing easily accessible drop-off locations (Adebambo & Owen, 2017). For this purpose, product stewardship programs have been activated, which is the "act of minimizing the health, safety, environmental, and social impacts of a product and its packaging throughout all lifecycle stages, while also maximizing economic benefits" (Product Stewardship Institute, Inc., 2016). Furthermore, a 'three R' concept has been called into action for battery waste management: reduce, recharge, and recycle. The most effective is reducing battery waste, followed by the use of rechargeable batteries and battery recycling, where valuable materials are recovered, energy is saved, and raw material extraction is reduced. (Kuchhal & Sharma, 2019)

Moreover, several advancements in battery technologies have entered the market. One example is the so-called 'green batteries', which are environmentally friendly materials used throughout the production process (Larcher & Tarascon, 2015). To focus on sustainable alternatives, additional approaches have been made, such as bio-based batteries offering a biodegradable and safer disposal option (Choi et al., 2020), as well as second-life batteries to extend the useful life of batteries. However, these can also pose risks on the other hand due to inconsistency and overall safety risks (Li et al., 2022).

In order to push forward such innovations, the EU proposed regulations to the battery market in order to enhance batteries that are sustainable, high-performing, and safe throughout every lifecycle stage (European Commission, 2020). Even though this only counts for the European market, it is likely to drive further innovations globally, too.

This increased awareness and importance given to the environmental aspect throughout the past decades has led to the connection and strong influence of sustainability on purchase intentions (Barber et al., 2012). Acting environmentally friendly and responsibly as well as implementing such programs successfully increases the green perceived value, and can in turn have a positive word-of-mouth effect which results in maximized consumer purchase intention (Zhuang et al., 2021). In a further study on the influence of sustainability on purchase intention, it was found that identifying environmental concerns, attitudes towards green products, and environmental knowledge in general can serve as an additional predictor of purchase intention (Jaiswal & Kant, 2018). These aforementioned aspects link to the household battery industry as well, which leads to the formulation of the following hypothesis for this research:

H1: The incorporation of sustainability throughout the life cycle of household batteries positively influences consumer purchase intention of the product.

2.3 Product quality

Product quality, by definition, is “any service giving rise to utility, such as safety, durability, and beauty” (Maynes, 1976), where the overall concept is crucial to meet three objectives, which are the estimation of consumer payoffs, the effectiveness assessment of the market, serving as a building block in economic theory (Maynes, 1976).

Furthermore, it is the ultimate perception of a customer of the superiority of a specific product or brand in comparison to alternatives to that product or brand, taking into account its expected purpose (Keller, 2013). It is usually an intangible perception, where a customer forms his own opinion or feeling about it and makes a purchase decision according to that feeling. (Mirabi et al., 2015)

According to Garvin's eight-dimensional framework, the term product quality is subdivided into eight dimensions: performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality. Additionally, further definitions of product quality have evolved from five approaches, including the transcendent, product-based, user-based, manufacturing based, and value-based approach. However, no specific global definition of product quality exists, which gives researchers and businesses a wide spectrum for interpretation of it. (Sebastianelli & Tamimi, 2002)

However, it is important to notice that product quality is entirely subjective, since in the end it is dependent on the consumer measurement and knowledge about the product, brand, and further alternatives to that product or brand and the effort a consumer puts into the evaluation and decision-making process (Maynes, 1976). Thus, it is often about the perceived quality in the consumer's mind, which then leads to an increased purchase intention if the desires are met (Mirabi et al., 2015).

A further expansion of the knowledge about product quality suggests taking a closer view of the consumer journey in the quality assessment of a product, starting with the pre-purchase thoughts and expectations and analyzing until the post-purchase stage how the consumer feels about the product's quality according to what he/she expected from it (Golder et al., 2012).

As this research has already touched upon, different consumer groups focus on different attributes when making a purchase decision, which is why there is a segmentation present in the market. Therefore, some firms specialize in high-quality products, usually connected to a higher price, and others offer lower quality products while attracting consumers through price arguments (Bagwell, 1992). This differentiation into high- and lower-quality products is also referred to as the premium versus the non-premium product category, respectively. However, a company needs to be very careful in the classification of its products in those segments, since failing to do so can be very costly and a company might lose its trustworthiness (Erazo & Gerena, 2022).

It is not surprising that richer countries are prone to spending a higher amount of income on high-quality products in comparison to poor nations since it often counts as a status symbol (Hallak, 2006). There is a logical explanation for that, since in richer countries, buyers usually associate high quality with a premium price when comparing within a specific product category or segment. If, in turn, the monetary prerequisites are given in that sense, the buyer

develops a higher tension to buy the higher-priced good, even though it comes at a higher price, because through that he/she gives a higher value to the product (Rao & Monroe, 1989).

In the household battery market, it is, however, not only the pricing of the products influencing the consumer to buy a battery that is priced at a premium. Further factors such as energy density, faster charging times, and safety features are of high value to consumers, especially those who have formed increased knowledge in that field (Yamada et al., 2016). That shows the importance of technological advancements in order to reach a higher quality perception of specific batteries, for which, in turn, a higher price can be justified.

Coming back to the categorization of batteries into premium versus non-premium, especially when observing the price there are significant differences. Private label brands usually offer batteries at a low price, while branded batteries are offered at a higher price. This meets the original perception of consumers, where private label brands were always considered to be of low quality compared to national brands, and they lacked brand equity. However, over the years that perception has changed, especially in the low-involvement product category where customers do not inform themselves much before a purchase, since retailers improved the quality of their private label brands significantly and still offer these products at a much lower price. (Dragåsøien, 2016)

That is due to the fact that private retailers started to categorize their products as well into standard and premium products, allowing them to increase the competitiveness of their products against national brands (Maruyama & Wu, 2014).

To bring the aforementioned aspects about product quality into connection with the two further variables of purchase intention and sustainability, it is first important to mention that higher quality products, especially related to the household battery industry, are connected to increased performance, longevity, and safety. These features, in turn, lead to a reduction in waste of partly hazardous materials which can harm human health as well as wildlife (Adebambo & Owen, 2017; Kuchal et al., 2019). Furthermore, Mirabi et al. (2015) also contextualized product quality as a central determinant of purchase intention. And since throughout the past decades the concept of sustainability has become a crucial factor for a product to be considered as high quality, the three variables thus stand in close connection to each other. Barber et al. (2012) strengthened this statement by finding out that consumers make their purchase decisions based on their perceived quality of that product, taking into account environmental aspects as well as price categorization. Thus, high-quality household

batteries are considered as such if they are sustainable and meet the further consumer expectations connected to their performance, and if that is the case, the consumer creates a high purchase intention, even though the product is high-priced.

Based on these insights, the following further hypothesis can be formed:

H2: The quality given to specific household batteries by consumers positively influences their purchase intentions.

2.4 Conceptual Framework

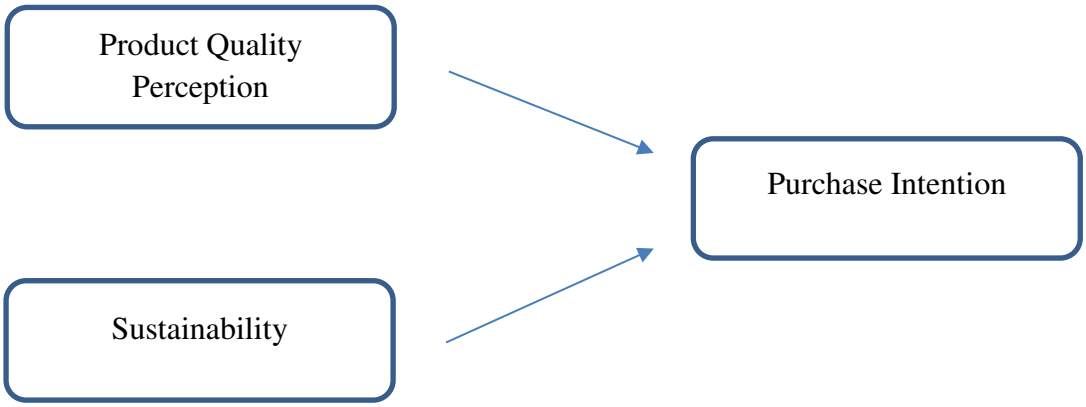

Figure 1: Conceptual Framework

CHAPTER 3: METHODOLOGY

In the upcoming chapter, the research methodology and design of this thesis will be presented in order to properly answer the previously developed research questions. Firstly, the research approach will be addressed, followed by the data collection methods that were used and the data analysis approach in order to show how the results were generated.

3.1 Research Approach

To bring the influence of sustainability on purchase intention and the moderating effect on product quality in the household battery market to light, a quantitative research approach has been chosen. This method is also referred to as reductionism, since that method requires the careful description of variables to be counted only through numbers and statistics, where the true results are reduced to a number. Here, the quantitative paradigm assumes that the variables are able to be measured objectively. (Mehrad & Zangeneh, 2019)

As the term 'quantitative' already indicated, data gained through the usage of that approach is collected in numerical form, involving systematic and empirical investigation of the topic by using statistical as well as mathematical approaches and processing numerical data (Basias & Pollalis, 2018). The strategy used to gain the data was creating a survey and distributing it through different channels to reach a wide spectrum of respondents, which is considered the most common and effective strategy to gain a representative data set that produces statistical data (Mehrad & Zangeneh, 2019).

Firstly, by analyzing existing literature an overall understanding of the background of the chosen topic as well as insights into the variables at hand could be formed. Based on these findings, a survey was created to build up on the knowledge gained and analyze it using the quantitative approach mentioned before. This approach comes with advantages such as the results of the research are not influenced by personal feelings or opinions incorporated in or through an answer given, it makes it easier to process large amounts of data and compare this data, and enables a researcher to develop quantitative valuation indicators to identify trends (Basias & Pollalis, 2018).

Two of the variables, namely sustainability and product quality, can have different levels in the product category of batteries, where sustainability can either be incorporated in a product and through the product lifecycle or not, and there are high as well as low-quality batteries offered in the market. Because of that matter, stimuli were created to have all potential

combinations at hand, and therefore it was possible to test how the different combinations affect the purchase intention of consumers. By asking general questions about the overall sustainability and quality perceptions of the battery market and on top of that using the created scenarios, all requirements to test the three research questions that were designed were fulfilled.

3.2 Primary Data

Primary data in this research was collected through a survey to properly analyze and find conclusions about the designed research questions. The method was chosen due to its advantages such as global reach, speed and timeliness, ease of entry and analysis, question diversity, controlled sampling, and the required completion of answers (Evans & Mathur, 2005).

3.2.1 Data Collection

The survey was distributed between Friday, the 30th of August 2024, and Thursday, the 5th of September 2024, through several social media channels such as WhatsApp, Instagram, and LinkedIn. On top of that, to generate more responses, pedestrians on the trams in Cologne, Germany, were asked to take a few minutes of their time to fill out the survey. If they confirmed, either an iPad was handed to them to complete the questionnaire, or they could scan a QR-Code and fill it out on their own device. For motivational reasons, the respondents were offered some sweets to complete the survey. This procedure was used, to the probability of finding volunteers to fill out the survey, because on the tram they have a pleasant environment when sitting down, and they have to wait for their stop to leave anyway.

For the sake of comparing different types of household batteries with different levels of quality and sustainability features, four scenarios were created to compare those in terms of quality perception and purchase intention of the consumer.

In the middle of the survey, an attention check question was implemented to check whether the respondent is attentive and reads and answers the questions properly instead of rushing through (Appendix 1). These kinds of questions, referred to as instructed response items, identify respondents in case they show conspicuousness by using straight lines, speeding, or inconsistent answers throughout the survey (Gummer et al., 2021).

Moreover, since there was no requirement for the participants to be of a specific nationality or geographic location, the survey was launched in the English language to make it accessible and clear for the maximum amount of people of any nationality.

The questionnaire was distributed using the Qualtrics software, and non-probability sampling was used for distribution, which has the advantage of being more time saving and is not connected to any costs, making it appropriate for this thesis (Rahman, 2023). In the end, 238 responses were recorded, of which 35 were incomplete, and three further answers could not be validated due to the failure of the attention check. The four scenarios presented randomly were evenly distributed as well, with 49 respondents receiving scenario one, 50 respondents receiving scenario two, 52 for scenario three, and the remaining 50 respondents being shown the fourth scenario. The four scenarios created are explained in the following section.

3.2.2 Stimuli Development

For the survey contributing to this research, four scenarios were created and randomly assigned to the respondents, meaning each respondent had one of the four scenarios assigned and was asked to answer the questions based on it. **Table 1** shows a matrix representing the four scenarios that were presented to the respondents. In Appendix 1, the full-text version that was present in the survey describing each of the four scenarios can be viewed, including the general introduction text which was the same for all scenarios. These scenarios were formulated according to the findings presented in the literature review.

Scenario 1: high quality, sustainable	Scenario 2: high quality, not sustainable
Scenario 3: low quality, sustainable	Scenario 4: low quality, not sustainable

Table 1: Survey Scenarios

Therefore, for the quality of a battery, factors like longevity, power, safety features, and price level were used, which were either described as being high or low. On top of that, the example of branded versus private label products was used, since these were found to be representative of high and low quality, respectively, for the majority of consumption of products in the low-involvement product category.

In terms of sustainability, it was clarified whether the fictional brand or private label, depending on the quality level, is using recyclable and recycled materials in their batteries,

and whether it participates in collection and disposal programs. These were key factors identified in the literature review as important when assessing the level of sustainability throughout the lifecycle of a battery and to what extent providers are incorporating these.

3.2.3 Measurement / Indicators

To measure the interdependence between the desired variables in this research and thus to answer the research questions of this thesis, the survey has been set up, consisting of a mix of questions from all three fields, which were taken from several research papers and studies performed in the past and adapted to the topic at hand.

The survey started off with some general questions about the consumer attitude towards sustainability in the household battery market, how the respondent acts, and how he/she expects battery providers to act towards sustainability topics. In order to find out about that, eleven questions were asked, and the respondents were given the opportunity to rate those statements on a 7-point Likert scale, ranging from ‘strongly disagree’ to' strongly agree’. The first seven of those statements were derived from Laroche et al. (2001), while the remaining four were referenced from Hansmann et al. (2006). For both sources, the Likert scale was adapted to have a consistent scale throughout the survey since that is required for performing the statistical tests.

Furthermore, three questions followed about the overall perception of quality differences in the battery market derived from Bao et al. (2011), which were adapted to the topic of the battery market and measured on a 7-point Likert scale as in the original study.

After that, the aforementioned four scenarios were introduced, and for each of the four scenarios, two question blocks occurred. Firstly, six questions about the quality of the product were asked, which were derived from Grewal et al. (1998) after adapting it to the battery topic, and secondly, four questions about purchase intention followed, referenced from Barber et al. (2012) and Nasermoadeli et al. (2013). All questions, again, could be answered on a seven-point Likert scale, which was adapted to fit this survey. An overview of the operational model is presented in **Table 2**.

Finally, the survey concluded with six demographic questions about gender, age, educational level, occupation, nationality, and income.

The full questionnaire, including the connection of all the questions to the appropriate reference studies, can be found in Appendix 1.

Framework	Measure	Items	Scale	Reference	Cronbach α
IV	Sustainability	7	7-point Likert Scale (*)	Laroche et al. (2001)	*0.901*
		4	7-point Likert Scale (**)	Hansmann et al. (2006).	
Moderator	Product quality perception	3	7-point Likert Scale	Bao et al. (2011)	0.850
		6	7-point Likert Scale	Grewal et al. (1998)	0.933, 0.803, 0.902, 0.935
DV	Purchase Intention	3	7-point Likert Scale	Barber et al. (2012)	*0.795, 0.917, 0.912, 0.950*
		1	7-point Likert Scale (***)	Nasermoadeli et al. (2013)	

** The scale was adapted from the original 9-Point Likert Scale.*
*** The scale was adapted from the original scale from 1-4.*
**** The scale was adapted from the original scale from 1-5*

Table 2: Operational Model

3.3 Data Analysis

After closing the survey, when a significant number of answers was present, the resulting quantitative data set was exported to the SPSS program for statistical analysis. Firstly, descriptive statistics in the form of frequency analysis have been performed to account for the dispersion of demographic data. Furthermore, the analysis continued with checking for the reliability of the different constructs using Cronbach's Alpha tests for each of the desired variables of this study. However, before that, some data recoding had to be completed due to the negative wording of questions within a question block to have data that can be analyzed in the same direction and not to have results switched around, manipulating the results. After validation, new variables could be computed to have one single variable for every question block in order to perform the analyses for the formulated research questions and hypotheses. Following that, descriptive statistics were analyzed before continuing with the hypothesis tests. Moreover, another frequency analysis was performed, where the means of the responses according to the scenarios for sustainability, product quality, and purchase intention were compared in order to check the degree of success of manipulation. The first hypothesis was

then tested by using a linear regression model to analyze whether the overall product quality perception influences purchase intentions and to test for the significance of the model by evaluating the ANOVA output. Additionally, the correlations of the variables have been analyzed. For the second hypothesis, the same analysis using linear regression has been performed. Lastly, a multiple linear regression was performed in order to analyze the whole model.

With the support of these test results, conclusions about the hypotheses could be derived, and a foundation for managerial and academic implications could be formed.

CHAPTER 4: RESULTS AND DISCUSSION

In this section of the thesis, the main results of the data analysis based on the survey answers are presented. Here, an analysis of quantitative data was performed, including data cleaning, descriptive statistics, hypothesis testing, and full model testing, as well as various statistical tests analyzed via SPSS. Through this analysis, the foundation is given to conclude this thesis.

4.1 Sample characterization

After closing the survey, the total amount of answers collected was 238. However, the useful data to be used was 201 responses since there were 35 incomplete responses and three additional responses had to be removed due to failing to pass the attention test. Thus, the survey had a completion rate of 86% after those eliminations. Moreover, the four scenarios were evenly distributed to the respondents, where 49 respondents received scenario one with the high-quality, sustainable option, 50 respondents answered the questions for scenario 2, the high quality, non-sustainable example, 52 were shown the low quality, sustainable version, and the remaining 50 respondents were provided with the scenario of the low quality, non-sustainable option. In the end, the survey had a majoritarian number of males answering, amounting to 62.7%, and the majority of respondents were German, making up 68.7% of the population, from a rather low to medium income level. That was due to the fact that data was mainly collected in Germany and the online distribution mainly reached young students. On top of that, non-probability sampling was used to distribute the survey; thus, the survey was not restricted by certain factors. Therefore, since the probability of taking part in the survey is unknown, the final result cannot be considered representative of the population as a whole. **Table 3** shows a summary of the dispersion of the survey results, for which the crosstabs analysis was used to gain the results. It shows a quite even distribution between the four scenarios in terms of the groups that answered it, indicating homogeneity across them.

		Scenario 1	Scenario 2	Scenario 3	Scenario 4	**Total**
Respondents	Total	49	50	52	50	201
Gender	Male	15.9%	16.4%	15.9%	14.4%	**62.7%**
	Female	8.5%	8.5%	9%	10.4%	**36.3%**
Age	18-24	9%	8%	8.5%	9.5%	**34.8%**
	25-34	7%	10.4%	11.4%	9.5%	**38.3%**
	35-44	2.5%	4%	2.5%	1%	**10%**
	45-54	3.5%	2%	2%	2.5%	**10%**
	55-64	2.5%	0.5%	0.5%	2%	**5.5%**
	65+			1%	0.5%	**1.5%**
Education	< High school			0.5%	0.5%	**1%**
	High school	2.5%	2.5%	6%	5.5%	**16.4%**
	Bachelor	11.9%	11.9%	10%	9%	**42.8%**
	Master	9%	10.4%	6.5%	9%	**34.8%**
	Doctorate	1%		1.5%		**2.5%**
	Other			1.5%	1%	**2.5%**
Occupation	Student	8.5%	5.5%	8%	6.5%	**28.4%**
	Working student	2%	5%	2%	2%	**10.9%**
	Part-time	1%	0.5%	1%	2%	**4.5%**
	Full-time	11.4%	12.9%	12.4%	12.4%	**49.3%**
	Unemployed	0.5%	0.5%	1%	1.5%	**3.5%**
	Retired	1%		0.5%		**1.5%**
	Other		0.5%	1%	0.5%	**2%**
Nationality	German	19.9%	16.9%	15.9%	15.9%%	**68.7%**
	Finland		2%	2%	1.5%	**5.5%**
	Austria		1%	1%	0.5%	**2.5%**
	France	1%	0.5%		0.5%	**2%**
	Hungary	0.5%	0.5%		0.5%	**2%**
	Other	3%	4%	7%	6%	**19.3%**
Net income	<500€	2.5%	2%	4.5%	4%	**12.9%**
	501-1500€	6.5%	5%	4%	4%	**19.4%**
	1501-2500€	4.5%	3.5%	5%	6%	**18.9%**
	2501-3500€	2%	6%	4.5%	4.5%	**16.9%**
	3501-4500€	4%	4%	3.5%	1.5%	**12.9%**
	4501-5500€	1%	2%	2%	1.5%	**6.5%**
	>5501€	3%	0.5%	1.5%	1.5%	**6.5%**
	Not said	1%	2%	1%	2%	**6%**

Table 3: Respondent Characteristics

4.2 Reliability analysis:

Before checking for the reliability of the constructs, two questions had to be recoded due to negative wording, meaning that they were reversely formulated compared to the rest of the questions in that question block. These two questions were number seven and eleven of question block two, which measured the overall sustainability perceptions of participants (Appendix 1). After that has been done, Cronbach's Alpha tests were performed for every question block in order to check for internal consistency between the items. Usually, in research it is said that the Cronbach's Alpha value should be at least 0.7 for the reliability to be confirmed, but since all values in this analysis at hand are higher than that and the majority even exceeds 0.9, it can be disclosed that all the question blocks meet the reliability requirement and are strongly significant (Bonett & Wright, 2015). The tests that were strongly significant with values exceeding 0.9 were the ones for the overall sustainability question block (q2, Cronbach's Alpha of 0.9), the quality perceptions of scenarios one (0.93), scenario three (0.9), and four (0.94), as well as the purchase intention block of scenarios two and three (0.92), and the fourth scenario (0.95). For the remaining question blocks, Cronbach's Alpha values lay between 0.8 for the purchase intention of scenario one and the general quality question block (q3) with a value of 0.85, leaving the quality perception block in scenario two with a value of 0.8. Even though these values are between 0.8 and 0.9, they are still considered good or sufficient, leading to the conclusion that all the question blocks indicate sufficient or high reliability. The test results can be found in Appendix 2.

After the reliability of the constructs has been confirmed, new variables could be computed for the sake of having one (average) value for each question block tested to make it easier to compare and test those variables against each other at a later point as well as to have one single variable representing a set of answers of the same topic, making it more representative. Therefore, a combined variable for each of the question sets tested before has been formed, amounting to ten new variables to be used for further analysis.

4.3 Key variables descriptives:

Those new, combined variables were then to be tested for their distribution. Before the respondents were actually presented with the stimuli created for this study, two question blocks appeared where they were asked to answer questions about their general affinity towards sustainability, applied to the household battery market, as well as their perception of

quality differences in the battery market to check whether they noticed differences in quality in the battery market or whether they are not too familiar with it and perceive there are no significant quality differences within the options to buy from in the market. Starting off with the attitude towards sustainable behavior, the descriptive statistics show a tension towards the sustainable behavior of the respondents, which is related to general environmentally friendly behavior, and shows an effort to help recycle batteries and reduce pollution. The overall mean computed by the frequency function shows a value of 4.7 with a standard deviation of 0.75, indicating a weak but still existing tendency to act environmentally friendly towards the environment. Regarding the general quality perception and knowledge of the battery market, the mean value lies at 3.2 with a standard deviation of 1.33, where one can conclude when considering the formulation of the questions, a small majority notices quality differences between the battery brands and options to buy from and does not agree with different batteries and offers being similar (Appendix 3).

Now that these findings have been identified, the descriptive statistics analysis continues with a comparison between the different sustainability levels, quality perceptions and purchase intentions in the different scenarios that were randomly presented and evenly distributed to the participants. Here, it can clearly be noticed that the perceptions differ significantly from scenario to scenario, where the highest agreement with a positive quality perception was associated with scenario one, representing a high quality and sustainable battery offer (mean=5.96), while the lowest agreement with the battery described was associated with scenario four, presenting a cheap but bad quality, non-sustainable option to buy. For the remaining two scenarios, namely the high quality, non-sustainable version of the product, the mean was slightly lower (mean=5.3) compared to scenario one, indicating that even though the product is of high quality, not acting sustainable as a battery brand slightly lowers the perception of quality from the consumer point of view. Acting sustainable while offering a cheaper, lower quality product, however, increases the quality perception by a bit compared to being non-sustainable (mean=3.74), indicating that consumers include the factor of sustainability as part of the quality perception of that product. (Appendix 3)

While there are clear differences between the two scenarios where high quality is included in the offer compared to those offering low quality in the quality perception of the product, these differences are not as present when comparing the scenarios concerning the consumer purchase intention. That could mean that the price plays an important role when actually thinking about a purchase and buying that product, which is especially the case in the low

involvement product category as identified in the literature review. While regarding the high quality, sustainable product scenario, a consumer might still show a high tendency to buy the product when knowing the facts (mean=5.45), the other extreme of the low quality, non-sustainability does not seem to be as unattractive anymore due to the price advantage, even though a consumer is still slightly unlikely to purchase (mean=3.27). The two mixed scenarios are both slightly attractive when it comes to purchase intention, with the high-quality product (mean=4.89) still slightly outperforming the low quality but sustainable option (mean=4.24). (Appendix 3)

For the sustainability perceptions, however, these differences in the means are not really present. Here, very similar means can be observed, more specifically a mean of 4.78 for scenario one, 4.72 for scenario two, 4.61 for scenario three, and 4.77 for the remaining scenario.

When analyzing the standard deviations, it can additionally be identified that these are all either close to one or even above that, showing that the data is quite dispersed, indicating disagreements between the population when it comes to the quality perceptions and purchase intentions, and what consumers set their focus on when making or considering their next battery purchase. This, however, only counts for the two variables of product quality and purchase intention, but not for the sustainability variables, where the standard deviations lie between 0.61 and 0.86. (Appendix 3)

Concluding these findings, it can be disclosed that the stimuli were chosen correctly due to the case that the descriptive statistics produced appropriate results compared to what was expected beforehand when disregarding the sustainability variable. This, in turn, also provides evidence for the correct research model choice of having two independent variables (sustainability and product quality) impacting one dependent variable (purchase intention).

4.4 Hypothesis testing results:

4.4.1 The impact of incorporating sustainability in household batteries on consumer purchase intention.

To analyze the effect of the incorporation of sustainability throughout the lifecycle of a household battery by a provider on the resulting consumer intention to buy that product, a linear regression analysis in SPSS was performed for the impact of sustainability on purchase

intention. Here, the overall constructs created from combining the stimuli were used. This type of analysis provides a good fit for this research question due to its purpose of defining and quantifying the relation between the two variables included in this hypothesis test (Hope, 2020). The full SPSS output can be found in Appendix 4.

After performing the regression analysis, however, no significant result could be found when observing the ANOVA output, indicating an insignificant relationship between sustainability and purchase intention in the battery market according to the battery's sustainability and quality level. For instance, it can be considered highly insignificant due to a high p-value of 0.709.

Moreover, when ignoring the significance level, all other indicators indicate similar results, namely a minimally negative Pearson correlation of -0.027, which is considered extremely low, and a low R-square almost equal to zero indicating that almost none of the variance in purchase intention could be explained by sustainability affinity, as well as very low B value of -0.052 designating no prediction level for purchase intention.

All of that taken together shows indication that for this specific relationship of the two variables, a high insignificance level leads to the conclusion that the null hypothesis is true, meaning that there is no clear influence of sustainability on consumer purchase intention. That also means, that regardless of the sustainable behavior level of an individual and his/her importance given to sustainability in the battery market, it solely depends on the battery features regarding sustainability and price and quality level and cannot be connected to the overall perception of sustainability in the battery market and affinity to act sustainable. That would not change any purchase behavior significantly. Thus, hypothesis one cannot be validated.

4.4.2 The impact of product quality in household batteries on consumer purchase intention.

For the purpose of testing the effect of product quality on purchase intention in the household battery market, a further linear regression model was performed to gain insight into the relationship between the variables. Just like in the first linear regression analysis of this thesis, the overall constructs created from combining the stimuli were used. The full SPSS output of that can be found in Appendix 5.

At first, it can be concluded that the ANOVA output shows insignificance for this statistical test as well. However, the insignificance is not as high as in the output of the test run before, indicating a slightly insignificant result with a p-value of 0.109. However, it also has to be disclosed that even at a 90 percent confidence interval, the result would not have been significant.

Furthermore, the R square value shows that only 1.3 percent of the variance in purchase intention can be accounted for by the variation in product quality, and a Pearson correlation of 0.113 shows a negligible correlation between the two variables. Additionally, a B value of 0.127 confirmed the aforementioned findings, meaning that even if the model was significant, overall product quality could only weakly predict purchase intention.

Concluding this analysis concerning hypothesis two of this research, one can derive that this hypothesis cannot be validated either, meaning that also in this case the null hypothesis seems to be true, and the second hypothesis must therefore be rejected. That means that no significant results could be found to support the hypothesis of product quality influencing purchase intention.

4.4.3 Overall conceptual model test

After running the analyses to find out about the influence of each independent variable on purchase intention separately, a full model test in the form of multiple linear regression was performed, including all three variables. More specifically, it tested how sustainability and product quality, together, impact the overall purchase intention of the household battery consumer. As has already been described in the previous two sections, the overall constructs created from combining the stimuli were used. The full output of this statistical test can be found in Appendix 6.

The results of this test disclose that, as was the case for the previous two analyses, there is no significant relationship between sustainability and product quality taken together on purchase intention to buy the product, as indicated by a p-value of 0.261. On top of that, a very low R square of 0.013 indicates that only approximately 1.3 percent of the variance in purchase intention can be accounted for by sustainability and product quality. The further values of the individual constructs and their impact on purchase intention remain the same as in the two previous analyses, showing low Pearson correlations as well as B values.

Concluding that analysis, it can be disclosed that purchase intention is not significantly influenced by sustainability and product quality as a whole. Thus, considering all three analyses performed, it needs to be assumed that the relationship between those variables may be too complex for this analysis and therefore needs further research and future investigations.

Hypothesis	Description	Result
H1	Incorporating sustainability throughout the life cycle of batteries has a positive impact on purchase intention	Insignificant, not validated
H2	Product quality perception of batteries has a positive influence on purchase intention	Insignificant, not validated

Table 4: Results from Hypothesis Testing

CHAPTER 5: CONCLUSIONS AND LIMITATIONS

This last chapter of the thesis will provide a summary of the main conclusions of this research, giving an overview of what has been found through analyzing the research questions at hand, and building a connection to what has been found in existing studies before. Additionally, it will have managerial and academic implications and will end with limitations and suggestions for further research.

5.1 Main Findings & Conclusions

The purpose of this research was to examine the impact of investigations in sustainability and sustainability perceptions as well as the quality level of a product on consumer purchase intentions in the context of the household battery market. It was the aim to grapple with the incorporation of sustainability by enterprises in the market throughout the battery lifecycle and high levels of product quality given to a battery, and how that has a significant influence on purchase intention.

RQ1: What is the impact of incorporating sustainability throughout the lifecycle of household batteries on consumer purchase intention of the product?

Opposing to what has been found in previous literature, the results of the investigations into the relationship between sustainability and consumer purchase intention have shown that sustainability does not show a significant influence on purchase intentions in the household battery market. For these investigations, a linear regression model was analyzed, where no significant influence could be identified. Therefore, this hypothesis had to be rejected, meaning that the null hypothesis was confirmed that no clear influence of sustainability on consumer purchase intention is present in the household battery market.

These findings turn out to be opposing to what has been found in further studies before, where due to the increasing nature of the sustainability topic in everyday life it was assumed that there is a clear connection and strong influence of that on purchase intention (Barber et al., 2012).

RQ2: What is the impact of the quality given to specific household batteries by consumers on their purchase intention?

Regarding the second research question, it could not be confirmed by the performed linear regression analysis either that product quality has a strong and positive impact on purchase

intention. Here, the linear regression model was performed again to test for the impact of the second independent variable of product quality on purchase intention, but no significant results were obtained.

These findings can therefore also not confirm what has been found in previous literature, that quality would be of a subjective nature dependent on consumer measurement and knowledge, and when confronted with the appropriate facts and information, the quality given to a product by a consumer would positively influence its purchase intention to buy the specific product (Maynes, 1976; Mirabi et al., 2015).

Overall conceptual model test

Concerning the overall conceptual model test, no evidence could be found to confirm that sustainability and product quality taken together would significantly influence purchase intention in the household battery market. This result was confirmed by the analysis results of a multiple linear regression.

These results contradict what has been assumed after reviewing the literature. However, it has also been found that several additional factors can play an important role in influencing purchase intention, such as price, value, brand perception and other external factors, showing the complex nature of the case at hand and indicating that further measures will have to be taken to find answers to the designated model (Mirabi et al., 2015; Younus et al., 2015).

5.2 Managerial / Academic Implications

The academic relevance of this thesis provides crucial insights into the field of consumer behavior in the low-involvement product category, more specifically the household battery market. These insights concern the complex case of the impact of sustainability and the product quality level in the battery market on consumer purchase intention.

In terms of managerial relevance, this study presented some deeper insights into the complex nature of the interplay of the three variables of sustainability, product quality, and purchase intention, for players in the market to gain insights into what consumers of household batteries incorporate in their decision-making process when making a purchasing decision, and what their initial focus should lie on to properly reach the consumer. The research can, however, unfortunately only assume indications on what a company should specifically focus on to win the consumer over and increase his/her likelihood of choosing one battery (provider) over another, as proven by the insignificant results of the hypothesis tests on the

relationship between sustainability, product quality, and purchase intention. That could potentially mean, that in an optimal case, sustainability features and their communication should be incorporated as well as product quality, to further increase the intentions to purchase the product. These aspects would in turn need to be incorporated into the communication and marketing strategies of enterprises present in the market to convince the consumer and increase its likelihood of purchase.

5.3 Limitations and Further Research

Due to the academic nature of this thesis, several limitations and restrictions come with it, with the most crucial ones being time constraints as well as monetary limitations. This section summarizes the main limitations of this research which should be respected. However, these can also form opportunities and could be of relevance for future research.

Firstly, when observing the demographics of the participants of this study, it can be observed that the majority of participants were German due to the fact that the study was performed in Germany and the majority of answers were collected in this country. Furthermore, it is evident that the majority of participants were male, and the survey mainly reached young students within the comparably lower income segment. This indicates that this sample cannot be considered representative of the whole population.

A further indicator that the research is not representative of the whole population is the sampling method. More specifically, non-probability sampling was used to distribute the survey; thus, the probability of taking part in it is unknown.

Moreover, the distribution through social media channels such as WhatsApp, Instagram or LinkedIn, and the random sample of pedestrians asked to fill out the survey in the tram, has not formed a professional setting and the environment of the location or further circumstances could, to a large extent, not be controlled.

On top of that, the fictional scenarios presented in the form of verbal information were hypothetical and might therefore not represent real-world purchasing behavior of consumers. Regarding the scenarios, another limitation of this research is the equal means of the sustainability variables for each scenario, which is an indication that the manipulation was unsuccessful for this variable, although it was appropriate for the two further variables.

Furthermore, even though it might give valuable insights into the household battery market, the battery segment cannot be representative of the entire market of low-involvement products, which was, however, not the prime intention of this research due to the fact that the battery segment should be more seen as an example along the low-involvement product market.

Due to these limitations and the findings of this research, several suggestions for further research can be formulated. Firstly, it would be suggested that a broader sample of the population is incorporated for the research to be representative of a larger market and generalized. On top of that, real-life data should be collected to represent actual consumer purchase behavior instead of hypothetical scenarios being randomly presented in a survey. Additionally, it would be interesting to examine the relationship of the variables included in this research for other products within the low-involvement product category. Lastly, due to one of the findings being that the relationship of the variables might be more complex than expected, further variables connected to the ones used in this research could be incorporated and it could be studied how these further influence or manipulate the relationship between sustainability, product quality, and purchase intention.

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APPENDICES

Appendix 1: Survey

Q1

Dear Participant,

Thank you very much for participating in this survey and through that contributing to my final steps of my masters program at Católica Lisbon School of Business and Economics.

The survey will take you around 5 minutes and will deal with the topic of how sustainability/environmental friendliness in the household battery market influence purchase intention, and how this relationship is influenced by the quality of the product.

The participation in this survey is voluntary and the information gained through your completion of the survey will stay entirely anonymous and will solely be used for the purpose of this study.

By proceeding to the next page, you consent that you have read, understood, and agreed to the terms and conditions.

Should you have any further questions, comments, or concerns, do not hesitate to reach out to me: s-phuge@ucp.pt

Ready to go?

- I consent

Q2

Please rank the following statements regarding the sustainability of household batteries, battery brands and the battery lifecycle.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Recycling batteries will reduce pollution							
Recycling batteries is important to save natural resources							
Recycling batteries will save land that would be used as dumpsites							
Household battery producers should act responsibly toward the environment							
Household battery producers should be concerned about the environment							
I try to buy batteries that are from environmentally friendly providers							
I do not pay attention to the sustainability features in a battery							
Ecologically positive waste disposal is important to me							
I put effort in the proper disposal of batteries							
I trust in the public administration and waste disposal companies for proper battery disposal							
Batteries are small, and contain only small amounts of poisonous substances, which can be neglected							

Q3

Please rank the following statements regarding the quality differences in the household battery market

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
All battery brands are basically the same in quality	○	○	○	○	○	○	○
There are no significant differences among different battery brands in terms of quality	○	○	○	○	○	○	○
As far as quality is concerned, the battery brand does not matter	○	○	○	○	○	○	○

Q22

Attention check

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
In order to check your attention, please answer this question with "strongly agree"	○	○	○	○	○	○	○

4 Scenarios:

<table>
<tr><td colspan="2">Introduction:

Imagine you are in store and want to buy new batteries for your flashlight. You know the size of the battery you need, but now that you are in the store, there are different options to choose from, varying in their quality and sustainability features.</td></tr>
<tr><td>Scenario 1: high quality, sustainable

Imagine you see a branded battery in the shelf that offers a long living, powerful battery with incorporated safety features, coming at a premium price. On top of that, the brand is using recycled as well as recyclable materials in their batteries, as well as participates in proper collection and disposal programs.</td><td>Scenario 2: high quality, not sustainable

Imagine you see a branded battery in the shelf that offers a long living, powerful battery with incorporated safety features, coming at a premium price. It focuses on these features, but does neither contain recycled materials nor is it recyclable, and the provider leaves the task of the battery collection and proper disposal to other parties.</td></tr>
<tr><td>Scenario 3: low quality, sustainable

Imagine you see a private label battery in the shelf that offers a low-priced battery with a comparably short battery life, little power, but sufficient to use. However, the provider is using recycled as well as recyclable materials in their batteries, as well as participates in proper collection and disposal programs.</td><td>Scenario 4: low quality, not sustainable

Imagine you see a private label battery in the shelf that offers a low-priced battery with a comparably short battery life, little power, but sufficient to use. It offers its battery at the lowest price available. It neither contains recycled materials nor is it recyclable, and the provider leaves the task of the battery collection and proper disposal</td></tr>
</table>

	to other parties.

The following two questions for each of the four scenarios:

Q9

Please rank the following statements regarding the quality of the battery described.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
It is very likely that the battery will be reliable	○	○	○	○	○	○	○
This battery appears to be of quality	○	○	○	○	○	○	○
This battery appears to be durable	○	○	○	○	○	○	○
This battery appears to be dependable	○	○	○	○	○	○	○
The image of the brand appears to be very good to me	○	○	○	○	○	○	○
I view this battery brand positively	○	○	○	○	○	○	○

Q10

Please rank the following statements regarding the intention to purchase the battery described.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I would consider purchasing this battery	○	○	○	○	○	○	○
I intend to try this battery	○	○	○	○	○	○	○
I plan on buying this battery	○	○	○	○	○	○	○
I would recommend others to buy this battery	○	○	○	○	○	○	○

Demographic questions:

Q10 *

What is your gender

- Male
- Female
- Prefer not to say

Q11 *

What is your age

- Under 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65 or older

Q13 *

What is your highest level of education?

- Less than high school diploma
- High school diploma or equivalent
- Bachelors degree
- Masters degree
- Doctorate degree
- Prefer not to say

Q12 *

What is your current occupation

- Student
- Working student
- Part-time employed
- Full-time employed
- Unemployed
- Retired
- Prefer not to say

country | List of Countries * ×→

What is your nationality

Germany

Q17 *

What is your monthly net income?

- Less than €500
- €501-1,500
- €1,501-2,500
- €2,501-3,500
- €3,501-4,500
- €4,501-5,500
- More than €5,501
- Prefer not to say

End of Survey

We thank you for your time spent taking this survey.

Your response has been recorded.

Appendix 2: Cronbach's Alpha Reliability tests

Reliability

Scale: Ov_sust_scale

Case Processing Summary

		N	%
Cases	Valid	201	100.0
	Excluded[a]	0	.0
	Total	201	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.901	.905	11

Reliability

Scale: Gen_quality_scale

Case Processing Summary

		N	%
Cases	Valid	201	100.0
	Excluded[a]	0	.0
	Total	201	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.850	.852	3

Reliability

Scale: S1_quality_scale

Case Processing Summary

		N	%
Cases	Valid	49	24.4
	Excluded[a]	152	75.6
	Total	201	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.933	.934	6

Reliability

Scale: S1_PI_scale

Case Processing Summary

		N	%
Cases	Valid	49	24.4
	Excluded[a]	152	75.6
	Total	201	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.795	.811	4

Reliability

Scale: S2_quality_scale

Case Processing Summary

		N	%
Cases	Valid	50	24.9
	Excluded[a]	151	75.1
	Total	201	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.803	.804	6

Reliability

Scale: S2_PI_scale

Case Processing Summary

		N	%
Cases	Valid	50	24.9
	Excluded[a]	151	75.1
	Total	201	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.917	.921	4

Reliability

Scale: S3_quality_scale

Case Processing Summary

		N	%
Cases	Valid	52	25.9
	Excluded[a]	149	74.1
	Total	201	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.902	.903	6

Reliability

Scale: S3_PI_scale

Case Processing Summary

		N	%
Cases	Valid	52	25.9
	Excluded[a]	149	74.1
	Total	201	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.912	.915	4

Reliability

Scale: S4_quality_scale

Case Processing Summary

		N	%
Cases	Valid	50	24.9
	Excluded[a]	151	75.1
	Total	201	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.935	.934	6

Reliability

Scale: S4_PI_scale

Case Processing Summary

		N	%
Cases	Valid	50	24.9
	Excluded[a]	151	75.1
	Total	201	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.950	.949	4

Appendix 3: Frequency Analysis

Frequencies

Statistics

		Overall sustainability combined score	General quality combined
N	Valid	201	201
	Missing	0	0
Mean		4.7218	3.1973
Median		4.9091	3.0000
Std. Deviation		.75403	1.32760
Skewness		-.971	.654
Std. Error of Skewness		.172	.172

Frequencies

Statistics

		S1 quality combined	S2 quality combined	S3 quality combined	S4 quality combined
N	Valid	49	50	52	50
	Missing	152	151	149	151
Mean		5.9592	5.3033	3.7404	2.7267
Median		6.3333	5.3333	3.9167	2.4167
Std. Deviation		1.00665	.81350	1.21107	1.40285
Skewness		-.582	-.180	-.197	.669
Std. Error of Skewness		.340	.337	.330	.337

Frequencies

Statistics

		S1 purchase intention combined	S2 purchase intention combined	S3 purchase intention combined	S4 purchase intention combined
N	Valid	49	50	52	50
	Missing	152	151	149	151
Mean		5.4490	4.8900	4.2404	3.2650
Median		5.5000	5.0000	4.7500	2.8750
Std. Deviation		.95057	.98349	1.25827	1.69739
Skewness		-.256	-.817	-.696	.181
Std. Error of Skewness		.340	.337	.330	.337

Frequencies

Statistics

		Sust_Scen1	Sust_Scen2	Sust_Scen3	Sust_Scen4
N	Valid	49	50	52	50
	Missing	152	151	149	151
Mean		4.7793	4.7236	4.6084	4.7654
Std. Error of Mean		.08708	.11056	.11863	.10730
Median		5.0000	4.8636	4.7273	4.8636
Std. Deviation		.60955	.78176	.85542	.75870
Skewness		-.956	-.755	-.707	-1.379
Std. Error of Skewness		.340	.337	.330	.337

Appendix 4: Hypothesis 1, Linear Regression

Regression Sustainability

Descriptive Statistics

	Mean	Std. Deviation	N
S1_4_PI	4.4540	1.48957	201
Overall sustainability combined score	4.7218	.75403	201

Correlations

		S1_4_PI	Overall sustainability combined score
Pearson Correlation	S1_4_PI	1.000	-.027
	Overall sustainability combined score	-.027	1.000
Sig. (1-tailed)	S1_4_PI	.	.354
	Overall sustainability combined score	.354	.
N	S1_4_PI	201	201
	Overall sustainability combined score	201	201

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Overall sustainability combined score[b]	.	Enter

a. Dependent Variable: S1_4_PI

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.027[a]	.001	-.004	1.49278	.001	.140	1	199	.709	2.218

a. Predictors: (Constant), Overall sustainability combined score

b. Dependent Variable: S1_4_PI

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.312	1	.312	.140	.709[b]
	Residual	443.450	199	2.228		
	Total	443.762	200			

a. Dependent Variable: S1_4_PI

b. Predictors: (Constant), Overall sustainability combined score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	4.701	.669		7.024	<.001					
	Overall sustainability combined score	-.052	.140	-.027	-.374	.709	-.027	-.027	-.027	1.000	1.000

a. Dependent Variable: S1_4_PI

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Overall sustainability combined score
1	1	1.988	1.000	.01	.01
	2	.012	12.635	.99	.99

a. Dependent Variable: S1_4_PI

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4.3822	4.5919	4.4540	.03952	201
Residual	-3.44893	2.58442	.00000	1.48904	201
Std. Predicted Value	-1.816	3.489	.000	1.000	201
Std. Residual	-2.310	1.731	.000	.997	201

a. Dependent Variable: S1_4_PI

Appendix 5: Hypothesis 2, Linear Regression

Regression Quality

Descriptive Statistics

	Mean	Std. Deviation	N
S1_4_PI	4.4540	1.48957	201
General quality combined	3.1973	1.32760	201

Correlations

		S1_4_PI	General quality combined
Pearson Correlation	S1_4_PI	1.000	.113
	General quality combined	.113	1.000
Sig. (1-tailed)	S1_4_PI	.	.055
	General quality combined	.055	.
N	S1_4_PI	201	201
	General quality combined	201	201

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	General quality combined[b]	.	Enter

a. Dependent Variable: S1_4_PI

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.113[a]	.013	.008	1.48368	.013	2.589	1	199	.109	2.234

a. Predictors: (Constant), General quality combined

b. Dependent Variable: S1_4_PI

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.700	1	5.700	2.589	.109[b]
	Residual	438.062	199	2.201		
	Total	443.762	200			

a. Dependent Variable: S1_4_PI

b. Predictors: (Constant), General quality combined

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	4.047	.273		14.800	<.001					
	General quality combined	.127	.079	.113	1.609	.109	.113	.113	.113	1.000	1.000

a. Dependent Variable: S1_4_PI

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	General quality combined
1	1	1.924	1.000	.04	.04
	2	.076	5.028	.96	.96

a. Dependent Variable: S1_4_PI

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4.1746	4.9375	4.4540	.16882	201
Residual	-3.42888	2.78305	.00000	1.47997	201
Std. Predicted Value	-1.655	2.864	.000	1.000	201
Std. Residual	-2.311	1.876	.000	.997	201

a. Dependent Variable: S1_4_PI

Appendix 6: Overall Conceptual Model Test, Multiple Linear Regression

Regression overall Model

[DataSet2] /Users/philliphuge/Documents/Catolica Lisbon/Master Thesis/Untitled2.sav

Descriptive Statistics

	Mean	Std. Deviation	N
S1_4_PI	4.4540	1.48957	201
Overall sustainability combined score	4.7218	.75403	201
General quality combined	3.1973	1.32760	201

Correlations

		S1_4_PI	Overall sustainability combined score	General quality combined
Pearson Correlation	S1_4_PI	1.000	-.027	.113
	Overall sustainability combined score	-.027	1.000	-.013
	General quality combined	.113	-.013	1.000
Sig. (1-tailed)	S1_4_PI	.	.354	.055
	Overall sustainability combined score	.354	.	.425
	General quality combined	.055	.425	.
N	S1_4_PI	201	201	201
	Overall sustainability combined score	201	201	201
	General quality combined	201	201	201

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	General quality combined, Overall sustainability combined score[b]	.	Enter

a. Dependent Variable: S1_4_PI

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Selection Criteria: Akaike Information Criterion	Amemiya Prediction Criterion	Mallows' Prediction Criterion	Schwarz Bayesian Criterion	Durbin-Watson
1	.116[a]	.013	.004	1.48695	162.463	1.016	3.000	172.373	2.240

a. Predictors: (Constant), General quality combined, Overall sustainability combined score

b. Dependent Variable: S1_4_PI

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.978	2	2.989	1.352	.261[b]
	Residual	437.784	198	2.211		
	Total	443.762	200			

a. Dependent Variable: S1_4_PI

b. Predictors: (Constant), General quality combined, Overall sustainability combined score

Coefficients[a]

Model		Unstandardized Coefficients: B	Unstandardized Coefficients: Std. Error	Standardized Coefficients: Beta	t	Sig.	Collinearity Statistics: Tolerance	Collinearity Statistics: VIF
1	(Constant)	4.282	.716		5.977	<.001		
	Overall sustainability combined score	-.049	.139	-.025	-.354	.724	1.000	1.000
	General quality combined	.127	.079	.113	1.601	.111	1.000	1.000

a. Dependent Variable: S1_4_PI

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions: (Constant)	Variance Proportions: Overall sustainability combined score	Variance Proportions: General quality combined
1	1	2.882	1.000	.00	.00	.02
	2	.106	5.222	.02	.05	.93
	3	.012	15.569	.97	.95	.05

a. Dependent Variable: S1_4_PI

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4.1257	4.8899	4.4540	.17288	201
Residual	-3.42420	2.80507	.00000	1.47950	201
Std. Predicted Value	-1.899	2.521	.000	1.000	201
Std. Residual	-2.303	1.886	.000	.995	201

a. Dependent Variable: S1_4_PI