All about the paradise:

luxury trends, customers' perceptions and willingness to pay for green high-end products

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Abstract

In der heutigen Zeit erleben die Nationen ihren höchsten Wohlstand. Immer mehr Menschen verfügen über die notwendige Kaufkraft, um sich teure, extravagante und exklusive Produkte zu leisten. Luxushersteller stehen daher vor der Herausforderung, sowohl diese Kunden zu bedienen als auch die Luxuswerte (bspw. Rarität, Genuss & Status) zu bewahren. Die Aufgabe ist umso schwieriger v.a. mit der Erscheinung einer neuen Konsumentengruppe (LOHAS), die umweltfreundliche Luxusgüter bevorzugt. Diese Arbeit widmet sich der Analyse der Nachhaltigkeit als Motivation für disruptive Innovationen für das Luxussegment. Das Ergebnis bestätigt die steigende Präferenz für nachhaltige Luxusprodukte sowohl von jungen als auch von erfahrenen Käufern (Status & Anerkennung vs. Bewusstsein/ Differenzierung). Des Weiteren erfolgte eine empirische Untersuchung zum Ableiten der Zahlungsbereitschaft für ökologische Luxusfahrzeuge. Die Analyse bestätigt die zuvor abgeleiteten Resultate. Wohlhabende Konsumenten sind ihren Lieblingsmarken treu und loyal. Demzufolge gaben sie eine höhere Zahlungsbereitschaft für schnelle, vernünftige (Reichweite/ Ladedauer) und teure Autos an. Ein hoher Abgaswert bildet den Hauptgrund für einen Markenwechsel. Demgemäß erfolgte eine Clusteranalyse, um die Kunden nach ihren Präferenzen einzuordnen. Das Output bestätigt die Existenz zweier Gruppen, die ähnliche Präferenzen vorweisen (Hauptgruppe mit stärkeren Vorzügen).

Anschließend erfolgte eine Analyse der Luxusliteratur (568 Papers & Bücher) mittels „STM“ (structured topic modeling). Sie zeigt sowohl die Neuorientierung als auch den Mangel an Forschung über nachhaltigen Luxus. Anhand der VisNetwork konnte die Wichtigkeit des Themas ermittelt werden. Außerdem, das Plotten der Arbeiten über die Zeit zeigt, dass nachhaltiger Luxus stetig an Bedeutung gewinnt.

Schließlich erfolgte eine Analyse des bestehenden Konflikts über Produktarten (Material vs. Erlebnis) und deren Effekt auf Konsumentenzufriedenheit. Das Resultat zeigt die individuelle Perspektive (Bedürfnisse und Involvement) als wichtige Einflussgröße. Außerdem wurde der Zeitfaktor (Konsumfrequenz, zusätzliche Kosten) als Mediator dargestellt. Hierbei wurde Luxus als Ausnahme betrachtet. Derartige Produkte stellen eine perfekte Kombination beider Entwürfe dar.

Abstract

Luxury products combine arts, quality and taste to shape the upper class of each category. Subsequently, affluent clientele is increasingly interested in such merchandise to enjoy the possession and feel privileged. The appearance of LOHAS as well as the consciousness of certain experienced customers shook the high-end market and its' values. for instance, whether and where to implement sustainability aspects among the value chain becomes a key aspect to succeed in the segment. For this purpose, we analyzed the primacy of ecology in the segment as well as its' capacity to drive disruptive innovations. Outgoing from the theory of disruptive innovations in the mass market, we modeled this philosophy in the luxury market. An empirical study was conducted to identify potential customers has shown the existence of a potential group: New entrants and experienced clients (eco-friendly & privilege-seeking). Then we modeled the WTP for luxury EVs as well as the churn risk for luxury manufacturers when ignoring sustainability issues. The results show an increasing acceptance for sophisticated vehicles in terms of acceleration, range and charging time. Moreover, Lowering Co2-emission has the highest preference which implies a higher WTP for luxury EVs from the favorite brand. Therefore, we argue that adopting sustainability won't be necessarily related with profits but ignoring it is risky (switch to competitors). The last chapter was dedicated to reciprocally legitimize the choice of this topic as a research subject. Using structural topic model methods, the output confirms the newness as well as the lack of research on implementing ecology in the luxury market. As an illustration, the VisNetwork reveals the topic as an important research hub since it is strongly related to major subjects such as market segmentation, cross-cultural context, and pricing/ branding strategies. Also, plotting the research wave (for each topic) over time confirms an increasing investigation of environmental friendliness in the luxury literature starting from 2014. Lastly, we tried to investigate the conflict about material and experiential purchases and their effect on well-Being. The results suggest individual abilities and requirements as major antecedents. Furthermore, the consumption type (frequency, additional charges etc.) profile the principle mediator. In this case luxury builds a special case since such merchandise score high on both aspects.

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1 Introduction

The overall wealth is increasing and has reached its maximum these days. More and more people have therefore the financial means and the desire to acquire extravagant and exclusive goods. Consequently, the market-attractivity has significantly grown and the number of firms dedicated to luxury production is expanding.

Both academics as well as market researchers are interested in analyzing and characterizing the market for high-end products. For instance, the literature studied the luxury phenomenon from various perspectives: historical, cultural, economic, social and individual. Subsequently, the luxury map is getting larger and broader.

This interdisciplinarity makes it harder to get a unique definition across all disciplines. Moreover, both the methodology and the view-angle differ across all areas. For instance, researches on psychology as well as on consumer behavior define the luxury phenomenon from a customer perspective. However, marketing an economic works focused on the product standpoint and builds the most appropriate characterization. For instance, defining luxury from an individual viewpoint is unhinged, instable and relative. For someone who lives in the desert, water might be considered luxury due the difficulty to acquire it (need to walk 20 km for the next source). Afterwards, when moving to the city, water won't be seen as luxury/ hard to acquire product. Instead, a small car like a Volkswagen Polo builds the new luxury for this guy because he uses public transport. Ensuing, the same person gets a better job and buy a Mercedes A-class. Subsequently, an upper-class car like an Audi A5 shapes the new luxury for him. Following this approach, we won't be able neither to characterize a high-end good nor to define a luxury market since all goods (water, Vw Polo, Mercedes A-class) might be luxury goods depending on individual needs, social and financial status. Therefore, the global market converts to a luxury market.

However, the marketing perspective consider a good to be luxury when possessing the following characteristics: high price, high quality, rarity, aesthetics, status and extraordinariness, and enjoyment. In addition, the weights of these features differ depending on product category (e.g. cars are unlike fashion), brand dimension and strength (Ferrari vs. Porsche), and firms' strategies (e.g. focus on rarity vs. quality). As an example, both Ferrari

and Porsche are luxury cars. However, it is more likely to posit Ferrari higher on price, rarity and status. Porsche points higher on quality (daily use).

Recent works on the high-end sector revealed the darkness on new trends such as ecology and sustainability and discussed their impact in the market. On the one side, numerous studies acknowledged its primacy in redefining the future market as well as in firms' success. Additionally, the majority of these investigations warned from ignoring these norms even if customers don't acclaim them openly. Moreover, the literature suggests that when applying those standards, manufacturers should not expect higher profits and revenues. Yet, overlooking them might cause the disaster.

On the other side, several researches highlighted the importance of ethic and sustainability for FMCG (Fast Moving Consumer Goods) but not for luxuries. The argumentation envelops some inferences such as buying frequency, goals and motivations, and the risk factor. As an illustration, people frequently buy fair traded coffee beans but not luxury items. Therefore, customers would have better feelings and sense doing something good for the environment. However, luxury purchases are seldom, intimate and are strongly related to aspects such as self-gift and reward. Thus, external and environmental issues have little (to no) relevance.

This discrepancy makes it hard for both manufacturers as well as academics to appraise and to judge the primacy of ecology and sustainability in luxuries to derive appropriate strategies and recommendations. Moreover, investigating ecology facets as an inspiration to compete in the luxury market and therefore, to pledge disruptive innovations, is essential.

Chapter two focuses on the evolution of luxury consumers' perception for ecological luxury goods. Beginning from a literature examination, we try to recognize the relationship between luxury and ecology. Moreover, inspecting business examples such as Tesla, Shilpa Chavan and Elvis&Kresse, we aim to evaluate the potential of environmental friendliness to drive disruptive innovations in the high-end segment. (Dis)- approving the possibility of conducting such innovations in the market is not sufficient, especially, for luxury houses. Therefore, an empirical study among German prosperous buyers was conducted to identify potential clients.

Afterwards, we tried, using Bayesian methods, to model the churn risk for luxury car manufacturers when ignoring sustainability aspects. for this purpose, German wealthy clients participated in a survey (CBCA) on the WTP for luxury EVs and their attributes. Respondents were given 3 alternatives (EV, PHEV and Combustion) of the luxury car they nearly plan to

buy. A nonchoice option was introduced and serves to predict the churn risk since choosing this option implies switching to competitors in their evoked set.

Chapter four emphases one of the newest and most relevant approaches in all disciplines, structural topic modeling. The main idea is to, reciprocally, approve the primacy of ecology in the luxury market as well as the lack of research. This serves to, discretely, legitimize the choice of ecology in luxury as an upper research topic. Additionally, appropriately cluster academic works on luxury is essential since all previous investigations used different viewpoints, methods and approaches (psychology, economy, history, sociocultural, etc.). Moreover, this research variety as well as the increasing number makes it difficult to have an unbiased result since human interpretations and elucidations are affecting it. Correspondingly, we maintain to identify the most discussed topics in the luxury literature as well as describing and characterizing the evolution of luxury researches over time.

The fourth chapter analyzed existing literature on material versus experiential acquisitions and their effect on happiness. An empirical study was conducted and aims to identify key mediators and antecedents that affect the manner people percept a product (being a possession or an experience). Moreover, recognizing factors influencing the happiness driven from a purchase/ consumption is a major issue. Luxury products embody here a special case since they perfectly combine both notions. For instance, acquiring a Hermes crocodile Birkin is not only to carry stuff, but also to enjoy the consumption and the experience being admired and well-regarded from others. Similar is the case when purchasing a Rolls Royce or a Patek Philippe.

2 The Evolution Of Luxury Consumers' Preferences For Ecological Luxury Goods

2.1 Introduction

With the growing emphasis placed on environmentally- conscious developments, more and more companies are opting to go green. Business and society are daily confronted with resource scarcity, population growth, climate change as well as environmental and social changes like the appearance of a new ecology consumer group "LOHAS" (Life Style Of Health And Sustainability). Companies seek to hold the potential to solve a number of ecological challenges and are therefore, seen as environmentally friendly innovators. According to insights and theories such as TIA (theory of innovation adoption), TRA (theory of reasoned action), TPB (theory of planed behavior) etc. consumer preferences develop along with technological change (Rogers, 2003). One key constituent in the diffusion of such new goods is the tendency for consumer preferences to change as the technology turn out to be more widespread and prevalent in the market. For instance, many clients swapped to EVs with the appearance and the relative success of the American car producer Tesla Motors Inc. Consequently, manufacturers need to reveal the darkness on consumer preferences and requirements toward implementing the right strategies to ensure a good market share and to participate in redefining the future business. Furthermore, Managers should have access to more data on consumers' reservation price, purchase decisions and preferences, competitive pricing strategies and new product launch to choose a suitable marketing instrument.

The aspect of green innovation includes many sectors such as energy production, transport, fragrances and cosmetics, fashion industry etc. Yet, the most discussed topic in academic journals is transport, especially due to the appearance of performed electric cars. Consumers were influenced by the 'new' technology and, particularly, by its advantages such as fuel cost saving, Co2- emission and other functional features. Additionally, Several States (USA, Germany, Sweden etc.) offer attractive financial incentives to encourage and support the purchase and the diffusion of electric vehicles. Despite these measurements, the buying rate

underlid expectations. For instance, Germany planned to reach 1 million EV by 2020. However, analyzing market sales and -growth, experts have decreased the number to a maximum of 200.000 cars (Frauenhofer Institut, 2013).

Various empirical studies (Bunch et al., 1993; Menon et al., 1999; Stern, 2000; Brownstone et al., 2000; Dagsvik et al., 2002; Jackson, 2005; Mills, 2008; Meyer & Winebrake, 2009; Karplus et al., 2010; Oliver & Rosen, 2010; Hidure et al., 2011; Schuitema et al., 2012; Petching, Heidenreich & Spieth, 2014) have been conducted to define product attributes that influence the adoption of environmental friendliness and to explore peoples' willingness to pay. Petsching, Heidenreich and Spieth (2014) studied for example the consumers' intention to adopt alternative fuel vehicles (AFV). They Conceptualized and designed a theory-based adoption model by integrating TIA (Theory of innovation adoption (Roger, 2003)) and TRA (Theory of reasoned action (Fishbein & Ajzen, 1975)). The study incorporates a typology of perceived AFV attribute, psychological and behavior- related aspects of consumers (Petching, Heidenreich & Spieth, 2014). Hidure, Parsons, Kempton and Gardner (2011) presented a stated preference study of electric vehicles using data from a national survey. The respondents were asked to choose between their favorite gasoline vehicle and two electric substitutes of that car. Using a latent class random utility model, the authors tried to estimate the willingness to pay for electric vehicles and their attributes: driving range, charging time, fuel cost saving, pollution reduction, and performance in terms of acceleration. The most crucial factors influencing buying decision of electric cars were driving range, fuel cost savings, and charging time. The environmental aspect was significant but not decisive. Moreover, the authors concluded that younger and well-educated populations are a good target. In addition, Axen, Mountain and Jaccard (2009) predicted an important future market for environmental friendly cars. They studied the "neighbor effect," where a new technology comes to be more desired as its adoption becomes extensive in the market. The research combined stated and revealed choice methods to stimulate the "neighbor effect" in the case of hybrid- electric vehicles.

In the same ecological context, Harrison et al. (2005), Hendarwan (2002) and Mason (2000) showed the importance of ethic on buying decision in the mass market. Consumers appreciate its significance not only on themselves but also on the world around them. Consequently, they are more likely to reassess their purchasing behavior. Buying FMCG makes it easier for consumers to, first show their concerns towards society and second, to feel good when acquiring them. Hence, various empirical studies like Vermeir and Verbeke

(2006), Futerra (2005) and Morri (2009) showed that about 30% of respondents confirmed their interest in ethical aspects when buying. Furthermore, Elliott & Freeman (2001), McGoldrick and Freestone (2008) stated out that consumers are willing to pay around 10% more for ethical goods compared to non-ethical. This indicates that sustainability and ethics cost more than counterparts did, which may not be the case. Harris and Freeman (2008) questioned this confusion and showed that sustainability and ethic do not necessarily result higher prices. Hence, they introduced the concept of "Separation fallacy" where customers misjudge that ethics and business are two different facets. Supporting this finding, Carrigan and Atalla (2001) stated out that shoppers would only purchase ethical goods if there were no extra charges for them. Moreover, many researchers (Bhattacharya & Sen, 2004; Auger et al., 2007) pointed out that despite their concern about ethics and sustainability, customers would not overlook quality and functional features to support ethics. For example, clients are less likely to buy fair traded coffee beans, chocolate or drinks that do not taste. In conclusion, the Perception of ethic goods differs between regular, repeated and low-involvement purchases, and luxuries (Vigneron & Johnson, 2004; Ward & Chiari, 2008).

Also, the high- end market is experiencing some refurbishment. The association of luxury with ecological considerations has influenced and broadened the vision of many people toward luxury, which was merely combined with some materialistic values like conspicuous consumption, Status, indulgence and waste before (Dubois & Duquesne, 1993; Vigneron & Johnson, 1999; Dubois, Laurent & Czellar, 2005; Heine, 2012; Langer & Heil, 2013). Consumers are now better informed and seek to buy goods that meet certain exceptional criteria such as sustainability, environmental friendliness and fair production. The elite luxury clientele is also concerned about these environmental issues and submit its responsibility through buying ethical and ecological goods. They redefined the market as well as the dimensions of a luxury product. Consequently, firms have the challenge to understand this new facet and to meet new customers' needs. Furthermore, manufacturers should be aware about ignoring sustainability and ethics in both production and marketing due to a high reputational risk, particularly through criticism conducting from a single customer through social networks. Kapferer and Bastien (2009) indicated that even if consumer response is still weak and not representative, luxury leaders should take the initiative and create a responsible approach. Therefore, "a quality that pollutes is no quality at all these days." (Kapferer & Michaut, 2015, p.4). Based on high quality, greater durability and deeper meanings, luxury experts see a good foundation for the design, the marketing and the production of merchandises that preserve social and environmental values (Kapferer, 2010).

The luxury value perception and the motive for luxury consumption are not only related to some social aspects of displaying status, success distinction etc., but depends on the nature of the individual and on financial and functional utilities of the luxury brands. Wiedmann, Hennings and Siebels (2007) conceptualized a framework to better understand consumer perception of indulgences. Introducing luxury as a four-dimensional aspect (social, individual, functional and financial), the authors have identified a broader variety of potential drivers. However, these principles were wide-ranging and not applicable to new product technologies such as EV. Numerous works have studied both the adoption of electric vehicles and the consumers' willingness to pay for EVs in the mass market, but not in luxuries.

2.2 Luxury and luxury consumption: A retrospect

From the beginning of human history and civilization, luxury goods and items were consumed and presented in various forms of consumption (Dubois, Czellar & Laurent, 2005). Its function and role were as clear and important in ancient Egypt, Greece and Roman Empire as in modern civilizations and societies. Originally, luxury consumption was reserved only to the elite and had a great wasteful aspect. Before the Punic wars (264- 146 BC), the roman social structure was quite stable, showing an extensive difference in prosperity between the senatorial and the equestrian class. "The census of 14 BC documented that the richest Roman was Cneus Cornelius Lentullus, with an estimated patrimony of 400 million sesterces, that is, 400 times as much as the official minimum for senators." (Dari-Mattiacci & Pliescka, 2010, S.8). In order to differentiate themselves from the lower class, rich Roman consumed extravagant goods that less wealthy people could not afford. Vel, Captain, Abbas & Hashemi (2011) for example reported about the Roman Empire when they sent Zenobia[1] to Rome in golden chains to signify their Triumph. This act displays the extravagant lifestyle of the ancient Arabs and elucidates their affinity towards displaying their consumption of luxury goods, which have been carried down to future generations.

"Many luxury brands have a long history with their origin in France, and many luxury goods manufacturers such as Louis Vuitton, which celebrated its 160-year anniversary in 2014" (LVMH 2015), have been around for a long time. For years, the high-end industry enjoyed its exclusive position in the market and a fairly stable market environment. However, supply

[1] During the second century AD, there existed the Kingdom of Palmyra, ruled by Zenobia, who was claimed to be the queen of the Near East (Vel, Captain, Abbas and Hashemi, 2011).

and demand structure for the market have changed significantly due to the increased global competition (Roux & Floch, 1996), counterfeited luxury goods (Arghavan & Zaichkowsky, 2000) and the change in consumers' sensitivity (Bendell, 2012).

Formerly, defining luxury was related to identify both its psychological and its functional aspects such as a status symbol and highly involved consumption knowledge that is strongly related to personal involvements and experiences. Luxury goods consumption was first studied by Veblen (1899) when he threw his first publication, "The Theory of Leisure Class", which addressed the concept of conspicuous consumption. This stressed that the central purpose of having high-end products and services is to signify prosperity and status. Around half a century later, the ''Veblen Effect'' was codified by Leibenstein (1950) to identify a positive relationship between quantity demand and price in the marketplace for luxury products. According to Giacalone (2006), Leibenstein (1950) broke the traditional demand theory in economics because he stated that the preference for goods rises by increasing their prices. Moreover, he (Leibenstein, 1950) introduced the ''snob-'' and the ''bandwagon-'' effects. The first suggests that the preference for goods decreases by increasing the number of buyers, whereas the second concludes that the demand for goods increases because customers follow others in their reference groups who have already purchased the product (Tynan, 2010). Vigneron and Johnson (1999) supported Veblen, bandwagon and snob effects once more.

Few years later, a new consumer- and identity-oriented definition of luxury has appeared where brands are considered as images in the minds of customers and other target groups, which are designed by companies to recognize their products. According to Kapferer (2008), luxury brands are strongly related to their main products. This was confirmed by a large part of academic definitions of luxury brands that denote the specific associations about product characteristics (fig.1) (Meffert & lasslop, 2003; Büttner et al., 2006; Valtin, 2004). Consequently, experts (Meffert & Lasslop, 2003; Wiedmann, Hennings & Siebels, 2007; Heine, 2012; Heil & Langer, 2013) assume that both luxury brands and products are associated with a high level of price, quality, aesthetic, rarity, extraordinariness and a high degree of non- functional associations. Luxury brands should be evaluated by the constitutive individualities of a product, which are summarized by the following values (Dubois & Duquesne, 1995; Dubois, Czellar & Laurent, 2005; Wiedmann, Hennings & Siebels, 2007; Heine, 2012; Langer & Heil, 2013):

- Price: the price has a main importance in luxury. It does not only reflect the high quality and features of a product, but also the degree of selectness. For both Snobs and Bandwagon consumers, soaring prices form the initial impression of the product and play a main role in the decision making (Vigneron & Johnson, 1999). Furthermore, exclusivity is imperative for companies, particularly for a leading position in the market. For instance, luxury manufacturers apply various marketing tactics such as limited edition and strategic alliances to better control both the availability and the spreading of the brand and guarantee therefore excessive prices.

- Quality: luxury brands bid eternal and undying goods. Those products won't be defect, even after a long usage, but rather repaired and often gain in value over time. The facet of quality in luxury depends on price and exclusivity and, is therefore not a key attraction for all customers.

- Aesthetics: Generally, the brand looks delightful, pleasing and embodies a creation of exquisiteness and elegance. For many clients, the product design should exceed their personality, taste and expectations.

- Rarity: In contrast to mass-market, the brand must be exclusive and rare in terms of limited quantities and tries not to disclose its (high) sales numbers. Luxury brands should not be available at any time or place or for everyone. Such a character is primary sought by Snobs.

Figure 1 Characteristics of luxury products

- Extraordinariness and status: "The brand has a mind and style of its own and its products offer a kick and surprise with the expected unexpected" (Heine, 2012). This feature became more and more important for some luxury consumers who primary seek recognition and related social values. The acquisition helps to reach the required status: either an identification with a certain elite group or a differentiation to preserve a certain privilege and honor.
- Symbolism and enjoyment: "The brand stands for the best from the best for the best; its charisma fills the room, and regardless of whether it is of a conspicuous or understated nature, deep inside, it is swollen with pride." (Heine, 2012). It is more about enjoying the product experience than a consumption per se. the acquisition of an expensive sportscar is not for traveling from A to B, but rather to adore the driving experience and to enjoy the feelings offered by it.

Over the last few years, a paradigm shift took place in the domain of luxury. High-end products are not only related to the traditional characteristics listed above but also to some new aspects such as environmental friendliness and social responsibility. Luxury brands have then adopted sustainability and ethics as a key part (Bendell and Kleanthous, 2007; Kendall, 2010; Davies et al., 2012) to ensure a good market share and to preserve their

customers and images. Consequently, managers have the defy to keep the brand exclusivity and the globalization of luxury brands balanced. According to Kleanthous (2011), this task becomes more complex in emerging countries, where luxury consumption is seen as a key distinction between rich and poor, and as a symbol for recognition and status. For example, Middle East consumers want something "else" and exceptional and prefer loud branded products: sunglasses, handbags and clothes must have a big logo which is recognizable from a big distance. In addition, they seek personalized and extravagant goods.

Recent luxury studies (Bendell and Kleanthouse, 2007; Kendall, 2010; Cvijanovich, 2011; Bendell, 2012) consider luxury and sustainability sharing common standards. Both place importance to rarity, to the notion of time and to the significance of heritage. "Both can be about creation, education, about pleasure and emotion." (Cvijanovich, 2011, p.1). Luxury values wander through generations and remain protected and treasured (fig.2). Without this reverence, the luxury world will no longer be existent. In the same way, sustainability has respect for natural resources, for human being and creation. Thus, "Both luxury and sustainability are becoming the guardians of heritage." (Cvijanovich, 2011, p.1). Furthermore, reasoning that luxury brands are reflecting consumers' identity and some exceptional values (Belk, 1988; Vigneron & Johnson, 1999; Jenkins, 2004; Dubois, Laurent & Czellar, 2005; Wiedmann, Hennings & Siebels, 2007; Langer & Heil, 2013), luxury clientele expects the brands to mirror their hopes and ambitions (Bendell and Kleanthous, 2007). "They are part of an affluent, global elite that is increasingly well educated and concerned about social and environmental issues." (Bendell and Kleanthous, 2007, p.2). Luxury consumers are unique and seek products that finest reflect their adoration of superfluity with a sense of fairness. They are different to non-luxury buyers in their purchasing. Decisions are always established by pleasure instead of requirement, affluence rather than charge and appreciation above criticism (Cvijanovich, 2011).

The introduction of sustainability as well as "going green" has faced luxury firms with many defies. On the one side, past communications on both sustainability and its measures had a negative effect on luxury buyers. Hearing about sustainable luxury or living, many customers were distressed and thought this would lead to a notable change in their lifestyles and norms. On the other side, Stakeholders came away with backbiting moods and negative feelings due to the perception that sustainable measures would be expensive (phenomenon of Separation fallacy) (Cvijanovich, 2011; Harris and Freeman, 2008). Luxury manufacturers have likewise felt that communication about improved production processes and the reduction of waste are not key issues that lead to a customers' happiness. Thus, Brands

should redefine their business model in response to the advanced consumers' conscientiousness. The key task here is to meet the intersection of traditional customer needs and new environmental facets implementing the accurate marketing strategies (Bendell and Kleanthous, 2007; Cvijanovich, 2011). For example, many companies that cannot adopt 100% sustainability give a share of their profits to some communities with a high green aspect. This support allows them to tie an additional ecological side to their image.

Several Authors (Prexl, 2010; Prüne, 2013; Kapferer & Michaut- Denizeau, 2014) disagree with this Philosophy. They defined the concept of "Green washing" (similar to "bluewasch"-washing through the reputation of the United Nations) which describes corporations that attractively manage their reputations with the public, financial community, and conventions to hide unconventionality, to distract attributions or errors and to obscure the nature of the problematic. Such firms engage in composite strategies and counter approaches to create confusions, to false firm's intentions and to shift both focus and attention away from the company. Environmentalists refers to countless examples:

"The world's leading ozone destroyer takes credit for leadership in ozone protection. A mammoth greenhouse gas emitter professes the precautionary approach to global warming. A major agrichemical manufacturer trades in a pesticide so hazardous it has been banned in many countries, while implying it is helping feed the hungry. A petrochemical firm uses the waste from one polluting process as raw material for another hazardous process, and boasts of an important recycling initiative. Another giant multinational cuts timber from virgin rainforest, replaces it with monoculture plantations and calls the project "sustainable forest development."

(Kenny Bruno, 1997, p.1)

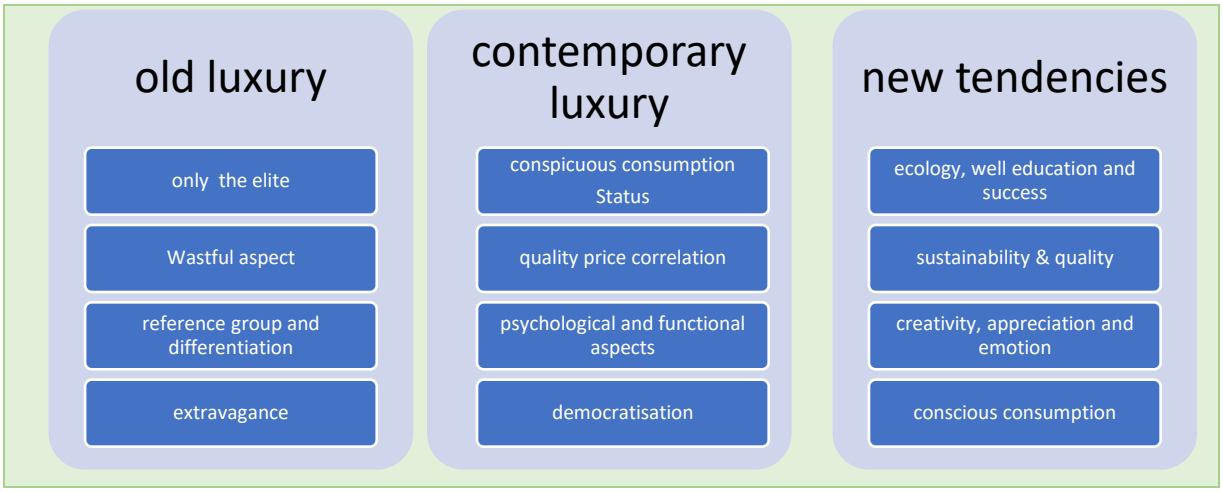

Figure 2 Evolution of luxury and luxury consumption over time

2.3 Disruptive innovation in luxury

2.3.1 Disruptive technologies in mass market

Various works like "Technology trajectories" (Dosi, 1982), "S-curves" (Foster, 1986) and "punctuated equilibria" (Tushman and Anderson, 1986) have studied the appearance of new technologies, their effect on both firms and consumers. They investigated the interruption of conventional technology and concluded that the evolution of the new good in terms of quality (Utterback and Abernathy, 1975; Foster, 1986) and incumbents 'difficulties (Bower and Christensen, 1995; Christensen, 1997) in matching their performance and competence are major flop reasons.

Few years later, Christensen (1997) showed the possibility that technologies with inferior performance can redefine the market structure. He introduced the notion of disruptive technologies which has had a profound effect on both academics and executives and on the way, they perceive an innovation. Bower and Christensen (1995) introduced numerous examples where incumbents failed to stay at the top of their business when market and technologies change: IBM missed the emergence of minicomputers, which were technologically simpler than mainframe. Consequently, they lost market share. Moreover, digital equipment has dominated the minicomputer market with innovations like the VAX

construction but missed the personal computer market completely. They (Bower & Christensen, 1995) also referred to Goodyear and Firestone who have entered the radial-tire market too late. Also, Kodak have lost market share because they neglected the arrival of digital camera.

According to Bower and Christensen (1995), Christensen (1997) and Adner (2002), firms that failed to survive such innovations displayed a multifaceted feebleness. First, bureaucracy and arrogance are significant flop causes: new entrants occupy a niche market with new products that usually bring up new performances or a different bundle of characteristics which (at least one) are not valued by existing customers. Consequently, market leaders ignore the new market because it is still immature and presents lower profit margins compared to the conventional one. Over time, attributes and features that are appreciated, progress rapidly so that they can overrun established goods (figure 3). In the same context, Downes and Nunes (2013) defined the notion of "Big Bang disruption" where product lines and businesses could be either created or destroyed briskly. "Say hello to big-bang disrupters. Once launched, these disrupters are hard to fight. They don't just create dilemmas for [incumbents]. They trigger disasters". (Downes & Nunes, 2013, p.2). Moreover, most entrepreneurs are not able to implement an efficient planning strategy and their investment are basically short termed. That's why they fail to adopt new technologies and to defend their business. In addition, many leading companies stay too close to their customers (sustaining Innovation). Before beginning a new production or developing new distribution channels, many executives would refer to their customers initially.

It's a hard task for most firms (including well managed) to keep focus on heterogeneous customers and markets. On the one side, they must forecast technological developments, assess cost-effectiveness and allocate resources to sustain the current market. This mission is too complicated and takes wholly the resources a company possesses. On the other side, enterprises are supposed to do the same procedure for both unknown customers which seem to be irrelevant and markets that do not yet exist. In addition, firms' hierarchy plays a vital role to implement the right strategy. Large companies are more unlikely to participate at new markets because of the exerted pressure from shareholders network. At the end of the day, meeting the wishes of current customer and winning market share is a major key for the survival of such companies.

Countless establishments have seen how tough it is to ignore new technologies. Lucas and Goh (2009) referred to the example of digital cameras. Even though they didn't meet the

necessities of conventional customers in the 1990s, they improved faster than consumers' request for performance did. Kodak's managers, industrial clienteles and trailers have also ignored the digital camera and saw no importance or advantage. Consequently, the new product offered new features and characteristics like compatibility and faster image transfer that attracted all consumer categories: professionals and amateurs. Consequently, Kodak lost its market share and business.

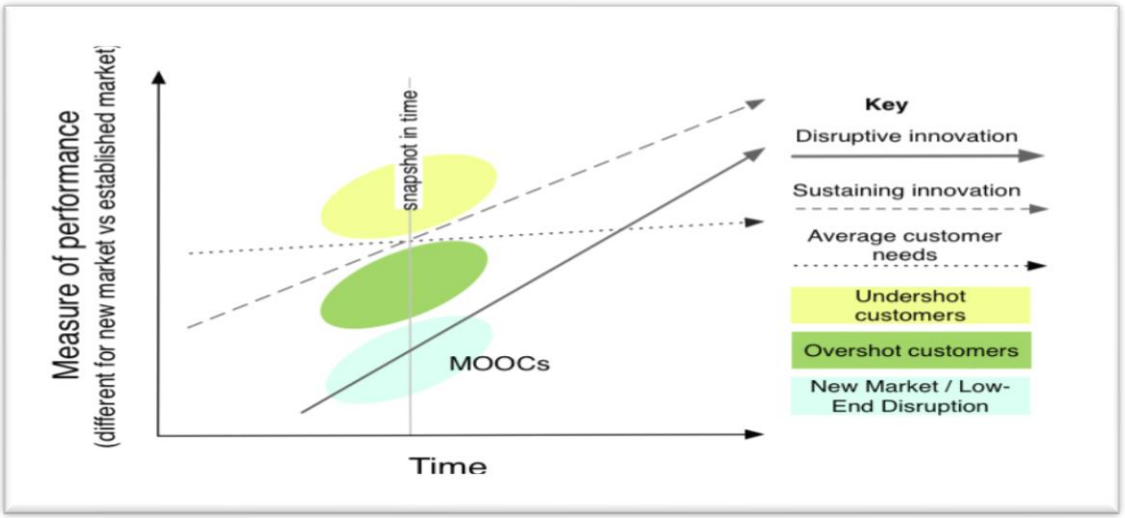

Figure 3 disruptive innovation (Christensen, 1997)

In addition, the hard-disk-drive is the best example that reveals the risk of staying too close to established consumers. In the history of this industry, market front-runners faced at each step a disruptive technological revolution: when the diameter of disk drivers shrunk from the original 14 to 8 inches, then to 5.25 inches and lastly to 3.5. Remarkably, each of these dimensions offered the market firstly less storage capacity and was ill-treated from current consumers and market leaders (Bower and Christensen, 1995). The 8-inch drive, for example, offered by introduction 20 MB and thus didn't attract current customer needs of 200MB. Over time, disruptive firms developed their invention and could offer a disk-drive that is smaller and that has more than 200MB capacity. Moreover, the "disruptive architecture" lead not only to smaller products but to other important attributes such as "low- cost stepper motors, ruggedness, light weight and low-power consumption." (Bower and Christensen, 1995).

All the examples mentioned above are identic in the way that each firm was too close to customers, tried to fulfill their needs and gave them exactly the performance and the features they are seeking for. With the appearance of new technologies that become more developed and ameliorated in a succeeding step, these firms are then hurt, and their clients adopted the new product.

Many studies (Bower and Christensen, 1995; von Hippel, 1994; Lynn, Morone and Paulsen, 1996) concluded that top managed establishments are leader in their industries in evolving and commercializing new technologies. But because these new goods target the future generation of their customers, those firms are seldom market leaders. Each time a disruptive technology emerges, the majority of established firms is unable either to follow or to react. This is due to the dissimilarity between the new and the existing product features.

In summary, disruptive technologies present atypical features compared to conventional goods. They have usually inferior quality (in one or more product dimensions) to mainstream technologies and therefore, serve only niche markets that perceive their new attributes. Likewise, Market frontrunners ignore the innovation because of its low-win-margins and unknown target groups. Over time, more and more customers use the new technology and appreciate some of its new features. Simultaneously, disruptive firms ameliorate their product that make the appearance of a new market promising. Remarkably, consumers become more and more familiar with the new merchandise. As a result, the niche market replaces the traditional one and well-known companies are destroyed. For example, the arrival of portable phones was accompanied with high costs, worse call quality, but created a market for portable phones offering new unfamiliar attributes such as portability, weight, small size and reachability.

In conclusion, disruptive innovation in mass market follow a definite path and substantiate goods with the following characteristics:

	Characteristics
1	Temporary inefficiency & lower price
2	New performances & standards
3	Unknown market and customers
4	Ignorance of market leaders
5	Proportional increase in performances
6	Substitution

Table 1 Characteristics of disruptive goods in mass market

2.3.2 Sustainability as inspiration for disruption in luxury

The luxury market has undergone some transitions from `conspicuous consumption´ to ´conscious consumption´. The appearance of a new consumer group (Lohas: life style of health and sustainability) that is interested in ethical and sustainable goods faced high- end manufacturers with the challenge to preserve both their image and brand value. In addition, experienced and satisfied luxury clients have reached a saturation level and are therefore interested in new goods with exceptional characteristics such as environment friendliness or ethics (figure 2). The literature differentiates between two attitudes. On the one side authors, such as Davies et al. (2012), Elliott and Freeman (2001), McGoldrick and Freestone (2008) affirmed the importance of ethics but don't consider it as a key aspect to succeed in luxury since buying high- end products is an intimate moment where customers are seeking to reward themselves. On the other side, Bendell and Kleathous (2007); Kapferer (2010); Bendell (2012); Hennings et al., (2013); Kapferer and Michaut (2015) Cohen (2015) empathize the significance of sustainable luxury to survive and guarantee market share. According to Kapferer (2010), ignoring these norms will lead to a high reputational risk. Both the appearance of new ecological customers and the new buying behavior of experienced clients (who want differentiation), have an enormous effect on firms' strategies and businesses.

Davies et al. (2012) have examined how consumers perceive ethical luxury and discovered the differences between luxury and commodities. Buying FMCG makes it easier for consumers to first display their concern about society and, second to feel pleased when purchasing. Other studies (Strong, 1996; Harrison et al., 2005; Vermir and Verbeke, 2006; Mori, 2009) have empirically confirmed this founding: about 30% of their respondents showed interest in ethical goods when purchasing (Mori, 2009) and were ready to pay 10% more (McGoldrick and Freestone, 2008). Despite this growth and interest, ethical FMCG present only around 4% of the total market sales (Davies et al., 2012). Based on further studies on consumer buying behavior (Vigneron and Johnson, 2004; Ward and Chiari, 2008) Davies et al. (2012) concluded that luxury consumers are looking for specific goods with specific features (materialistic and personal values) to both enjoy and to impress others. Therefore, ethics in luxury and commodities have significantly distinct aspects and motivations at least in four factors (prestige, self-image, ethical condition of production and

convenience). Their argumentation encloses essentially four dimensions. First, the quality-price differential. When buying high-end goods, clients think more about price and social values as about ethics. In addition, people would buy fair trade coffee but not luxury because the price difference will not vary as much as it will be in luxury. Second, the most crucial factor for a low willingness to pay for sustainable ethical goods is the lack of information and a low rate of publicity and promotion unlike commodity. Third, because of the irregularity of purchases clients are less aware about ethics and don't expect this will have any negative impact on society and environment. Besides when habitually buying environmental friendly goods, consumer may feel good. The fourth argument is the lack of availability since per definition, luxuries are not easily obtainable.

2.3.3 Reconciliation of luxury and sustainability

As mentioned before, luxury goods should show some exceptional characteristics like excellent quality and a high level of prestige. In the same context, Wiedmann et al. (2009) developed a conceptual model that classified these characteristics into 4 dimensions: the financial value includes price. Usability, quality and uniqueness form the functional value. The third dimension incorporates some individual assessments like self- identity and materialism. Finally, conspicuousness and prestige belong to the social values. To check if luxury and ecology fit together, these dimensions should be investigated with the principles of environmentalism (ecology, economy and social) defined by Balderjahn et al. (2015).

The ecology aspect requires a mature use of rare resources and materials which implies high prices in both production and retail (Franco et al., 2014). Gardetti and Giron, 2016 refers to the owner of the brand Pachacuti, Carry Somer who explained that, to realize competitive advantages and market share, luxury firms should follow ethical strategies and sustainable production processes without ignoring the principles of luxury goods (high price, quality, aesthetic, etc.). In addition, many Authors like Usunier (2006), Bloemer et al. (2009) and Godey et al. (2012) investigated the importance of the CoO- effect[2]. They assumed its enormous impact on buying decision since it is considered as quality indicator like Italian fashion, German cars and French fragrances. In the same Context, Gam et al. (2010), pointed out that customers accept to pay more for ethics under the assumption that the new

[2] Country of origin effect (Godey et al. 2012)

good illustrates, at least, similar quality. Bendell and Kleanthous (2007) concluded that price differences (ethic and non-ethic) doesn't affect buying decisions in luxuries because producers are supposed to guarantee a minimum level of transparency in both production and resource usage to save business and preserve competitiveness. Consequently, the financial dimension shows a positive (at least a non-negative) correlation with sustainability and shapes therefore an opportunity for luxury firms.

Furthermore, price is not the most crucial factor influencing buying decision in luxury, since high-end clients are primary interested in prestige and status (Kapferer and Michaut, 2015). Besides, luxury is eternal in terms of quality and exclusivity. For instance, many goods like jewelry and arts can be transferred through generations and are therefore more and more expensive and exclusive (Verde Nieto, 2011). The actual literature illustrates many examples showing the convenience of luxury and ecology. Bendell and Kleanthous (2007), for example, emphasized sustainability in production like the usage of natural dyes, environmental friendly resources or recycling strategies for certain product categories. Achabou and Dekhili (2013) added that customers are unlikely to accept recycling by expensive goods, especially if they have a lower quality. Other authors such as Bendell (2012), Hennings et al. (2013), Gibson and Sibold (2014) referred to numerous manufacturers that succeeded in understanding and influencing (eco-) luxury consumers. The American car manufacturer Tesla motors Inc. impressed the market with its efficient automobile so that the owner profits from the combination of ecology (Co2-emission, low costs, unlimited warranty) and superfluity (exciting acceleration, design, exclusivity, status & prestige). Numerous users switched to Tesla and their accomplishment attracted other established producers and market leaders such as Daimler, BMW, Porsche etc. Consequently, luxury and ecology share numerous facets. It is therefore essential for manufacturers to find the appropriate combination to fit various needs. Clients still appreciate and seek the fundamentals of luxury, but the intensity differs.

2.3.4 Sophisticated disruption in Luxury: modeling disruptive innovation in luxury

All well- read executives are familiar with the fundamentals of disruptive innovation and how to save business. As mentioned above, Bower and Christensen (1995) defined the terminology and set some indications for prognosis. They have taught leading managers to look for start-ups that offer cheaper substitutes to their products, then target the whole

market. The model shows that new goods are not only cheaper but also have a lower quality than conventional. Consequently, firms have enough time to react and save their industry. This assumption doesn't hold anymore since numerous creative start-ups begun to reframe the market for high-end goods. They aim to change the pattern of consumption and production for a positive common result. The task becomes more and more complex for established manufacturers. Sarvepalli and Moore (1967) pointed out that creativity and destruction necessitate each other. Besides, luxury, as usual, is associated with heritage and creativity which causes destruction. Several firms (Tab.2) illustrated this idea and succeeded in jostling recognized constructers. "Elvis & Kresse" is a good example of a probably positive disruptive innovation in luxury fashion. Starting from an environmental problematic, the manufacturer succeeds in combining industrial waste with deep luxury values to produce high-end handbags. They attracted many luxury consumers and celebrities like Cameron Diaz. Similarly, the luxury automobile industry has submitted some improvements. The US car manufacturer Tesla motors Inc. recognized changes in luxury buying behavior as well as in consumer needs. Tesla targets not only well-educated luxury consumers who care about ethics (LOHAS) but also traditional buyers and offers them the fundamentals of luxuries (figure 1). The LOHAS are successful people who seek to project their status and their concern about environmental problems through the consumption of such green goods. The firm produces high-end electric vehicles with a tall quality, a clever design, robustness and other luxury standards (individual, social, functional and financial). Unlike the traditional disruptive innovation described by Christensen (1995) and Rogers' innovation diffusion (2003) which gain acceptance within 5 steps (innovators, early adopters, early majority, later majority and laggards), luxury disruptions have few test users and are then promptly approved by the clear majority (Downes & Nunes, 2013).

For a successful disruption in luxury, the new good should first, satisfy some conditions like superior design and aesthetics that are important luxury characteristics. Second, it must have an ecological side and prove a positive economic advantage like fuel cost saving in the case of electric vehicles and reducing waste in other industries. Manufacturers should pay attention when executing such policies since numerous studies (Elliott & Freeman, 2001; McGoldrick & Freestone, 2008; Davies et al., 2012) have shown that ethics are not decisive buying motivators. Contrarily, they could have a negative impact on luxury consumers who, for example, refuse recycled fashion clothes. Lastly, disruptive products ought to show innovativeness in terms of features, ideas and technology to fulfill consumers' dreams. This way, Tesla has attracted countless high-end buyers. The car offers high technology like the

partial auto pilot, an impressive control center (LCD- touchscreen) and, especially, a wireless connection to the manufacturers (software updates, etc.) (Tesla, 2016).

Start-up	Market	Motivations	Characteristics
Elvis & Kresse	Fashion handbags	• A huge amount of industrial waste • Reduce it • The "Deeper luxury report"	• Recycling: Trash into luxury ecological goods • Funding growth only by sales • Reforming both luxury market and value
Cosescha	Fashion Knitwear	• Financial crisis in Argentina → No cash flow for start-ups • Idea: first a friend then a training by Buenos Aires government about environmental problems	• Making vintage- inspired knitwear from disposed ladies tight
Tesla	Auto-industry	• Better world with better conditions • Technological motivations • Luxury consumers seek "Something else"	• Luxury EVs with good design and features • Guarantee: Quality, durability, creativity, high technology and ecology
Rags2richens	Household	• Living conditions and women's situation next to Manila • Inspiration by the fashion brand Edun	• Carpets and rags, employing women living in a slum • Based on love of quality and amazing design • No refunds • culture of quality • Profit reinvestment to better build artisans in academies • Transparency, creativity and freedom artisans

Shokey	Fiber industry	• Poverty • Help growth eco-system to provide safety and transparency	• Produces yak fiber to help Tibetan surviving • Partnership with luxury brand Shanghai Tang • 4 field strategy: 1. direct income generation 2. Preserving local culture 3. Promoting sustainable use of resources 4. community development
Mumbai -based Shilpa Chavan	fashion	• Born in poor community • Many unemployed artisans • Felt an appetite for eco-sustainable goods	• Planet's first fair trade green footwear form (WFTO) • Starting capital: <$10.000 • Products inspired from tradition • Old tires, natural fibers and handmade fabrics. Locally sourced • Goal: bigger factory with a capital of around $20 million by 2020.

Table 2 successful ecological luxury start-ups

Bendell and Kleanthous (2007), Bendell (2012), and Kroeber-Riel and Gröppel-Klein (2013) saw many indications for disruption and concluded that "the current time is potentially disruptive for incumbent luxury brands and groups". (Bendell, 2012, p.1). In his work 'Elegant disruption: how luxury and society can change each- other for good', Bendell (2012) stated out 5 significant sings that are able to change the rules of luxury. First, manufacturers should revise their values because consumer attitudes and tastes are changing from 'conspicuous consumption' to 'conscious consumption' (Wiedmann, Henning & Siebels, 2009; Zahn & He, 2012; Kapferer & Michaut, 2015). Also, the financial crisis in 2008 had a remarkably influence on consumers' behaviors. Many western and eastern luxury clientele mislaid the old-style of prosperity and affluence. They began to reorganize their way of life with respect to some new ecological morals. Second, clients are becoming more aware of production process and conditions of several brands. They are more and more concerned about social and environmental aspects and are, therefore, seeking eco- goods (Moore, 2009; IFOP, 2010). Third, the author empathized the effect of communication channels and social networks. This bidirectionality allow consumer not only to promote and react but also to participate in generating new values and features (Wellman, 2001; Waddington, 2012). For instance, many firms make use of this, they adjusted their products and so, attracted new consumers.

According to Bendell (2012), hyper- connectivity permits industrials to know more about their business and tolerate transparency. The market is then further exposed for firms that have a true story, deep principles and a high lucidity degree. Science fiction doesn't possess that influence and appeal as before. Finally, the Geographical shift, especially with the growth of the Asian and south American markets, and the emergence of a new era of thoughts and beliefs (transmodernism) yield disruptive potential. Eventually, many luxury houses have fingered a menace and are trying to adopt their trades and to develop new strategies with the view to save their own business and to survive. For example, Hermes has launched a new Chinese luxury brand that focuses on local ancient design. Another illustration is the "special days" by LVMH group where they demonstrate transparency regarding production and trading. Unlike mass market, established luxury houses have then discerned this change and have immediately implemented these strategies as a reaction signal.

Another study conducted by Downes and Nunes (2013) recognized a disruptive potential in luxury driven by many creative companies. Investigating their strategies and approaches, the authors have identified three significant and weighty characteristics. These start-ups try to combine inspiration, ingenuity and inventiveness in order to produce special goods with special features. The most fruitful strategy is the use of 'Hackathons' where many inspired experts and inventors try to find out, what kind of features, technologies and structures could come together. They are often efficacious because they have neither pressure nor stress, which allows sophisticated destruction. In addition, such firms create a new market with unconstrained growth, unlike the traditional one. In this case, the good targets many customers and segments simultaneously. So, there are trial users who buy it at first, then the massive mainstream. It is high probable that the invention won't be felicitous in several phases, but they will get it right at some point. And so, they don't only meet with consumers' expectations but a touch above. Looking at the example of Tesla motors Inc. that satisfies all these conditions. Many luxury consumers switched to the car manufacturer and are remarkably excited about quality (safety, warranty, acceleration, range, infrastructure, etc.), features (autopilot, traffic signs recognition, touchscreen, etc.) and services (wireless updates, no intermediaries: direct relationship to clienteles). Moreover, those creative traders have changed some marketing rules. To realize competitive advantages and market share, they do not follow traditional schemes (porter, 1985) but they associate creativity, technology and performance and, have therefore a random path. Noteworthy, they are not direct competitors from the same industry and they aim neither the bottom of the market nor low-end consumers. These companies are totally different from incumbents who, just innovate

to preserve prices and revenues from dropping. Downes and Nunes (2013) mentioned that this combination results cheaper prices. This is not the case in luxuries when looking at some prices like the Tesla model S and handbags of Elvis&Kresse. This type of innovation changes the rules and can destroy a whole product line within a fleeting time. It is called 'Big Bang innovation' (Downes and Nunes, 2013). The difference to mass markets is that incumbents have immediately reacted. Ferrari, Rolls-Royce, Daimler, Porsche etc. began the production of several electric cars and proclaimed some other models with better performances. In addition, Daimler AG have sold its shares in Tesla and pronounced that the upcoming electric models like the B-class, will be self-produced (Mercedes-Benz, 2016). Consequently, start-ups in luxury compete through new products that show entirely unusual characteristics such as similar or even higher prices and quality than conventional goods. Subsequently, they present a menace for established firms.

To conclude, the luxury market displays roughly disruptive potential driven by creative start-ups. In addition to attractive product features, these new entrants involve ecology, creativity and high-tech as competing advantages. Unlike the mass market, the introduced new luxury merchandise such as the electric car of Tesla or the handbags produced by Elvis & Kresse has to some extent better features (acceleration for cars and load capacity for handbags) compared to established ones. To date, there is no real cases that illustrate the effect and the course of a disruptive innovation in the high-end sector. However, the cited examples confirm the threat of such innovations, and allow the prediction of their course and physiognomies in comparison to mass market (table 3).

The difference between luxury and mass markets is that high-end interrupters don't aim the low-end consumer and try to reach the whole market in a next step. They enter the top of the market with performed high quality goods and target all consumers simultaneously. These creative firms try to combine existing technologies and to fit them together in order to have a suitable product. They don't target existing luxury firms and, even don't see them as competitors. Unlike commodities, market leaders have here reacted instantly. For instance, they offered equivalent products and pronounced others that are better performed (for example Daimler, Ferrari, etc.).

	Disruptive innovation (mass market)		Sophisticated innovation (luxury)
1	Temporary inefficiency & lower price	√	High quality & price
2	Menace comes from traditional competitors	√	Come out of left field. You are not a direct challenger/competitor
3	New performances & standards	≈	New performances & standards
4	Unknown market and customers	≈	Unknown market and customers
5	Ignorance of market leaders	√	Immediate reaction of market leaders
6	Proportional increase in performances	√	High quality & performances from the begin
7	Substitution	?	Not yet confirmed but should be more complicated due to: • Deep liaison between Customers and their favorite luxury brand ➔ Higher loyalty • Rapid reaction from luxury manufacturers

Table 3 disruptive vs. sophisticated innovation

Furthermore, they developed peerless strategies to save their business like the "special days" by LVMH or the foundation of a local Chinese luxury brand by Chanel. Remarkably, the innovative products seem to have even higher quality in terms of durability, features and ease of use, than their counterparts and, have therefore soaring prices. Substitution cannot be confirmed since sophisticated innovation is a new phenomenon and still unstudied. Looking at the Teslas' Sales, it becomes evident that many luxury consumers are interested in the new car and have bought it. But is that changing temporary or forever? The task is more complex, especially when the favorite brand offers the same technology and features because luxuries are based on brand love, loyalty and emotions. Consequently, it is difficult to judge if consumers would simply switch to the new one.

2.4 Adoption path of innovations

The TIA (theory of innovation adoption) has been used to study the adoption behavior of a variety of different innovations since 1960 (Meuter et al., 2005; Venkatesh et al., 2003). The philosophy gives an overview about major milestones in technology adoption research (Vankatesh et al., 2007). Hirunyawipada and Pawsan (2006) made a review of empirical studies on consumer innovativeness and adoption research. They concluded that, before a consumer engage in behaviors, an attitude toward this comportment is formed. Furthermore, they refer to Rogers' innovation- decision- process model that describes the psychological sequences underlying attitude formation within five stages: first, gaining knowledge about innovation. Second, based on perception of several characteristics, a consumer attitude is formed. S/he then develops a p/n feeling about performing a certain behavior that leads to a p/n attitude. Lastly, this adoption/rejection is implemented in a congruent behavior (Rogers, 2003). Similar to TAM (technology acceptance model), the TIA explains how users come to accept and use new technology in relationship to the attitude formation which leads to adoption behavior (Vakentesh et al., 2007). Hence, the Attitude formation is based on 2 main characteristics of an innovation: Perceived usefulness & ease of use which influence subsequently adoption decision and behavior (Davis, 1989; Kulviwat et al., 2007). Other characteristics such as compatibility, trialability and like must be took in consideration (table.3).

Fishbein and Ajzen (1975) developed the theory of reasoned action (TRA) - one of the most influential and fundamental theories of human behavior- that explains consumers' decision-making- process (Vakantesh et al., 2003; Yoh et al., 2003). In addition, the TRA outlines social acceptability as central factor of innovation adoption, particularly when uncertainty of the innovation is high. Wang and Chen (2012) supported this finding and concluded that attitudes are crucial in adoption decision.

Consequently, both theories are inherently related as they center the importance of attitude in the adoption process. Stern (2000) defined the 'theory of values, beliefs and norms' (VBN) as an extension. In summary, he demonstrated that consumer's personal and moral values are important determinants of innovation adoption decision and choice. Beyond, the actual adoption behavior is guided by other factors like personal norms (Stern, 2000). They represent a further antecedent of behavioral intension and, thus extends the basic model of TRA. Attitudes and personal norms interact to form the behavior of a consumer (Jansson

2011, Stern, 2000; Petschnig et al., 2014). Jansson (2011) tried to integrate 2 research waves, environmental psychology research and the diffusion of innovation, in order to explore factors motivating or hindering adoption of high- involvement green products. A survey with Swedish car owners was conducted. The results show that an adoption decision within the domain of high- involvement innovations like alternative fuel vehicles (AFV) is not tied either to TIA or to TRA, but is knotted to both. It is a complex process combining theoretical aspects from the previously introduced notions (table 4). The adoption of alternative fuel vehicles was driven by fuel efficiency (cost saving) and by environmental friendliness. Furthermore, adopters expect higher demand for AFVs in the future, especially if they would have higher (non-)monetary advantages and would be more compatible and less complex in terms of features, use and maintenance.

Theory of innovation adoption	Theory of reasoned action
• Has been used to study adoption behavior of a variety of different innovations since 1960 (Meuter et al., 2005; Venkatesh et al., 2003).	• A predominant theory in the context of adoption and diffusion
• Cornerstone in technology adoption research (Vankatesh et al., 2007).	• Has a rich history (Fishbein and Hijzen, 1975)
• Before a consumer engage in behaviors, an attitude toward this behavior is built.	• One of the most influential and fundamental theories of human behavior.
• Attitude formation is related to subsequent behavior.	• Similar Theories: Theory of planned behavior (Ajzen, 1991).
• Central component is the Roger's innovation-decision process model: ○ Describes the psychological process focusing on attitude formation within 5 steps. ○ Underlying the effect of the subsequent behavior	• A widely used framework to explain the consumer decision-making process (Vakantesh et al., 2003; Yoh et al., 2003) • Attitudes play a central role in adoption decisions (Wang and Chen, 2012).
• Similar to TAM: technology acceptance model: ○ How users come to accept and use new technology in relationship to the attitude formation which leads to adoption behavior (Vakentesh et al., 2007). ○ Attitude formation based on 2 main characteristics of an innovation: Perceived usefulness & ease of use which influence subsequently adoption decision and behavior (Davis, 1989; Kulviwat et al., 2007).	!! But!! Subsequent behavioral intensions are influenced by various attitudes and subjective norms which are considered as „best predictor of actual behavior ". (Fishbein and Ajzen, 1975; Yoh et al., 2003; Huijts et al., 2012).

	Include consumer's perception that person relevant to the decision maker see s/he should or should not engage in a certain behavior (Oliver and Bearden, 1985).
TIA includes these two characteristics and extends them with further vital characteristics of innovation like compatibility, trialibility or the like.	TRA outlines social acceptability as central factor of innovation adoption. Particularly when uncertainty of the innovation is high like the case of EV.

Table 4 TIA and TRA: characteristics and advantages

2.5 Empirical study

2.5.1 Target customers and hypothesis

Generally, an important tenet of evolutionary psychology entails that humans' mind are successively fulfilled by a broad range of socialization forces (Pinker, 2002). This concept supports the idea that a consumer's behavior evolves in a dynamic way to best fit his/her needs given some specific vicissitudes (Griskevicius and Kenrick, 2013). Along these lines, Saad (2013, p356) empathized the role of consumer perception in the decision-making process. He argued, "[T]here are innumerable visual stimuli that are innately and universally appealing. For example, newborns and infants, too young to have been socialized, gaze longer at and respond more favorably toward attractive faces". Similarly, young luxury buyers (baby buyers) can be conceptualized to be somewhat "raw," with limited experience. They seek the fundamental benefits of acquiring high-end products such as social status and recognition. Therefore, buying glittery, and/or fashionable goods could be the best avenue. Also, much literature (Howell & Hill, 2009; Johnston & Finney, 2010; Gonzales-Cutre, Sicilia, Sierra, Ferriz & Hagger, 2016) confirms that self-determination-theory (SDT) can help when examining the relationship between needs and well-being. Its fundamentals suggest two different motivations that can be either sustained or diminished. On the one side, intrinsic incentive is a natural interest that boosts the willingness for mastery and assimilation. These values are likely to run deeper in luxury consumption situations. Csikszentmihalyi and Rathunde (1993), and Ryan (1995) empathized its' primary role as a source of enjoyment

and vivacity. As well, Deci and Ryan (1985, 2000) stated out a positive correlation between intrinsic motivations, autonomy and self-confidence.

Generally, thus, experienced wealthy clients are more knowledgeable-have more expertise- and are likely to be able to appreciate a luxurious product more than others. Importantly, they tend to be more aware of environmental complications, and thus try to adapt their behaviors and lifestyles earlier, faster and stronger than other. Consequently, acquiring a luxury EV might be an effective way to, first show concern with environmental issues and, secondly, to enjoy the fundamentals of luxury such as pleasure and satisfaction. The more they succeed in finding such opportunities, the higher their psychological outcome will be. Notably, these notions are consistent with the principles of the VBN (values beliefs and norms) theory that takes into consideration socio-demographic factors, personal norms, values and beliefs as antecedent for "green" behavior. For instance, Jansson et al. (2011) tried to integrate two research streams--environmental psychology research and the diffusion of innovation--to explore factors motivating or hindering adoption of high- involvement green products. To investigation their conjectures, a survey with Swedish car owners was conducted. The results show that an adoption decision within the domain of high- involvement innovations like alternative fuel vehicles (AFV) is not tied either to TIA (theory of innovation adoption) or to TRA (theory of reasoned action)—but, in fact, it is knotted to both. It could be argued that the adoption of alternative fuel vehicles was, thus, driven by fuel efficiency (cost saving) and by ecological concerns. Furthermore, adopters expect higher demand for AFVs in the future, especially if they would have higher (non-)monetary advantages and would be more compatible in general and less complex in terms of features.

On the other side, extrinsic motivations are driven by external social desires such as status and appreciation. Therefore, one can argue that the performance of an activity is (also) driven by exterior factors for a pure societal outcome such as gratitude and recognition (Bandwagon and Veblenian behaviors). Accordingly, young unexperienced luxury clientele primary seeks status, recognition, etc. Thus, they are largely driven by rather external drives (Vigneron and Johnson, 1999). Afterwards, they become more and more familiar with luxuries and begin consuming their favorite brands (app.2). At this point, they often consider themselves as "recognized" prosperous buyers and member of an elite. Therefore, the materialistic impulse decreases compared to the outgoing position and their choices are more consistent with their own beliefs and preferences. Such customers aim, in a sense, at the equilibrium between intrinsic and external motivations. Later on, however, customers may reach a certain saturation level (higher luxuriosity) and begin seeking for alternatives to preserve privilege.

In that sense, EVs are likely to fit their evolving preference structures in an efficient way. As a result, we maintain:

H1a: Older, experienced luxury consumers prefer environmentally friendly luxury products.

H1b: Young luxury buyers tend to have higher materialistic motivations and, thus, exhibit less of a preference for environmentally friendly luxury products.

Next, we turn to arousal theory. This theory offers fundamental notions in behavioral psychology with the goal to understand decision- making. While this work deals with the adaptation and the willingness to accept luxury products in form of luxury EVs, it is necessary to address other issues such as customer need for novelty and his/ her perception of new ecological products. Both, arousal and the need for novelty theories support the idea that customers are weak in predicting and defining what they need specifically and over time (Garcia-Torres, 2004). However, they are trying to maintain their arousal level high enough through the search for newness which entails the necessity "to experience something not previously experienced, or something deviating from everyday routine." (González-Cutre et al., 2016, p1). Consequently, both luxury consumer groups are expected to be interested and willing to buy environmental friendly goods such as eco-tourism or electric cars. In addition, we build on TIA (theory of innovation adoption) and the TAM (technology acceptance model) as bases for our subsequent hypotheses. TIA and TAM explain how users come to adopt/accept and use innovative technology in relationship to their attitude-formation which provides one avenue to explain adoption behavior (Vakentesh et al., 2007). Hence, attitude formation is largely based on two characteristics of an innovative product: Perceived usefulness & ease of use which subsequently facilitates the adoption (Davis, 1989; Kulviwat et al., 2007) (for completeness, we add that other characteristics such as compatibility, trialability should be considered as well, of course). The innovative and superior characteristics of new luxury electric cars in terms of acceleration, comfort and efficiency (Co2-emission, fuel-cost-saving) amount to the main attractions for the purchase.

We note that this notion is supported by the TRA (theory of reasoned action), e.g. Ajzen, (1975) and VBN (theory of values, beliefs and norms) that explain consumers' decision-making- process (Stern, 2000). TRA outlines social acceptability as dominant factor of innovation adoption, particularly when uncertainty of the innovation is high (Chou, Chen and Wang, 2012). Thus, it can be argued that with the increasing environmental menace, people are more likely to adapt their behavior in a conscious way and develop a preference for ecological luxury products. Accordingly, environmental friendly products such as EVs, fair-traded and ecological goods are gladly seen and preferred by a well-to-do community which favors the luxury products. Therefore, we maintain that the adoption of green innovations in the high-end segment is motivated by both intrinsic (consciousness, new preferences & norms, quality) and extrinsic (social acceptability, impress others & differentiation) factors that sustain and accelerate the adoption process. Next, we suggest novel luxury product have the potential to hold arousal at sufficiently high levels, so the luxury consumer can truly enjoy the consumption experience and reach the desired social status. Therefore, trendy, sustainable luxury products such as electric vehicles can evoke a need for novelty and originality for prosperous customers. Based on the above, we offer to the following:

H2a: Despite their opposing motivations, both luxury categories (baby-buyers & experienced) are interested in sustainable vehicles.

Furthermore, portions of evolutionary psychology that bear on consumer behavior (e.g. Griskevicius and Kenrick, 2013) as well as game theory (e.g. Butnaru, 2009) support the dynamic nature of customers' preference evolution, esp. during times of social changes. Similarly, a metaphoric approach to Maslow's theory supports the idea that once one's first order needs are satisfied, new requirements (second order) emerge, and so on (Maslow, 1943). For instance, under various assumptions (e.g. personal, social, functional and financial), acquiring the desired good/status increases the willingness to achieve an enhanced, upper-luxury-level. Typically, rather unexperienced clients aim more for a certain status level and privilege. Consequently, they engage more in a conspicuous behavior to show their belonging to an "elite". For example, ecological and sustainable products such as luxury electric cars is a courteous manner to acquire the desired social status (recognition), since they are fashionable, noticeable and can only be consumed in public. Eco-friendly people in contrast, are aware about environmental conflicts and aim to reiterate their

responsibility and mindfulness through a conscious behavior and conscious consumption of luxury products. As state above, in contrast, unexperienced buyers are more oriented and look for exclusive, extravagant, conspicuous luxury products. This contention was already mentioned by Martinez et al. (1998) as they concluded that early adopters are younger, richer and have generally higher education level than late adopters. However, although mentioned some time ago, the notion neither detailed or motivated through existing theories or framework nor was it carried over towards the segments involving luxury products. As a result, we argue:

H2b: Young luxury buyers plan higher budgets and budget shares for luxury purchases than more experienced luxury buyers.

One of the most important tenets of market research is the gender effect. In fact, it has been argued that gender differences allow to explain some of the largest difference in consumer and consumption behavior around the globe. Thus, we expect that knowing the target customer's gender and his/her preferences or differences thereof is of major importance in the luxury business as well. For instance, Stockburger-Sauer and Teichmann (2013) found out that females have higher preferences for perceived symbolic and social values. Additionally, the existing examples of ecological creative start-ups in the high-end segment (Elvis&Kresse, Cosescha, Rags2richens, Shilpa Chavan, Shockey, etc.), show that the majority is targeting the female gender. Therefore, we maintain that:

H3: Women have a stronger preference for luxury products that are environmentally friendly than men.

2.6 Methodology

The goal of this work is to find out if a disruptive innovation in the luxury market is more likely to occur due to sustainability aspects. Furthermore, knowing which customers are more likely to adopt the innovation is a primary finding for high-end vehicle manufacturers. Hence, it is easier to apply the right strategies to preserve current clients, to serve new tastes and, to increase the firm's attractiveness.

Due to the sensitivity and the difficulty to recruit high-end clients, it was essential to choose an appropriate stimulus. First, product familiarity is an important condition to get consistent and realistic answers. Second, avoiding a pure gender driven product, allows to get a heterogeneous and a representative sample. Accordingly, Luxury vehicles seem to be the most appropriate product. Unlike fashion and jewelry, both genders like and drive cars. Even if they do not drive themselves, they are familiar with it and can judge their experience. In this case, a cross sectional study seems to be the best method. It captures a single moment in time, collecting relevant information from a focus group at one point. It is therefore an easier way for researchers to get the information they need for analysis. Additionally, for managers to get insight on a smaller scope, cross-sectional studies are a more realistic and, often, more effective way to get the data they need to make informed decisions.

For this purpose, German wealthy customers were asked to complete a subset of information on environmental friendliness and on conspicuous consumption. Environmental friendliness is measured using the "Green scale" developed by Haws, Winterich & Naylor (2014). It includes six statements that respondents should evaluate on a 7-points Likert scale. Consequently, the sum of the evaluations serves as an indicator for ecology. Various authors (Chen, 2014; Biswas & Roy, 2015) affirmed the reliability and validity of the scale and used it in numerous studies.

Analogous, the conspicuous consumption level is measured using a reliable and valid question catalog established by Eastman, Goldsmith & Flynn (1999). Likewise, the materialism level is defined by the sum of all statements. In addition, the sample includes a rich set of demographic variables like age, income, education level, number of cars in household and the budget dedicated for the next car purchase. All these variables might clarify numerous uncertainties about consumers' decisions.

Afterwards, a choice based conjoint analysis was conducted. Each participant was shown 17 different cases where he had to choose between three alternatives (pure electric, hybrid and combustion energy) the car he is more likely to buy. In five cases, customers were only shown combustion or hybrid vehicles that are not pure electric. In addition, the sample contains only people who are planning to buy a new car in the next seven to nine months.

243 Luxury clients (147 male and 97 female) completed the survey. The first analysis of the data affirmed its' representativeness since the individual average income was between €50.000 and €75.000. According to the institute of German economy in Cologne, a single person with a net yearly income above €49.140 is considered rich (Appendix 1). Even young people with no income, come from rich families (avg. number of cars ~3) and are considered potential customers. For instance, they acknowledged an average budget between €41.000 and €55.000 for their purchase (table 5).

```
> sumdata<-select(mydata,Age,facwage,faccars,facbud)
> summary(sumdata)
      Age             facwage      faccars       facbud
 Min.   :18.00   No income:32   one car:18   <25    :45
 1st Qu.:25.00   <36 T€   :70   2 cars :71   26-40  :34
 Median :30.00   37-50T€  :14   3 cars :72   41-55  :28
 Mean   :33.81   51-75T€  :13   4 cars :48   56-70  :47
 3rd Qu.:42.00   76-126T€ :64   5 cars :34   71-100 :49
 Max.   :69.00   127-250T€:41                101-150:30
                 >250T€   : 9                >150   :10

> summary(youngpeople1)
      Age           faccars        Wage       facbud
 Min.   :18.00   one car: 3   Min.   :1   <25    :10
 1st Qu.:20.50   2 cars :11   1st Qu.:1   26-40  : 7
 Median :22.00   3 cars : 3   Median :1   41-55  : 2
 Mean   :22.26   4 cars :10   Mean   :1   56-70  : 3
 3rd Qu.:24.00   5 cars : 4   3rd Qu.:1   71-100 : 5
 Max.   :27.00                Max.   :1   101-150: 3
                                          >150   : 1
```

Table 5 Summary of the collected data (R-output)

2.7 Results and marketing implications

Luxury academics are empathizing two different (contradictory) buying motivations: Conspicuousness and environmental friendliness (extrinsic and intrinsic). Therefore, it is indispensable to categorize high-end customers based on their self- perception (either materialistic or ecologic) to better understand their motivations and behaviors. As mentioned above, both constructs were measured using valid and reliable scales. Respondents evaluated a set of statements that provide their close on each alternative. Afterwards, two regression analysis are done to identify the role of demographics on each measurement (table 6 and 7). As expected, the findings illustrate that the older people are less materialistic than young customers are. They are aware of the environmental conflicts and try to project their consciousness through a matured ecological behavior.

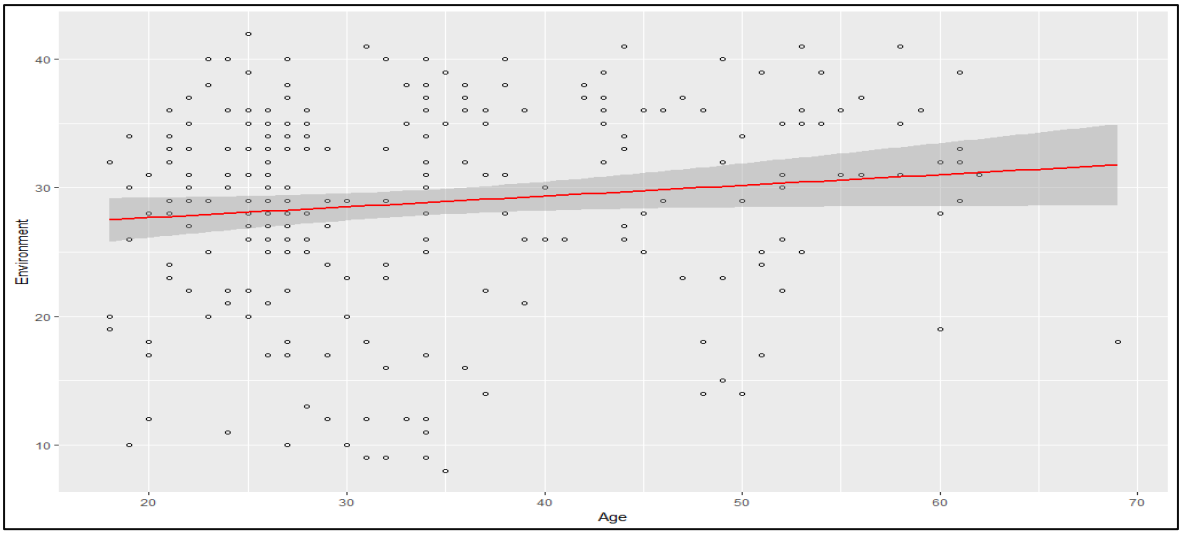

Figure 4 Linear relationship Age Ecology with confidence interval

In addition, knowledgeable customers have reached a saturation level and their belongingness to the "elite" is already deep-rooted. Another important output is that young buyers with higher income are more engaging in a conspicuous behavior. Their aim is to attain social recognition and to conquer the desired public status. Moreover, they want to enjoy their prosperity. Such clients build a principal component of the luxury market, since they seek the fundamentals of high-end goods (extraordinariness and rarity), have basic motivations (essentially Veblenian and Bandwagon (Vigneron and Johnson,1999)), and plan

higher funds for their car purchase. Figure 4 illustrates this result since young buyers (less than 40) generally dedicate higher amounts for this purchase. This is consistent with the principles of luxury where price is a key aspect for prestige. Additionally, the result affirmed that females are less materialistic than men are. This might be due to the nature of the product since women have other goods that better reflect their status and prestige like jewelry and fashion.

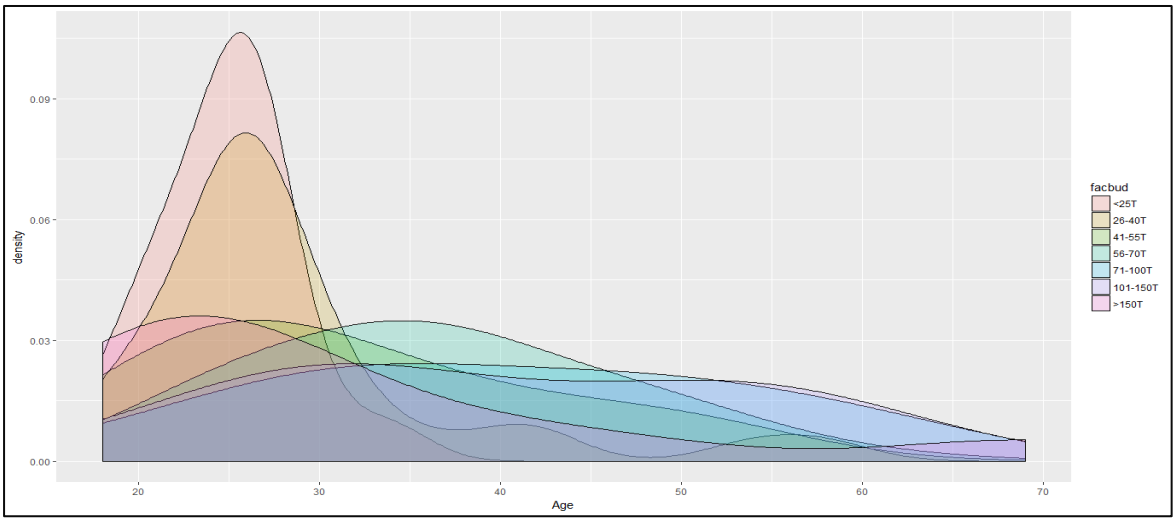

Figure 5 Capital distribution by age category

The second regression analysis deals with the ecology level. The output confirms the results of the first step. Old buyers are less materialistic. They are conscious about environmental challenges and, thus adjust their behavior. Another explication of this outcome might be the positive correlation between age and luxuriousness. Old buyers are generally more experienced and more familiar with high-end possessions than young clients are (Deci, 2000a, González-Cutre et al., 2016). Subsequently, their objective is to preserve this privilege through differentiation. Green products can be a brilliant approach. Moreover, women are more concerned about the environment since they have highly significant negative materialistic and positive ecology factors (table 6 and 7). Besides, the number of cars in household has a significant negative impact on the sustainability score. A conceivable explication might be the findings of Davies et al. (2012), Elliott and Freeman (2001), McGoldrick and Freestone (2008). They acknowledged that buying high- end products is an intimate moment where customers are seeking to reward themselves. The authors added that, unlike commodities, luxuries have lower purchase frequency. Consequently, customers assume that this won't have negative impacts on the environment.

Remarkably, the budget people dedicate for their next car purchase diminishes with an increasing ecology score. Environmental friendly customers gave lower funds than conspicuous clients. This might be due to the relative lower quality and proficiency of green products. Thus, hypothesis H_{1a}, H_{1b}, H_{2b} and H_3 are approved.

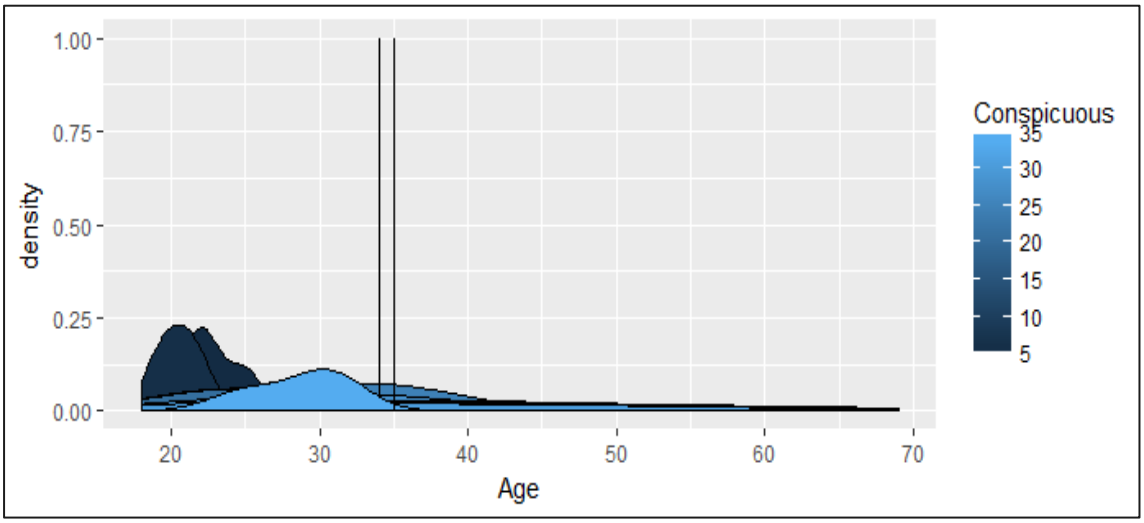

figure 6 Materialism distribution among luxury respondents

```
lm(formula = Conspicuous ~ Age + Wage +Gender +Budget +
                           Cars.im.household, data = mydata)
Residuals:
     Min       1Q   Median       3Q      Max
-14.9661  -5.5887  -0.1685   5.7306  18.4742

Coefficients:
                  Estimate Std. Error t value Pr(>|t|)
(Intercept)       19.82490    2.24468   8.832 2.34e-16 ***
Age               -0.21747    0.05929  -3.668 0.000302 ***
Wage               1.26679    0.38141   3.321 0.001037 **
Gender            -2.74202    0.91010  -3.013 0.002869 **
Budget             1.36615    0.29926   4.565 8.02e-06 ***
Cars.im.household  0.04446    0.40445   0.110 0.912551
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 6.717 on 237 degrees of freedom
F-statistic: 13.43 on 5 and 237 DF,  p-value: 1.553e-11
```

Table 6 Conspicuousness level (R output)

```
lm(formula = Environment ~ Age + Wage +Gender +Budget +
                           Cars.im.household, data = mydata)
Residuals:
     Min       1Q   Median       3Q      Max
-22.8530  -4.0847   0.7434   5.6358  14.8291

Coefficients:
                  Estimate Std. Error t value Pr(>|t|)
(Intercept)       25.13192    2.47756  10.144  < 2e-16 ***
Age                0.27172    0.06544   4.152  4.6e-05 ***
Wage              -0.70889    0.42098  -1.684 0.093515 .
Gender             2.81378    1.00452   2.801 0.005513 **
Budget            -0.47054    0.33031  -1.425 0.155608
Cars.im.household -1.67730    0.44641  -3.757 0.000216 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7.414 on 237 degrees of freedom
F-statistic: 8.256 on 5 and 237 DF,  p-value: 3.295e-07
```

Table 7 Ecology level (R output)

In a next step, all choices were converted to a binary variable (1 if EV was chosen, 0 else). As mentioned above, every respondent faced 17 choices. In 5 cases, there were only hybrid and combustion cars. Accordingly, only respondents with 6 or more Ev- choices out of 12 are considered potential buyers (>= 50%). After filtering the data using R-studio, a logistic regression is done to better characterize potential electric car buyers. Table 8 summarizes the results.

Despite their incongruity, ecology and materialism are positive and highly significant. With contrasting goals and motivations, both categories show high responsiveness for electric cars. On the one side, old luxury buyers (and the LOHAS) are more concerned about the environment and want to reflect their responsibility through the consumption of green products. Another possible explanation could be that sustainable cars guarantee privilege and a high prestige level due to their trendiness and exclusivity. On the other side, young buyers are unexperienced. Following privileged and honored customers, might afford them the status and the recognition they are looking for. Besides, they are primary interested in

the fundamental aspects and benefits of high-end goods such as exclusivity, rarity, extraordinariness and enjoyment (figure1).

Surprisingly, people with several cars were less interested to buy the power- driven ones. This contrasts early judgements that multicar households might accept the relative low range electric cars: electric in the city and gasoline for long distances. Similar results were found by Hidrue et al. (2011) in their study "the willingness to pay for electric vehicles and their attributes". Finally, the output confirmed the age effect since older people scored higher on environmental friendliness and, therefore more willing to buy alternative fuel vehicles.

```
glm(formula = electric ~ Age + Gender + Education.level + Wage +
                         cars.im.household + Buy.price + Class +
                         Environmental.friendliness+
                         Status.consumption, family =
                         binomial(link = "logit"), data = chosen_df)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.5221  -1.0087  -0.7655   1.2025   1.9112

Coefficients:
                            Estimate Std. Error z value Pr(>|z|)
(Intercept)                -2.868040   0.669340  -4.285 1.83e-05 ***
Age                         0.023819   0.008975   2.654 0.007953 **
Gender                      0.176879   0.142172   1.244 0.213458
Education.level            -0.052231   0.070561  -0.740 0.459165
Wage                       -0.007080   0.057960  -0.122 0.902772
cars.im.household          -0.160951   0.063006  -2.555 0.010633 *
Buy.price                   0.043252   0.058511   0.739 0.459779
Class                      -0.031726   0.045310  -0.700 0.483802
Environmental.friendliness  0.051654   0.010772   4.795 1.62e-06 ***
Status.consumption          0.036664   0.010785   3.399 0.000675 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)
    Null deviance: 1449.6  on 1075  degrees of freedom
Residual deviance: 1387.8  on 1066  degrees of freedom
AIC: 1407.8

Number of Fisher Scoring iterations: 4
```

Table 8 logistic regression for the choice of EVs (R output)

Toward testing the theory, a reverse test was conducted. The goal is now to depict customers who are less likely to buy environmental friendly car. Reciprocally, respondents with less than 6 EV-choices (6 combustion and hybrid+ 5 cases without EVs.) were selected. Likewise, the output confirms that both clusters (Eco and Conspicuous) are mainly interested in purchasing luxury EVs (table9). Additionally, multicar households were more interested in combustion and hybrid vehicles. Unlike the first analysis, education has here the most important effect on the willingness to buy sustainable products. For example, improving the education level from high school to an academic degree increases to readiness to acquire electric driven cars by 0.469.

```
glm(formula = notelectric ~ Age + Gender + Education.level +  Wage + cars.im.household +
              Buy.price + Class + Environmental.friendliness + Status.consumption,
              family = binomial(link = "logit"), data = notchosen_df)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-3.2195   0.2282   0.3516   0.5033   0.9334

Coefficients:
                            Estimate Std. Error z value Pr(>|z|)
(Intercept)                 8.934505   0.844325  10.582  < 2e-16 ***
Age                        -0.039328   0.008498  -4.628 3.69e-06 ***
Gender                      0.108184   0.143866   0.752 0.452064
Education.level            -0.469444   0.103486  -4.536 5.73e-06 ***
Wage                        0.066884   0.060069   1.113 0.265514
cars.im.household           0.282456   0.067829   4.164 3.12e-05 ***
Buy.price                  -0.241453   0.062163  -3.884 0.000103 ***
Class                       0.066431   0.050150   1.325 0.185290
Environmental.friendliness -0.072288   0.010987  -6.580 4.71e-11 ***
Status.consumption         -0.031856   0.010441  -3.051 0.002281 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 1930.8  on 3054  degrees of freedom
Residual deviance: 1742.5  on 3045  degrees of freedom
AIC: 1762.5

Number of Fisher Scoring iterations: 6
```

Table 9 reverse test (R output)

To conclude, the results presented above are primary for luxury car manufacturers since they simultaneously face two different consumer groups. Both environmental friendly and status-seeking customers are willing to buy electric vehicles. They differ in goals and motivations. Old customers are more ecological and try to adjust their behavior to show their apprehension (LOHAS). In addition, other experienced clients consider electric vehicles a fine way for differentiation and guarding privilege. Also, young clients (under 40) show a high inclination. The trendiness and the exclusivity of this new product afford a certain status level through superior features such as acceleration and high-tech level. Furthermore, it facilitates them to show their belonging to an honored group. This is consistent with the fundamental principles of buying luxury products. The existence of a moderate group between old and young seems to be logic and is approved by the data (figure 5). Also, the self-determination theory assumes the existence of such trend. After entering the luxury market, customer seek the basic benefits of acquiring flattered products (more extrinsic motivations). Afterwards, they reach a maturation level where the consumption is more driven by intrinsic motivations and beliefs (favorite brands, quality and appropriateness) (Ryan and Deci, 2000). The upper level constitutes knowledgeable and privileged customers. Such experts are familiar with the market and aim to distinguish themselves and guard their privilege (figure 8).

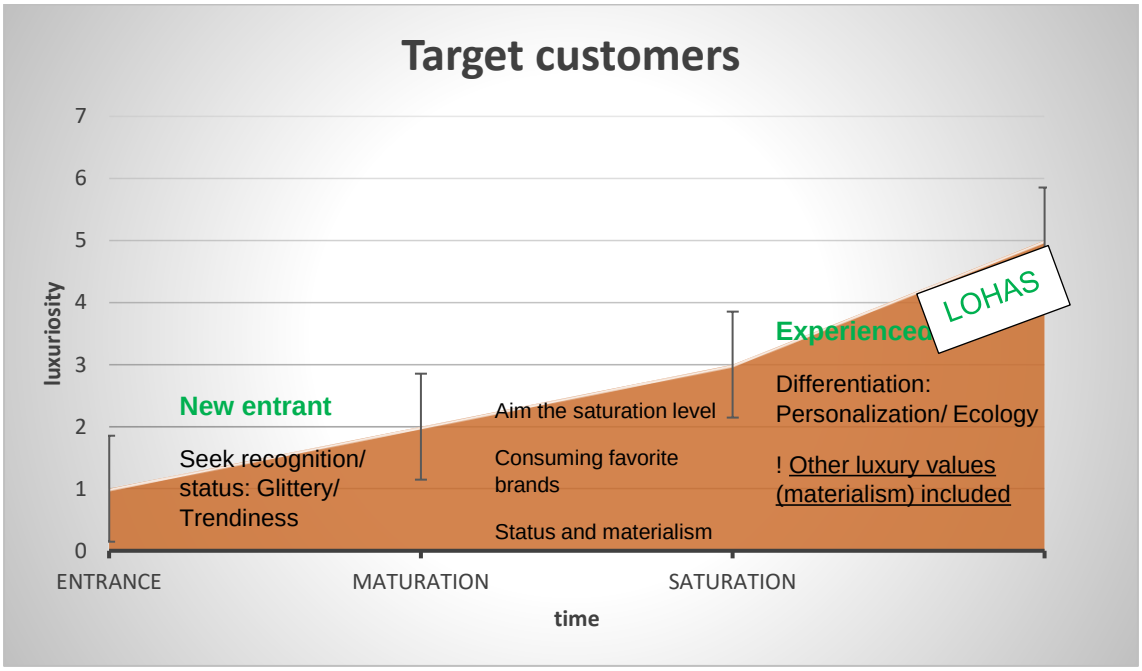

figure 7 Target customers

2.8 Conclusion and managerial implications

The results of the study affirmed the classification of luxury buyers based on their materialism and ecology levels. Additionally, age was shown to be mediator for this categorization since older buyers are more environmentally friendly than young clients. In addition, we find that, despite their contrasting motivations, both groups are interested and willing to buy ecologically driven luxury products in the form of a luxury electric vehicle. Interestingly, younger buyers seek more of recognition and a high social status that new luxury electric vehicles can deliver. Accordingly, they are dedicating higher budgets for their car purchases. Importantly, older, experienced customers are more aware of environmental issues and adapt their behavior. Also, they might find in alternative fuel cars an effective way to keep feeling privileged and to differentiate themselves from others.

From a managerial perspective, it appears that new entrants try to redefine the luxury market using the ecology/sustainability as these dimensions emerge as important drivers in the luxury market. Luxury firms seemingly understood that these dimensions pose a considerable threat but started to react by reassessing their strategies to develop things into an opportunity. To illustrate, not only did car manufacturers begin the production of electric cars but fashion houses such as LVMH or Chanel empathized sustainability in production, marketing and sales.

If and how luxury firms will suffer permanent damage as there remains a certain contradiction within luxury products due to the inherent "wastefulness" of luxuries cannot be assessed at this point in time. Clear seems that a number of luxury companies reacted fairly well. Future research should investigate reaction options for incumbents as well as try to develop optimal reaction patterns for entrants and incumbents, probably calibrated by industry.

Another important challenge for luxury manufacturers is to identify the target customers as precisely as possible. Toward this goal, our empirical study investigated the willingness to accept luxury electric vehicles. Clients were grouped into three groups based on their luxuriousness (luxury level). New entrants (baby boomers) are rough and unexperienced. Therefore, they seek the fundamentals of luxuries such as recognition and status. Glittery and trendy products are then demanded. After reaching a certain maturation level, consumers are mainly interested in consuming favorite brands and reconsider their behavior. This cluster seems to be not very attractive at this time for so-called green disruption since the choices are moderate and aim traditional values and brands. Also, because they may

switch between both poles depending on their current requirements. As clients become saturated and, therefore belong to an experienced privileged group. It becomes apparent that, also in the case of ecologically driven luxury products, willingness to pay for luxuriousness correlates positively with age. Naturally, this is important news for the practicing manager but carry-overs to other product categories should be done with care. Obviously, investigating the peculiarities of a market or an industry that may facilitate or inhibit such carry-overs would amount to important research opportunities. Consequently, this helps luxury car manufacturers to identify potential segments and to provide each target with the desired product characteristics. While this finding is already pregnant with importance for managers, future research should try to develop new theory as to the constructs causing the contrast. In addition, future research should investigate the attribute preferences like price, electric range, charging time and acceleration to provide each cluster with the suitable and tailored goods for young buyers and experienced, older clients.

2.9 Appendix

Appendix 1 Segmentation of German social class according to income (Institut der deutschen Wirtschaft Köln)

2.10 Literature

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3 A Bayesian Model to estimate the Risk tolerance of Luxury EVs within a Brand: The effect of ecology on decision making

3.1 Introduction

Sustainable and environmental friendly goods are daily gaining importance and responsiveness. This has pushed companies to acclimate their strategies into “green” policy. Even luxury manufacturers are concerned since this can wholly destroy the business and lead to customer churning. The risk is particularly high in this segment due to its sensitivity and to the intricate customer requirements. For instance, researchers like Bendell and Kleanthous (2007), Kapferer (2010), Bendell (2012) and, Kapferer and Michaut (2014) discussed the implications of ignoring these norms, even if clients do not acclaim them openly.

Unlike regular merchandises, prosperous buyers have a deep liaison to their favorite brands due to the social, individual and functional benefits offered by luxury products (Dubois & Lauren, 1994; Dubois, Czellar & Laurent, 2005; Wiedmann, Hennings & Siebels, 2007; Hennings, Wiedmann, Klarmann & Behrens 2013). This ‘loyalty’ suggests a forgiveness buffer when these companies partially lose their appeal or temporary underlie their competitors. In other words, people are more likely to disregard some attributes to, further consume their desirable trademarks. For example, one would ignore a missing Navigation system in a Ferrari, but not in a Volkswagen. However, many uncertainties should be revealed: how often would customers forgive their favorable brands when ignoring some aspects such as sustainability and ecology? Moreover, which boundaries have high-end manufacturers to avoid the red zone?

This work evaluates the key aspects and motivations for luxury electric car buyers. In addition, it models the tolerance level for manufacturers. Many arguments legitimize the choice of the automobile segment. First, the market share within luxuries is about 40% (€489 billion out of €1,2 trillion) in 2017 and shows a continuous growth of 8% compared to 2016 (Bain and company, 2017). Second, due to a low purchase frequency and to a high investment rate, people are more rational in their decisions. In addition, unlike fashion or jewelry, there is no discrimination effect since both genders appreciate cars and use them. Fourth, a car symbolizes the best way to project prosperity such as Status and prestige

because they can only be consumed publicly. Finally, product experience (previous/ current) with a vehicle have generally a long cycle and shapes therefore the foundation for future choices (Pollak, 1970; Garcia-Torres, 2009). For instance, Pollak (1970) pointed out that past consumption pattern influences present consumption. Besides, Garcia-Torres (2009) studied the evolution of consumer preferences over time and found a significant effect of past on present and, present on future consumption patterns. For example, for someone who likes a specific car and had a pleasing experience with it, the next purchase is more likely to occur within the same brand. Even if the acquired product to some extent underlies others in his evoked set, it is expected that clients would ignore some features and needs toward savor the brand. typically, this is what all brands implicitly strive for because it strengthens the true brand value through a forgiveness level.

3.2 The effect of brand and customer' specificities on loyalty

The academic literature on brand experience (Brakus, Schmitt and Zarantonello, 2009), brand attitude (E. Cretu & J.Brodie, 2007), brand involvement (Zaichkowsky, 1985), brand attachment (Thomson, Maclnnis & Park, 2005), brand personality(Aaker, 1997) and brand image (R. Graeff, 1997, Martínez Salinas & Pina Pérez, 2007) studied the impact of firms' dimensions on consumers' loyalty in different ways. They acknowledged these assets as key aspects for a firm's success. Furthermore, Aaker (1999) and Grohmann (2009) empathized the importance of self-congruence in affecting customer response to the brand. Generally, shoppers seek products that better symbolize them with particular traits to express their self-concept. Thomson et al. (2011, p.36) define it "as the cognitive and affective understanding of who and what we are." Besides, the concept contains two different facets: the 'actual-self' (based on perceived reality of the self) and the ideal-self (based on dreams, goals and the striking self). According to Aaker (1999), both ways can lead to self-congruence through a brand that match one of the two traits. Once people find the variety that fulfil this necessity, they become more attached to it and, therefore loyal.

However, most of the theories mentioned above flow in one direction (B2C). Consequently, it is necessary to reveal the darkness on consumer's ability, involvement and motivation to process information, and his/her perception of the brand. Duesenberry (1952) was the first to introduce the idea of "habit formation" where he showed that current behavior is partially affected by past consumptions. This was affirmed by Pollak (1970). Similarly, Lancaster

(1966) pointed out that people consume a specific product because of its inherent values and surplus. Moreover, Hawkins and Hoch (1992) for example, observed subjects' judgement under different involvement levels. The findings suggest that familiarity is a mediator for the truth effect. Meaning, when exposed to a familiar product, a so-called "ring the bell" reaction occurs and people are more likely to trust the information. Consequently, luxury car producers should make use of this finding (familiarity & market share) to introduce sustainable and environmental friendly goods. In the same context, Malär, Krohmer, Hoyer and Nyffenegger (2011) presented a conceptual framework that illustrates the relationship between self-congruence and emotional brand attachment. The model announces self-esteem, public self-consciousness and product involvement as mediators. In other words, customer' characteristics and his/her involvement determine his/her relation to the brand. They are more related to the brands that better reflect and confirm who they are rather than to those that promise helping them achieving the ideal-self. High-end manufacturers are then expected to identify new tendencies such as ecology and apply the right strategies to serve the new clientele. Such approach is decisive for both loyalty and future success. Nonetheless, loyalty is a relative concept since clients are always seeking to maximize their utility (material & immaterial) through acquisition or consumption (Berry, Levinsohn & Pakes, 1995; Brownstone, Bunch & Train, 2000; Train, 2002). They might turn the wheel and choose completely different goods that better fit their current needs. In general, people think they make decisions based on trivial traits such as product attributes and monetary values. In fact, a real complex computation is behind. They, unconsciously, develop an approach based on both product related experience (emotional outcome from previous purchases) and expertise (ability to perform product related tasks successfully) to facilitate the decision-making process.

To help marketers with "a useful foundation for research on consumer behavior", Alba and Hutchinson (1987) introduced five dimensions of consumer expertise (cognitive effort, cognitive structure, analysis, elaboration and memory). The first two dimensions mentioned above were shown to have a positive benefit on the latter. The Authors (Alba & Hutchinson, 1987) identified a simple but a potent effect of repetition on cognitive effort: Familiarity reduces both the effort and the reaction time during decision-making (automaticity). The second dimension describes the weights of the facts for both novices and experts. For instance, this cognitive structure correlate positively with familiarity. Practitioners should be aware of this finding that mediates the loyalty philosophy and make use of it. For instance, in case market leaders are up to date, customers would trust them more than others and

their decision won't include a complex computation (automaticity). Pham and Johar (1997) confirmed this finding and proposed a model of source identification. They described the hierarchical source monitoring when people fail to retrieve the information's source. The results seem to be trivial and useless for practitioners, but it is crucial in reality. For instance, the usage of unique labels, features, logos and tools permits to associate the brand with a higher individuality degree. Therefore, the retrieving procedure follows the easiest and shortest path within the suggested model. In other words, people are familiar with the brand and are more likely to prefer it among all others.

In another work, MacInnis and Jaworski (1989) studied the information processing from advertisements. The proposed integrative attitude formation model differentiates between utilitarian and hedonic needs, which result in cognitive and emotional responses. Furthermore, it stresses the effect of clients' AMO (ability, motivation and opportunity to process brand information). Likewise, the outcome is useful in practice. For example, the model can be divided into 3 main blocks (AMO, elements of brand processing and the evaluative level) which makes it useful as a diagnostic tool. In this case, it is easy for firms to locate the deficit, if the choices and attitudes are inconsistent with the input (needs and AMO- antecedents).

All the suggested studies empathized the importance of consumers' ability, motivation and opportunity to process the brand information on their attitudes toward a company (loyalty). Understanding buyers' preferences in general and the consistency of the brand perception with the firm's expectations specifically is advantageous. Therefore, marketing researchers and practitioners need the complete set of puzzles to derive a consistent judgment, since fitting this discrepancy permits to achieve an additional powerful dimension.

3.3 Customer churning

The churn philosophy can be classified into voluntary and non-voluntary. The non-voluntary churners are easy to identify and to deal with (Haden, Tiwari, Roy & Rota, 2008). These are customers who are pushed to abandon the brand for several explanations. For example, when firms revoke a package or when clients are unable to pay an arrangement. it is more critical when it emanates to voluntary churn. People make then a conscious decision to cut with the brand. Afterwards, they switch to competitors. Analogous, this can be decomposed

into two categories: incidental and deliberate churn. The former happens when specific conditions avert the customer from his current consumption (Haden, Tiwari, Roy & Rota, 2008). For instance, if he can't afford the required financial means or moves to an unsuitable -geographical- area. The user is then more likely to terminate his rapport to the brand. The latter reveals high challenges for most companies. It occurs when the clientele starts to empathize competitors' products due to their superiority in terms of technology, quality and economical attributes. In this case, the task becomes tough through both, the intense competition and the variety of products and services that faces the customer. Thus, Liu and Shih (2004) related to the indispensability of new strategies that capture customer needs, progress the satisfaction level and so, retention.

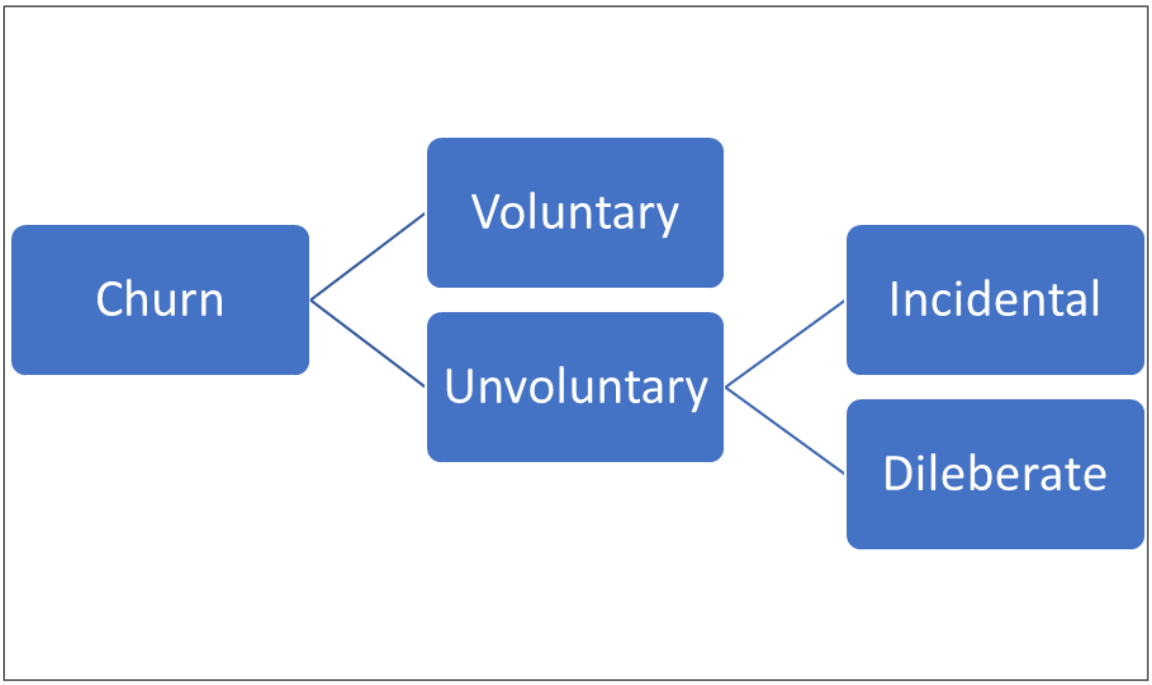


Figure 8 different churning types

It has become a commonly acquaintance that companys' most important asset is the customer (Kim & Yoon, 2004; Kim, Park, Dubinsky & Chaiy, 2012). Subsequently, businesses are opting customer-oriented strategies for sustaining their competitiveness and guarantee a stable profit. However, Keaveney (1995) accentuated the difficulty and the costs (advertising, promotional expenses etc.) of such processes in a saturated market where customers constantly face a gigantic variety of products and services. To this issue, Burez and Van den Poel (2007) identified two approaches: the reactive and the proactive. Firms

that adopt the reactive way are more passive. They wait until clients ask to cut the relationship. At that point, they offer the customers higher incentives to hold them. Even if they succeed preserving their clients, the drawbacks like excessive costs, lower brand mercy and, purely incentive oriented relationship will overwhelm. Contrarily, the proactive procedure occurs when businesses primary focus on identifying risky clients (that are more likely to churn) and try to retain them. This kind of targeted strategy is advantageous. It allows to protect the core business and to save market share. Additionally, proactive firms are generally more innovative and so, have a better image. Nonetheless, Van den Poel and Larivie're (2004) stressed the disadvantages of an inaccurate procedure. For example, companies would offer high incentives to clients who are not really churning.

Therefore, it is essential to be up to date, to identify the new tendencies, and to offer the clienteles the product and the quality they are looking for (or maybe a touch above). Moreover, it is recommended that companies aim new customer generation (Bower & Christensen, 1995; Christensen, 1995; Adner, 2002).

Traditional methods of predicting churn risk are unprecise since they only identify trends in data using pure mathematical algorithms. Additionally, businesses are often unable to identify if a customer is more likely to switch to competitors until it is too late. The main reason for the usage such soft computing algorithms, is their low cost. For the prediction of churn risks, companies used to apply a pure demographic-based model. Wei and Chiu (2002) criticized this approach since it creates an analysis which is based on customers and ignore all other facets such as product attributes. Furthermore, due to restricted customer information, a pure demographic-based-prediction won't be efficient. Additionally, the luxury academic literature on brand associations (attachment, love, involvement etc.) ignore such facets. They assume a continuous relationship (untainted loyalty) once the customer appreciates a brand.

3.4 Literature review on decision making (DM)

3.4.1 Consumer psychology and preferences

3.4.1.1 Consumer behavior: a retrospect

Consumer behavior has emerged as a separate field of study during the 1960's. It is characterized by two paradigms: the positivist and the non-positivist. The former is still considered to be the dominant. It empathizes the "supremacy of human reason, and that there is a single, objective truth that can be discovered by science". (Paschauri, 2002, p.319). the latter envelops two perspectives: the interpretive and the postmodern. Both argue that people can only be treated as totalities. Subsequently, they criticize the traditional paradigm (positivist) since it treats the consumers as passive objects. Additionally, the classic view ignores much of the diversity, complexity and fertility of consumer experiences. Generally, the traditional view of consumer research can be classified into 3 main perspectives:

- **The rational view**

  This view empathizes the importance of internal mental processes in decision-making. Economists were the first to introduce first models in buying behavior. They identified two phases: the purchase act and the post-purchase reactions (Paschauri, 2002). Moreover, they assume the acquisition as a result of largely conscious economic calculations. Accordingly, clients would spend their income on goods that afford higher utilities (higher satisfaction level). Years later, Marshall (1890) revised this assumption and introduced the Marshallian model of "marginal utility" that takes into consideration the influence of relative individual changes in single features/ attributes such as costs or quality, holding others constant.

  Westing and Albaum (1975) criticized the ability of pure economic views in both forecasting decision making processes and in explaining all variations in sales. Moreover, many researches within the discipline "set out to deliver rational revelations for behavioral, psychological, preferential and aggregate demand variations in behavior." (Paschauri, 2002, p.323). For instance, Lewis et al. (1995) conducted experiential works to offer rational enlightenments for behavioral. They identified the potential impact of: price variation on brand preference, changes in product cues on desirability, and price variation on demand sensitivity. Also, the authors pointed out that customer' scarcity (either to fail in choosing the

right good or that the new good undermine status-quo) has a main influence on buying decision. To summarize, rationalism support economic arguments that empathize the effect of internal mental processes on purchase.

- **The behavioral view**

Unlike rationalism, this perspective underscores the importance of external and environmental signals in the learning process. Behaviorists treat clienteles as an unknown entity (black box). Moreover, they assume that consumer behavior is a conditioned response to external environmental cues such as advertising. For Instance, they enlighten the primacy of various strategies (behavioral modification techniques) that influence, manipulate, modify and control buyers' actions (Peter & Nord, 1982). Numerous authors such as Thorndike (1911), and Watson (1920) proposed several models to study the learning effect. They categorized the view into two major approaches: the classical conditioning and the instrumental learning. The former occurs when pairing a stimulus that elicits a response with another which doesn't. Afterword, the second begins to elicit the same response as the first one due to the paring (Feinberg, 1986). The latter describes the fact that people are more likely to learn how to perform behaviors that result positive outcomes (happiness, satisfaction etc.) and to avoid those producing negative feelings such as guilt (Skinner, 1938, 1953). Furthermore, the response can be followed by a positive reinforcement (reward), negative reinforcement (avoid unpleasantness) and unpleasant events (punishment).

- **Cognitive view**

It highlights the role of information processing in the decision making. This perspective perceives people as "problem solver" who are actively looking to lead their environment through information. Whether the learning process is conscious or not, is still a debate. On the one side, authors like Langer (1983) introduced the "mindlessness" term where people, to some extent, process information in an automated -passive- way. On the other side, other theorists such as Allen and Madden (1985) assume that some instances of conditioning are cognitive processes. For example, when expectations are formed about a strong linkage between stimuli and response. They termed it the "masking effect".

In conclusion, the information processing theory (cognitive view), is essential in understanding countless consumer behavior models. Furthermore, Barry and Howard (1990) stated out that people wander respectively through three stages (cognitive= thought, affective= feeling and conative= behavior) in responding to marketing messages like promotion and advertising. Consequently, this pattern articulates "cognitivism" in its'

strongest form. It suggests that attitudes control behaviors. Accordingly, customer should be exposed to information to influence (strengthen/ weaken) their behavior.

Despite some critic to the assumption that people are complex information processing entities, cognitivism has dominated the consumer behavior field. in luxuries, this has a huge influence on decision making since social and behavioral aspects are dominating.

3.4.1.2 The arousal theory and the seek for novelty

The arousal theory builds the fundamental of the behavioral psychology in understanding decision- makings. Besides, while this work deals with the WTP for luxury EVs, it is necessary to reveal the darkness on some aspects like customer need for novelty and his/ her perception of new products like ecological luxury vehicles. According to academics like Garcia- Torres (2004) and Johnson-Laird, Girotto and Legrenzi (2004), and Legrenzi and Umita (2011), the arousal level is positive and, strongly related to wellbeing and feelings. Subsequently, it determines peoples' performances. Furthermore, the theory supports the idea that performance necessitates a variety of stimuli (Hebb, 1955; Berlyne, 1970). For instance, clients prefer a rich set of products with distinctive features, so they have enough choice and their decision would be more consistent. However, the authors recommend a moderate arousal level since its' consequences follow a U- inverted curve: very low as well as very high stimulations won't allow people to perform well. Likewise, this finding is primary for luxury car manufacturers since producing non-familiar vehicles might have negative consequences.

Berlyne (1960, 1970) investigated the novelty effect on buying decision. He stated out that customer' need for newness and originality affects the hedonistic degree of the stimuli. Meaning, people favor to get enough stimuli from outside to be well. This overlaps with the fundaments of luxury such as high quality, exclusivity and other hedonic values. Nonetheless, he argued that familiarity correlates negatively with the arousal level. As an illustration, when customers are repeatedly exposed to the same product (-set), their appreciation and excitement decreases (Nelson & Meyvis, 2008). Therefore, choosing a convenient time and strategy in presenting their products is a challenge for luxury companies. Likewise, selecting which features and attributes a product should have is decisive. Moreover, the diversity of prosperous buyers, their needs, motivations and wishes makes

the task more complex for manufacturers. For instance, car producers should simultaneously serve different tastes like environmental friendly clients with electric/Hybrid vehicles, and people who seek the fundaments of luxury with extravagant and exclusive cars.

To summarize, unlike the rational view, the arousal theory assumes that customers don't know what they want specifically. But, they are trying to maintain their arousal level constant through the seek for newness (Garcia-Torres, 2004). This postures a challenge for luxury car manufacturers while introducing electric driven cars.

3.4.2 Consumers' decisions from an economic view

3.4.2.1 The probabilistic perspective

Economists assume that clients behave in a way that maximizes their relative utility. Moreover, they consider this worth as a constructed measure that has no natural level or scale. This kind of research is known under discrete choice models where generally a decision maker (firm, customer, agent) faces series of choices over time and among a set of options. For example, when clients choose between various products, or when a company chooses a technology to use in production. Also, if respondents select an integer from 1 to x on a x-points Likert scale question. discrete choice models are then derived under the assumption of utility maximization. This goes back to 1927 where Thurstone introduced the concept under psychological stimuli (binary probit). Years later, the stimuli were construed as utility and therefore, resulted in a utility maximization seed (Marshak, 1960). All the following models are reproductions and are known as RUMs (random utility models) (table 10).

McFadden (1974, 1978, 1987), Train, McFadden and Ben Akiva (1987), Train McFadden and Goett (1987), and Train (2002) commit the choice set to be:

- Mutually exclusive: choosing one alternative implies not choosing the rest.
- Exhaustive: all possible alternatives are included.
- Finite: the number of alternatives is finite (restrictive and a specification for discrete choice models compared to regression).

Moreover, respondent has the option to choose either both or none of the alternatives. In this case, the expanded choice set is still clearly exhaustive. The specification of the choice set depends on the research goal. Discrete choice models have therefore the advantage (compared to regression models) that it answers the question of which rather than of how much. It allows a greater flexibility in handling the non-linear price schedules that respondents face.

From a customer perspective, the decision maker (n) faces a series of J alternatives. He aims to obtain a certain utility level from each choice. Consequently, he picks the alternative that provides him the highest worth.

$$U_{nj} > U_{ni} \; \forall \; i, j$$

However, the researcher doesn't observe the decision maker's utility. Only some attributes of the alternatives (X_{nj}) and some demographics (S_n). Accordingly, he develops a "representative utility function"

$$V_{nj} = V\left(X_{nj} S_n\right) \; \forall \; j$$

The utility function can therefore be decomposed into two parts: systematic (observed) and stochastic (unobserved).

$$U_{nj} = V_{nj} + e_{nj}$$

Moreover, the systematic part (V_{nj}) can also be divided in product features (Z_{nj}) and consumer's characteristics (demographics) (S_n)

$$U_{nj} = Z_{nj} + S_n + e_{nj}$$

RUM	characteristics
Logit	• Widely used • $e_{nj} \overset{iid}{\sim}$ extreme value • Errors are uncorrelated among all alternatives. But have the same var. σ^2 for all of them • Considers taste variation, substitution patterns and repeated choice over time. • Critic: ○ if 2 alternatives possess similar unobserved factors → corr → model suffers ○ Assumption: each choice is independent → IIA problem.

	○ In many cases factors influencing one choice may persist over time (blue bus/red bus).
GEV	• Developed to avoid IIA problem • Allow correlation among unobserved factors over alternatives • Collapses to logit if correlation=0 • Groups alternative in several nests: ○ Easy model: high correlation between alternatives of the same nest ○ Complex form: allow any correlation patterns
Probit	• e_{nj} ~ N (0,Ω) / Ω a full covariance matrix • Any correlation pattern and heterodaskicity • e_{nj} ~ N (0,Ω) over choices and alternatives → flexibility in handling correlation over time and alternatives
Mixed logit	• Allow any distribution • e_{nj}= Ω + V ○ $V \underset{\sim}{iid}$ extreme value → fully general and can approximate every model
Mixed probit	• Same mixed logit • $V \sim N(0,\Omega)$ → easy to estimate

Table 10 most used methods computing customer utility and DM

3.4.2.2 The Bayesian tradition: definition and properties

Powerful tools for estimating discrete choice models have been settled within the Bayesian technique. Unlike traditional processes, these new methods can estimate model parameters without calculating the choice probabilities. Furthermore, they are efficient in deriving parameters on the individual level within any model and under random taste variation. For example, Albert and Chib (1993) have developed an exact Bayesian approach for modeling categorical response data using the idea of data argumentation. McCulloch and Rossi (1994) established new methods for conducting a finite sample, likelihood-based analysis of probit. The algorithm uses a variation of the Gibbs sampler and avoids a direct evaluation of the likelihood.

Bayesian methods have numerous advantages compared to frequentist. First, unlike probit and mixed logit where the MLE (Maximum Likelihood Estimator) can be associated with numerical difficulties, Bayesian doesn't require any maximization.

Furthermore, traditional algorithms fail to converge in such situations and doesn't guarantee that the maximum has been reached. Even the choice of the starting values is still an issue (Train, 2002). Second, Bayesian procedures guarantee consistency and efficiency with more relaxed assumptions. For instance, its estimators are consistent for a fixed number of draws. If this amount rises at any rate with sample size, the coefficients are efficient. Cameron and Trivedi (2005) stated out that Bayesian procedures guarantee higher flexibility for the researcher since they deliver the entire posterior distribution of the parameters of interest. Meaning the user can decide which moment/ quantile of the distribution to report based on decision theoretic criteria. Unlike frequentists, Bayesian methods are conditioned on data. The results are exact finite and approach the normal distribution in large samples where the influence of priors disappears. Finally, Bayesian provides a natural way to select models (Cameron and Trivedi, 2005; Train, 2002).

However, the Bayesian approach is linked to some costs especially for researchers who are used to classical ways. They need to be more familiar with various interrelated techniques. Afterwards, the learning curve gets steep. Also, the convergence is an issue, since Bayesian models use enough iterations to converge (takes a long time too). Unlike the convergence to a maximum by traditionalists. Bayesian scientists cannot therefore easily determine whether it is achieved or not.

According to train (2002), McCulloch and Rossi (1994) and, Albert and Chib (1993), Bayesian are in many cases faster than classical approaches and provide satisfying pattern for inference and decision making. Under certain assumptions, the estimators are asymptotically equivalent to the MLE and can therefore be interpreted in a classical way. The researcher has initially some ideas about the parameters θ of his/her model. He/she collected data to improve or to update his/her beliefs that are represented by a probability distribution ($P(\theta)$) over all possible values that θ can take. This is termed prior. He/she observes the choice of N independent decision makers $Y=\{Y_1,Y_2,\ldots Y_N\}$. Based on this sample information, the scientist updates his/her ideas about the value of θ. This is denoted as posterior distribution $P(\theta|Y)$ and depends on y since it only incorporates the information contained in the observed sample. In conclusion, there is a definite relationship between the posterior and the prior through the Bayes' rule:

$$P\ (\theta|Y) = \frac{P(Y|\theta)\ P(\theta)}{P(Y)}$$

with
- P(Y|θ) is the likelihood
- P(Y) is the marginal likelihood/ evidence / $P(Y) = \int P(Y|\theta).P(\theta)\ d\theta$

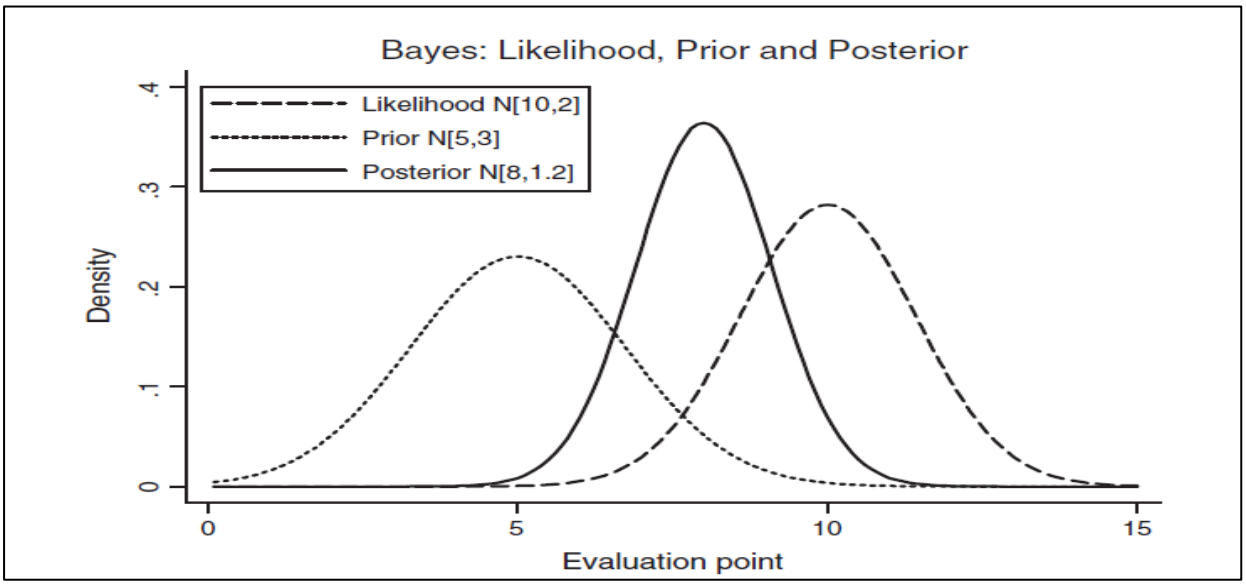


Figure 9 Bayesian analysis of mean parameter of normal density (Cameron & Trivedi,2005)

- Specification of the Prior

The researcher can choose between non- and informative priors depending on the available data and his/her goal. Noninformative priors have minor impact on posteriors. It is an effortless way since the choice of a uniform prior $\pi(\theta) = c$ (∀ θ / c>0) places equal weights on all possible values of θ. However, in cases where the parameters θ are unbounded, the density $\int \pi(\theta)d\theta = \infty$ is improper and implies an improper posterior. Also, the prior is invariant to reparameterization. Meaning, if it is unsuitable for one parametrization, it will be unsuitable to all others.

A well-known uninformative prior is the Jefferys' prior (Also known as vague, diffuse or flat) which has a large variance σ^2. It can serve as a method of generating a prior when there are no obvious candidate priors available.

Conjugate priors (informative or diffuse) require a convenient functional formula for the prior and result in a good and methodically tractable illustration of the posterior under definite sample density of the data. Natural conjugate pair means that the sample density, prior and posterior, lie in the same class of densities (figure 9). Table 11 summarizes the most used conjugate families.

Distribution	Sample density	Conjugate prior density
Normal	N [θ, σ^2]	Θ ~ N[μ, σ^2]
Normal	N [θ, $1/\theta^2$]	Θ ~ Gamma [α, β]
Binomial	β [N, θ]	Θ ~ Beta [α, β]
Poisson	P [θ]	Θ ~ Gamma [α, β]
Gamma	Gamma [υ, θ]	Θ ~ Gamma [α, β]
Multinomial	MN [$\theta_1, \theta_2, \dots, \theta_k$]	$\theta_1, \theta_2, \dots, \theta_k \sim Drichelet\ [\alpha_1, \alpha_2, \dots, \alpha_k]$

Table 11 most used conjugate families

- Markov Chain Monte Carlo Simulation

The researcher aims to get a large sample from the posterior distribution since it provides desired information about both the moment characteristics of the sample of estimates and other relevant measures. This task is more complicated if there is no closed-form expression for posterior density. Using Monte Carlo Markov Chain method, the scientist run sequential draws that harvest simulated values. Running long enough sequences is a key aspect here. Subsequently, the values converge to a stationary distribution that coincides with the target posterior density p(θ|Y). the Method named MCMC referring to simulation Monte Carlo and the sequence of Markov Chain that uses 2 approaches: Gibbs Sampler and Metropolis Hastings.

The former is a Markovian updating scheme that is easy to implement. The algorithm proceeds as follows. Given random starting values $(U_1^0, U_2^0, \dots, U_k^0); U_1^1$ is drawn from $(U_1 | U_2^0, \dots, U_k^0)$. Similarly, U_2^1 is drawn from $(U_2 | U_1^1, \dots, U_k^0)$ and so on till U_k^1 from

$(U_k | U_1^1, \dots, U_{k-1}^1)$. This is one iteration. According to Geman and Geman (1984), U_s^t is a simulated observation from U_s when t is large enough. Repeating this process m times independently yields m iid (independent and identically distributed) k-tuples $U_{1j}^t, \dots, U_{kj}^t \; / \; J = 1, \dots, m$. Analogous, the collection $U_{s1}^t, \dots, U_{sk}^t$ is treated as a simulated sample from $[U_s]$, $\forall$ s.

the latter is more performant due to its flexibility regarding the initial approximating distribution and the jumping one (Cameron & Trivedi, 2005). However, the Metropolis Hastings algorithm is somehow slow in changing values and so, sluggish in swapping between the chains.

In conclusion, product characteristics have a key influence on decision making. On the one side, product involvement/ characteristics and brand relationship build the fundament of the behavioral aspects especially, in the high-end segment where people are better informed, experienced and have deeper liaison to their favorite manufacturers. On the other side, as mentioned by the economic perspective, customers seek to maximizes their relative utility through the choice of a specific good among others. A juncture of both views yields the decision either to buy or not and which product. Again, this is primary for luxury houses since psychological, social, functional and financial dimensions play a deeper role in the decision making compared to mass producers.

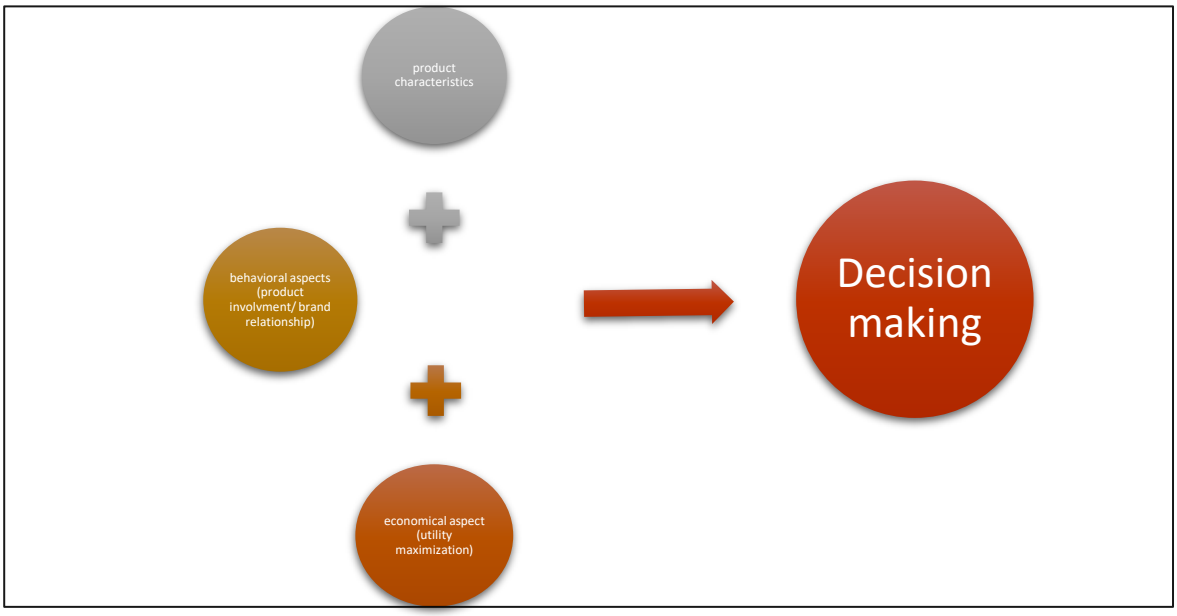


Figure 10 Decision making Procedure

3.5 Empirical study

3.5.1 Choice of attributes and data collection

As mentioned above, the car industry is a main component for the success and the accomplishment of the luxury market. For instance, an increase of round 11% was recorded between 2016 and 2017 so that the business' market share is about 41% (€489 billion out of €1,2 trillion) in 2017 (Bain and company, 2017). Additionally, the appearance of new tastes, namely ecology and sustainability has led to numerous challenges. Car manufacturers have the task to, first conserve their clients who are looking for the fundamentals of high-end merchandises, and second serve the new tastes and attract them. Numerous studies (Hidure, Parsons, Kempton & Gardner, 2011; Petsching, Heidenreich & Spieth, 2014) have been conducted to elucidate the willingness to pay for electric vehicles. Based on the following car attributes: driving range, charging time, fuel cost saving, pollution reduction, and performance, respondents were asked to choose between three alternatives, the vehicle they are more likely to buy. as a result, people prefer functional features like higher driving range, fuel cost saving and faster charging time. The Co2 emission, which is the specificity of battery electric vehicles (BEV), was significant but not conclusive in the decision making. All studies were aiming to evaluate car attributes and were about mass products. However, prosperous buyers have a unique impulse and their relations to brands are much more robust. Subsequently, their choices and preferences are based on completely distinct aspects that should be investigated. Thus, luxury car producers obtain a better and wider view on the new market necessities.

Unlike commodities, high-end products should display status and some other social ans individual values through high quality, exclusivity, indulgence etc. (Dubois & Laurent, 1994; Dubois, Czellar & Laurent, 2005; Wiedmann, Hennings & Siebels, 2007; Heine, 2012; Langer & Heil, 2013). Most prosperous buyers are therefore seeking expensive goods that keep them privileged or at least guarantee a certain status level. Performance in terms of acceleration is an excellent quality and prestige indicator. Fast vehicles are gladly seen and appreciated. Subsequently, the owner not only enjoys the driving experience, he/she also adores being honored and appreciated by others since cars can only be consumed publicly. Additionally, the luxury literature underlies the role of price as a quality indicator for all customer categories (snob, Veblenian, Bandwagon & perfectionist). There exists a lower

bound under which none of them would buy the good because it is a harmful quality signal. Above this amount, the diverse groups are formed depending on their individual, social and functional needs, and readiness to pay (Vigneron & Johnson, 1999). Unlike the mass market, where the decision to acquire alternative fuel vehicles correlates positively with cost-savings (e.g. fuel & maintenance) (Jansson, 2011), prosperous clientele is seeking expensive goods with high quality.

H_{1a}: independent on their backgrounds (e.g. snobs, Veblenian etc.), all prosperous buyers show high preferences for high acceleration.

Therefore,

H_{1b}: independent on their backgrounds (e.g. snobs, Veblenian etc.), all prosperous buyers are willing to pay higher prices for luxury EVs from favorite luxury car manufacturer.

The charging time and the range are functional attributes that are decisive in the DM. In the mass market Hidrue et al. (2011) found a negative effect of coming from a multicar household on the willingness to buy electric vehicles. Similarly, and unlike what most people would think (Flexibility: Prosperous buyers have access to many cars. Therefore, they can switch between them depending on their needs), we reason that the same effect is present in the high-end segment. This clientele is experienced, seeks the fundaments of luxuries and, have therefore higher standards and wishes. Independently, if they have 20 or 30 Hermès handbags in the wardrobe, the new one may not underlie their possessions in any dimension (functional, social, individual and financial). Besides, it should be better at least in one fact. Similarly, someone who owns a Ferrari, a Porsche and a Lamborghini is less likely to buy a new vehicle that has lower acceleration, range, etc. than his status-quo. This idea is also supported by various theories on innovation adoption where people are willing to buy the new product only if it shows better features (Jannsson, 2011).

H_2: improved functional aspects such as better range and shorter charging time correlate positively with the wtp for luxury EVs from preferred luxury brand.

Also, the marketing of innovative products such as alternative fuel vehicles is always linked with subsidiaries (non- and monetary). Both government and companies encourage this in several ways like unrestricted parking, tax- exemption and free charging. These attributes are important for this study to find out how they affect the buying decision and how they correlate with the number of cars in household as a mediator. Studies on the willingness to buy electric cars in the mass market (Hidrue et al., 2011; Kochhan & Hörner, 2015) showed the importance of reducing battery costs and of introducing non- and monetary subsidies on DM. This is understandable since these monetary advantages, evidently influence the utility function.

Outgoing from luxury literature on buying motivations (Leibenstein, 1950; Vigneron & Johnson, 1999), on product definition and associations (Dubois, Czellar & Laurent, 2005; Meffert & lasslop, 2003, Langer & Heil, 2013), financial and social motives like status and recognition are major buying motivations. For instance, there is a positive correlation between price and quality in the segment. Expensiveness implies superior quality. Therefore, we expect a minor effect of subsidies on the wtp for luxury EVs since this might be a bad quality signal.

H3: The introduction of non- and monetary subsidies such as tax exemption has little to no influence on the wtp for luxury EVs.

The Co2 emission is key aspect and a specification of BEVs. Therefore, it is essential to study its' impact on the buying decision. According to the behavioral decision-making theories (chap. 3.4.2), customer ability to process information and his involvement have key effect on his decision. Studying his/her willingness to pay for EVs vis-à-vis his/her engagement and appreciation for ecology, gives a wide view on the choice and helps marketers to better understand the key motivations for ethics in luxury. It is therefore a combination of behavioral and economic perspectives to derive an appropriate estimation. Moreover, this allows to clarify the conflict within the luxury literature: On the other side, Ward and Chiari (2008) and Davies et al. (2012) for example, sympathize sustainability as an exceptional and trendy marketing tactic, but don't consider it decisive like the fundamentals of luxuries. For instance, they cited many arguments like the low-buying-frequency. People

buy once a week fair traded coffee bones and feel then helping others through this conscious behavior. However, they don't buy a Rolex or a Ferrari in the same tact. Additionally, the researchers proclaim the availability of environmental friendly goods as well as their quality as a feebleness. Finally, they argue that the purchase act is an intimate moment where only enjoyment and self-reward are major factors.

On the one side, researchers like Bendell and Kleanthous (2007), Kendall (2010), Bendell (2012), Wiedmann et al. (2013) and Kapferer (2014) underlies ecology as key aspect in the segment. Furthermore, they warn from ignoring it, even if customers don't acclaim it openly. The authors showed that the appearance of new ecological luxury consumers like the LOHAS as well as the increasing demand for green products (from traditional buyers) makes ecology decisive in the market. Nonetheless, a comparison between luxury fundaments with the ecology principles showed numerous intersections. As an illustration, the fact that we should fairly handle with rare resources implies a limited production that is also costly. As a result, we get exclusive products that have a good quality but also expensive which overlaps with luxury values. Besides, luxury start-ups like Tesla, Elivs&Kresse or Schilpachavan combine creativity, environmental friendliness with high-tech to get advantages and compete with market leaders. This pressure is continuously pushing established firms to introduce similar concepts. As an illustration, luxury car manufacturers started immediately the production of EVs whereas the rest announced upcoming models with better features.

H4: Prosperous buyers have high preference for Co2 emission reduction.

For this purpose, 243 luxury customers participated in the study (147 male and 97 female). Only respondents who were planning to buy a luxury car in the next 7-9 months were kept to get more realistic choices. At the beginning, they completed a set of questions on the luxury car they are more likely to purchase (favorite brand). Moreover, the survey includes measures of environmental friendliness and on materialism settled by Haws, Winterich and Naylor (2014), and Eastman, Goldsmith and Flynn (1999) respectively. The "green scale" contains 6 questions that are evaluated on a 7-points Likert scale. The sum serves as an ecology indicator. In the same way, the materialism level is defined through a reliable and valid question catalog.

```
 Cars.im.household  Environment        Gender       Conspicuous        Wage           Age            Budget        Profession
 Min.   :1.000     Min.   : 8.00   Min.   :1.000   Min.   : 5.0   Min.   :1.000   Min.   :18.00   Min.   :1.000   Min.   :1.000
 1st Qu.:2.000     1st Qu.:25.00   1st Qu.:1.000   1st Qu.:12.0   1st Qu.:2.000   1st Qu.:25.00   1st Qu.:2.000   1st Qu.:3.000
 Median :3.000     Median :30.00   Median :1.000   Median :18.0   Median :4.000   Median :30.00   Median :4.000   Median :4.000
 Mean   :3.037     Mean   :28.84   Mean   :1.395   Mean   :18.4   Mean   :3.683   Mean   :33.81   Mean   :3.621   Mean   :3.905
 3rd Qu.:4.000     3rd Qu.:35.00   3rd Qu.:2.000   3rd Qu.:25.0   3rd Qu.:5.000   3rd Qu.:42.00   3rd Qu.:5.000   3rd Qu.:4.000
 Max.   :5.000     Max.   :42.00   Max.   :2.000   Max.   :35.0   Max.   :7.000   Max.   :69.00   Max.   :7.000   Max.   :8.000

   Education          facwage     faccars                                  facedu
 Min.   :1.000   No income:32   1 car :18   vocational baccalaureate diploma:155
 1st Qu.:6.000   <36 T    :70   2 cars:71   GCE                                : 59
 Median :7.000   37-50T   :14   3 cars:72   vocational technical diploma       : 10
 Mean   :6.506   51-75T   :13   4 cars:48   comp. apprenticeship               :  8
 3rd Qu.:7.000   76-126T  :64   5 cars:34   higher degree                      :  6
 Max.   :8.000   127-250T :41               GCSE                               :  3
                 >250T    : 9               (Other)                            :  2
```

Figure 11 summary of the data (R-output)

The collected data includes demographic information that are relevant to study the willingness to pay for luxury electric vehicles. In addition to the standard data like age, income and gender, the number of cars in household, the education level and the budget dedicated to the next purchase were collected (figure 11). Also, the education level is a good indicator for ecology, as well-educated people are more aware about environmental issues and are therefore more likely to adapt their behavior. The goal here is to find out if the ecology level is the main factor influencing the buying decision. Meaning if prosperous consumers acquire EVs predominantly because of the low Co2 emission or more due to values like (exclusivity, enjoyment, etc.) provided by luxury products. The number of cars serves then as a mediator since multicar households are supposed to be suppler. For example, they might use another vehicle if the charging takes too long or when the trip clearly exceeds the battery capacity. Finally, people gave the amount they are dedicating for the car purchase. Combined with the output of the conjoint analysis the researcher can identify the consistency of the decision and which attributes (levels) are key aspects here. This is essential to model the choice and to identify both churners and the churn causes within a luxury brand.

The respondents were given three prototypes of their favorite car, which they are willing to buy closely: a BEV, a PHEV and an ICE. For the ICE cars, only price and performance were varying to study the hedonism effect in the decision-making. The questionnaire doesn't mention concrete manufacturers since each respondent has a different favorite car and his loyalty and brand relationship (involvement, love, attachment, etc.) is relative. For instance, both Ferrari and Porsche owners love their cars and enjoy their experiences, but they have different relations due to diverse brand facets. Furthermore, a none- choice- option is added to allow for churn prediction. When preferred manufacturers ignore ecology and sustainability, churners are then more likely to purchase other goods from their evoked set.

In other words, they, voluntary, switch to competitor who affords them the functional, individual and social values they are looking for. Each respondent was shown 17 choice cases and should pick up the alternative he is more likely to purchase. The attribute variation was in percentage and relative to the basis version of that model since every participant has a different preferred car. Thus, the result is more realistic and generalizable which implies consistency.

Manufacturer (Model)	Price [€]	Energy	E-Range [km]	Charging time in min	0-100km/h [sec]	CO_2 [g/km]	Source
Tesla Model S 85D	92.800	BEV	528	Supercharger: 270 km in 30 min; Wall connector: 100km/h	4,4	0	Tesla, 2015
Tesla Model S P100D	157.670	BEV	613	Supercharger: 270 km in 30 min Wall connector: 54 km/h or 81km/h	2,7	0	Tesla, 2017
Tesla Model X	166,150	BEV	542	Supercharger: 270 km in 30 min Wall connector: 54 km/h or 81km/h	3,1	0	Tesla, 2017 a
Artega Scalo	170.000-	BEV	400	Fast Charger: <1h; Haushalt: 10h	3,6	0	Artega, 2015a
BMW i8	130.000	PHEV	37	2,5h; Wallbox: 2h (80%)	4,4	49	BMW, 2015a
Porsche Panamera S E-Hybrid	106.720	PHEV	36	80%: 15 min; 100%: 2,3 h	5,5	71	Porsche, 2015b; Porsche, 2015a
Porsche Panamera S	104.340	ICE	-	-	5,1	204	Porsche, 2015
Mercedes S 500 e lang	109.777	PHEV	33	Charging station: 1,9h; Home charging: 4,1h	5,2	65	Mercedes, 2015
Mercedes S 500 lang	109.777	ICE	-	-	4,8	192	Mercedes, 2015
Volkswagen Passat GTE	44.250	PHEV	50	Regular charger: 4:15h; Wallbox: 2:30h	7,4	39	Volkswagen, 2015
Volkswagen Passat TSI	40.025	ICE	-	-	6,9	143	Volkswagen, 2015a

BlueMotion							
VOLVO XC90 T8 Twin Engine	77.800	PHEV	50	3,5h - 7,5h	5,6	49	VOLVO, 2015
VOLVO XC90 T6 AWD	75.054	ICE	-	-	6,5	186	VOLVO, 2015
Mercedes C350 e	50.961	PHEV	31	3,5h	5,9	54	Mercedes, 2015a
Mercedes C300	43.702	ICE	-	-	5,9	157	Mercedes, 2015a

Table 12 Conventional premium-luxury ICEs EVs and PHEVs

Based on collected data from diverse manufacturers (table 12), it becomes clear which attribute levels are more realistic for the analysis. All models within a category have similar characteristics. For instance, the average range is around 550 km (+- 10%) which match with a combustion car. This is also the case of PHEV when adding the electric range to the regular one. Moreover, numerous manufacturers have special charging stations where around 80% of battery capacity is reached in less than 30 min. However, people have the domicile charging option which obviously has lower efficacy. Integrating this option in the conjoint analysis is indispensable since people feel more comfortable charging their cars at home. Also, the reachability and the geographical distribution of charging stations is still an issue especially in villages. Contrasting the theories of disruptive innovations (Bower & Christensen, 1995; Christensen, 1997) that undertake the idea of lower price and inferior quality for the new good, luxury EVs are faster and more expensive than numerous luxury vehicles. For example, the Tesla Model S P100D costs around € 157.670 and goes from 0 to 100 Km/h in 2,7 seconds (table 12). A Mercedes S560 4Matic has a price of € 116,994 and a speeding up of 4,6 seconds from 0 to 100 km/h (Mercedes- Benz, 2017).

The Co2 emission is decisive in this study since it plays a mediating role in indicating the type of the car. A 100% and a 0% emission represent an ICE and an EV respectively. It was also compulsory to introduce 2 other values for the PHEV to see the effect of a minimal amelioration on choices. Table 13 summarizes the attributes and their levels. For the utility computation, the lowest level (for example -5% for the price/ 50 km for electric range) was set to zero. Subsequently, all estimators are relative to an amelioration/augmentation.

Attribute	Levels (compared to preferred gasoline)
Price	• -5% • 0% • +5% • +10%
Acceleration	• -10% • 0% • +10%
Electric range (km)	• 50 (+ combustion) • 250 • 500
Charging time for 50 km (in min)	• 10 • 30 • 120 • 300
Co2 emission reduction	• 0% • 70% • 80% • 100%
Subsidiary	• No subsidiary • Non-monetary • Monetary

Table 13 attributes and their shaping

3.5.2 Data groundwork and utility computation

3.5.2.1 Coding data for utility computation

In discrete choice models, preferences are represented by utility functions.

Mathematically:

$$U_{in} = U(Z_{in}, S_n); \quad \forall\, i \in J; \; I \begin{cases} Z_{in} \text{ attributes of alternative i faced by consumer n} \\ \\ S_n \text{ all relevant characteristics of consumer n} \end{cases}$$

The decision rule is therefore explained by choosing the alternative i with the highest utility among all options

$$U_{in} > U_{jn};\ \ \forall \mathrm{J} \neq \mathrm{i,j}\ \in J$$

The utility can be therefore decomposed into:

$$U_{in} = \underbrace{Z_{in} + S_n}_{V_{in}:\,systematic\ part} + \overbrace{e_{in}}^{stochastic\ part};\ I$$

$Z_{in}\ product\ features$

$S_n\ demographics$

In case of two brands (easiest situation), the utility functions are expressed as follows:

$$U_{1n} = V_{1n} + e_{1n}$$

$$U_{2n} = V_{2n} + e_{2n}$$

The researcher is then interested to compute the probability of choosing one brand (brand 2 for example) which is given by the cumulated density function (cdf).

$$P_{2n} = P(e_{1n} - e_{2n} < V_{2n} - V_{1n})$$

As mentioned above, the systematic part includes two portions:

- Product attributes:

$$U_{1n} = \alpha_{1n} + \beta_1 Price_{1n} + e_{1n}$$

$$U_{2n} = \alpha_{2n} + \beta_1 Price_{2n} + e_{2n}$$

With the assumption that all people have the same price sensitivity. Also, α is the intrinsic preference for the brand.

$$U_{1n} - U_{2n} = \alpha_{1n} - \alpha_{2n} + \beta_1(Price_{1n} - Price_{2n}) + (e_{1n} - e_{2n})$$

The data gives only the difference $\alpha_{1n} - \alpha_{2n}$, it is therofore easier to set one intercept (for example α_{1n}) to zero.

- Demographics:

Similarly, including demographics (gender as an example) in the probability of choosing brand i eliminates its effect since it exists in both utilities for brand 1 and brand 2. The researcher should then introduce it in only one equation:

$$U_{1n} = 0 + \beta_1 Price_{1n} + e_{1n}$$
$$U_{2n} = \alpha_{2n} + \beta_1 Price_{2n} + \beta_2 Gender_n + e_{2n}$$

In this study, there are 3 products and the none choice option. Consequently, there are four utilities (1 for each choice). $U_{4n} = \alpha_{4n} + \beta_1 Price_{4n} + e_{4n}$ is set to zero to compute other utilities relative to the churning option since only difference in utility matters. In summary:

$$U_{1n} = \alpha_{1n} + \beta_1 Price_{1n} + \beta_{2n} Performance_{1n} + \cdots + e_{1n}$$
$$U_{2n} = \alpha_{2n} + \beta_1 Price_{2n} + \beta_{2n} Performance_{2n} + \cdots + e_{2n}$$
$$U_{3n} = \alpha_{3n} + \beta_1 Price_{3n} + \beta_{2n} Performance_{3n} + \cdots + e_{3n}$$
$$\boldsymbol{U_{4n} = 0 + \beta_1 Price_{4n} + \beta_{2n} Performance_{4n} + \ldots + e_{4n} = 0}$$

The choice probability (logit) is expressed by $P_{ni} = \frac{e^{(\beta^*/\sigma)' x_{ni}}}{\sum_j e^{(\beta^*/\sigma)' x_{nj}}}$

However, the parameter σ is called scale parameter since all coefficients are scaled By $\frac{1}{\sigma}$ to reflect the variance of the unobserved part of the variables (Train, 2002).

subsequently only the ratio $\beta' = \frac{\beta^*}{\sigma}$ is estimable not the individual level which implies the standard logit expression:

$$P_{ni} = \frac{e^{\beta' x_{ni}}}{\sum_j e^{\beta' x_{nj}}}$$

3.5.2.2 Using R-Stan for Bayesian estimation

Due to its advantages (chapter 4.2.2), the choice was to use a Bayesian approach to estimate the willingness to buy luxury EVs from favorite car manufacturer. To this issue, the software R-studio was used with the extension RStan for Bayesian statistics. The Stan is a C++ library for Bayesian modeling that uses the NUTS (No-U-Turn sampler) to get a suitable posterior estimation depending on available data and on the specified model (Hoffman & Gelman, 2014). The RStan package fits Stan models to R and allow the usage of the output such as posterior inferences and log posterior density (Stan Development Team, 2017).

The first section of the Stan program is called data block (figure 12), which specifies the data conditioned to the Bayes Rule. The parameter block declares the parameters whose

posterior distribution is required. These are the attribute sensitivities for each car type (price: beta_mu[1], acceleration: beta_mu[2], Erange: beta_mu[3], charging time:beta_mu[4], Co2: beta_mu[5] and subsidiary: beta_mu[9]). The vector includes also the car type (EV, PHEV, ICE) conditional to the Co2 emission (beta_mu[6], beta_mu[7], beta_mu[8]). Furthermore, a vector of 7 demographics: dem[N], is introduced to determine the characteristics of potential buyers for each car type. Consequently, it was necessary to define a matrix of attributes to each choice X_1, X_2, X_3.

```
# Model
code = "
data {
  int<lower=0> N;      // Observations
  int<lower=0> I;      // Id
  int<lower=0> y[N];   // Choice Indicator
  int<lower=0> Id[N]; // Choice Indicator

# matrix of attr for each choice
  vector[9] X1[N]; //
  vector[9] X2[N]; //
  vector[9] X3[N]; //

  vector[7] dem[N]; //

# 3 intercepts for each cartype
  int<lower=0> T1[N]; //
  int<lower=0> T2[N]; //
  int<lower=0> T3[N]; //
}

parameters {
  // Attributes sensitivities
  vector[9]     beta_mu;
  real<lower=0> beta_sig[9];
  vector[9]     beta[I];

  //Demographics : a set of parameters for each car type
  vector[7]     gamma[3];

}

model {
vector[4] U;
vector[4] P;


// Priors for the attributes sensitivities
beta_mu ~ cauchy(0,2.5);
beta_sig ~ uniform(0,10);


// Multilevel model
for(i in 1:I){
  beta[i] ~ normal(beta_mu,beta_sig);
}

// Priors for demographics
for(k in 1:3){
  gamma[k] ~ cauchy(0,2.5);
}


for(n in 1:N) {
  U[1] = dot_product(gamma[T1[n]],dem[n])+dot_product(beta[Id[n]],X1[n]);
  U[2] = dot_product(gamma[T2[n]],dem[n])+dot_product(beta[Id[n]],X2[n]);
  U[3] = dot_product(gamma[T3[n]],dem[n])+dot_product(beta[Id[n]],X3[n]);
  U[4] = 0;
  P = exp(U)/sum(exp(U));
  target += log(P[y[n]]);
```

Figure 12 Stan code (parms & priors)

Nonetheless, the choice was to set a Cauchy distribution for the attribute priors. According to Polson and Scott (2011, p1), Cauchy distributions “occupies a sensible ‘middle ground’ within this class: it performs very well near the origin”. Even so, Gelman, Jakulin, Grazia, Pittau and Su (2008) recommend a Cauchy distribution with mean 0 and a scale 2,5 because it is a longer-tailed version of the distribution got through one additional success and one-half additional failure in a logistic regression. They also affirm that the Cauchy prior beats existing implementations of Gaussian and Laplace priors. Similar prior is set for the demographics.

The last part of the code summarizes the utility computation after Train (2002). The fourth utility corresponds to the nonchoice option. Accordingly, it is set to zero toward analyzing the preferences for Evs, PHEVs and ICEs from the favorite car manufacturer compared to churning.

Afterwards, the data should be prepared for the R program. The Stan function accepts data as a named list, a character vector of object names or an environment. R will then search for objects with the same names as those declared in the block data of the Stan. Therefore, a list of starting values was announced. Next, the Stan function can draw the posterior samples from the Stan program and other variables like the number of Markov chains to be used, the number of warming, total iterations each chain and the number of cores to be used in drawing (figure 13). It is meaningful to fix a generous size for warmups since there is no theoretical guarantee that the draws obtained from this step are from the posterior distribution. So, the warmup draws may only be used for diagnosis and not for inference.

The usage of the ggmcmc package is advantageous since it permits to flexibly create graphs and allows the users of Bayesian inference to get better and more flexible visual diagnostic tools. Also, Monte Carlo methods generate samples from a probability distribution. Subsequently, they are widely used in many aspects of optimization and numerical integration, and especially in sampling from posterior distributions in Bayesian inference.

For the convergence analysis, the choice was to use the coda package since it is still considered as the reference package in R unlike the boa package, although it is less complex (Fernandez, 2016).

```
library(parallel)
install.packages("WriteXLS")
library("rstan")
library("WriteXLS")
rstan_options(auto_write= TRUE)
options(mc.cores = parallel::detectCores()-1)


modelfit<- stan(model_code = code, data= dat, iter = 3000, chains =3, warmup = 1000)
print(modelfit)
write.csv(summary(modelfit),"C:/Users/houss/Desktop/3000 iter 3 chains/Results3chains.csv")
```

Figure 13 Stan code for posterior drawings (Rstan)

3.5.2.3 Results interpretation

Before running the model estimation, it was necessary to choose a convenient set of parameters. The Bayesian literature suggest the number of draws to be above 1000 draws to have efficient estimations (RStan, 2017). Additionally, using multiple chains is highly recommendable since having both various chains and sufficient draws allow the researcher to better judge the model and, see multiple chain convergence. It is important to mention that Stan uses a stochastic algorithm and so, the results will not be identical even with repetition using same parameters and starting values. In this case, after trying some combinations like 4 chains and 3000 iterations or 2 chains and 1000 iterations, the choice was to use 3 chains and 3000 draws due to a good mixture of computing time and results.

The ggmcmc package was used because it provides multiple tools, so that their combination gives a precise indication of lack of convergence and, gives clues how to fix it:

- **Formal**
  - $\hat{R}$: ggmcmc provides a potential scale reduction factor as one of the most valuable tool for chain convergence. $\hat{R}$ relies on different chains for the same parameter through a comparison of both a within and a between chain variation. Therefore, it is expected to be close to 1 in the ideal case. The first 5 parameters are the price, performance in terms of acceleration, electric range, charging time and Co2 emission reduction respectively. Beta_mu[9] describes the subsidiary variable. The sequences appear to have mixed well. The estimated potential scale reduction factors $\hat{R} \sim 1$ for all the parameters and quantile of interest displayed (figure 14).
  - Gewecke z-scores: stresses the contrast between the begin and the last part of a chain. More precisely, the test is a frequentist comparison of the means.

Subsequently, the result should lay between -2 and 2 (Fernandez, 2016). This area allows to check for problematic chains. In this case, it was difficult to identify the area only for these parameters since the model computes also coefficients at the individual level.

```
Inference for Stan model: fed4fa288cc4982f79bc480286c23923.
3 chains, each with iter=3000; warmup=1000; thin=1;
post-warmup draws per chain=2000, total post-warmup draws=6000.

                mean se_mean     sd     2.5%      25%      50%      75%    97.5% n_eff Rhat
beta_mu[1]      0.75    0.02   0.36     0.01     0.51     0.77     1.01     1.41   234 1.01
beta_mu[2]      0.46    0.01   0.23     0.00     0.30     0.46     0.62     0.89   243 1.02
beta_mu[3]      0.05    0.00   0.01     0.02     0.04     0.05     0.06     0.08    90 1.04
beta_mu[4]     -0.01    0.00   0.02    -0.06    -0.03    -0.01     0.01     0.03   281 1.02
beta_mu[5]      1.12    0.19   0.52     0.06     0.77     1.14     1.49     2.09     7 1.19
beta_mu[9]     -0.24    0.00   0.03    -0.31    -0.27    -0.24    -0.22    -0.18   515 1.01
```

Figure 14 Stan model output

- **N_eff** is a random variable estimated from the simulation draws. The one with higher effective sample size has lower standard errors of the mean and more stable estimates. This choice guarantees the highest n_eff (figure 14) values among all other alternatives (highest values here compared to pretests with 4 chains and 3000 iterations).

- **Histograms/density plots/ full and partial chain comparison**

  Histograms present the posterior distribution and combine the values of all chains. Nonetheless, it is only a general view of the distribution and the posterior shape, not a convergence plot. The price histogram shows a bell-shaped distribution in the positive interval (figure 15). This is consistent with the fundamentals of luxuries. Prosperous buyers are accepting expensive cars because they signalize high quality and exclusivity. Furthermore, customers dedicate high budgets for the vehicle purchase since it is the best mean to project prosperity and status. In conclusion, luxury buyers are accepting soaring prices from favorite manufactures to enjoy the experience of driving their dream cars. This implies, that higher prices won't prevent clients from acquiring their favorite vehicle (other luxury values and features should be guaranteed).

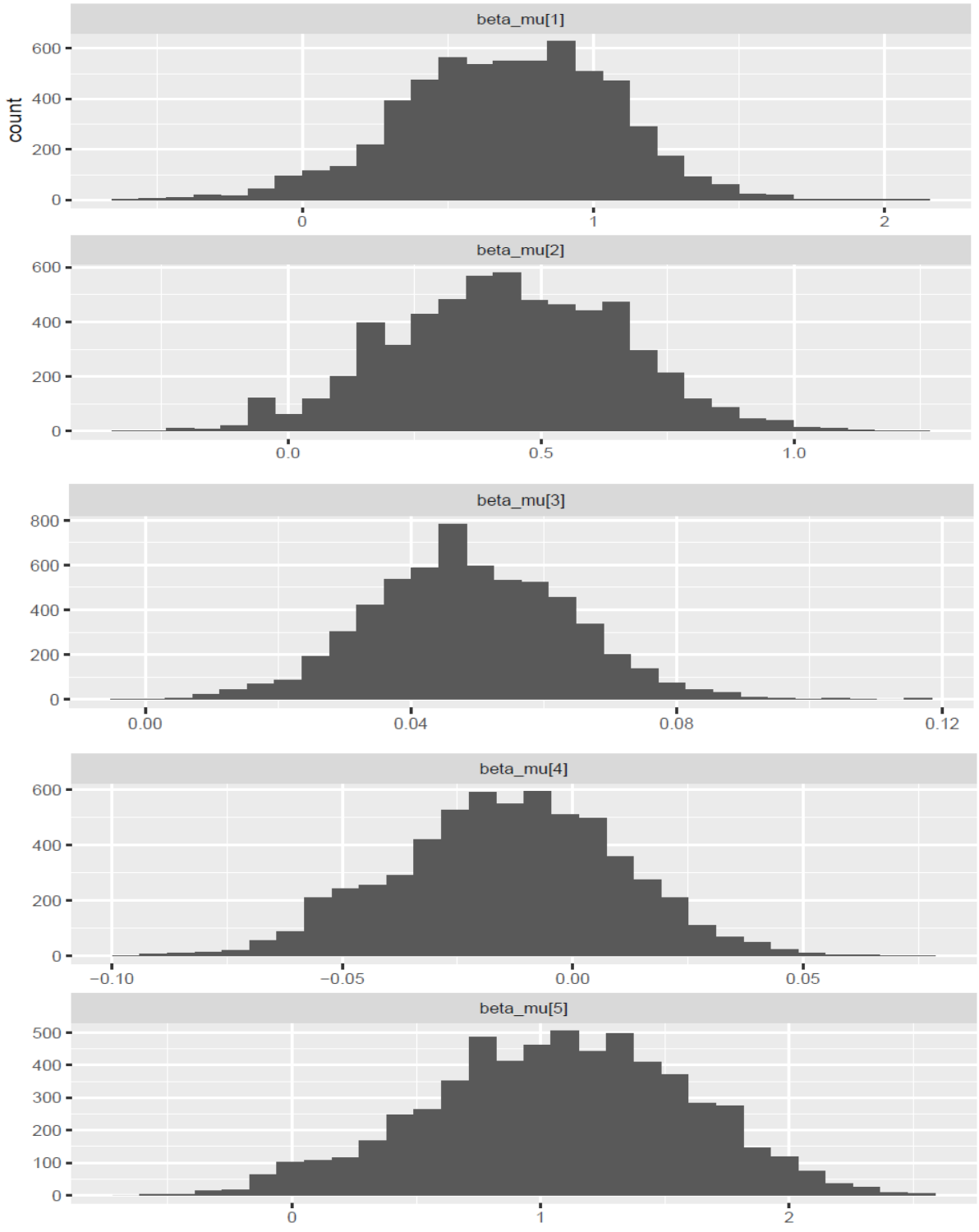
  Acceleration have also a positive distribution. This is consistent with the fundaments of luxury where functional dimensions are decisive. For instance, fast vehicles have improved features, quality and are more sophisticated. Besides, the distribution of the range preferences is commonly positive which infers that prosperous consumers are preferring performed vehicles with a range comparable to combustion ones. Unlike some guesses like prosperous buyers have numerous cars and therefore, they can use another vehicle if the

travel distance exceeds the battery capacity, this study shows the indispensability of large ranges in their DM. This is also consistent with the luxury definition as well as with the adoption theories where the new car should show, at least, similar (& better) features as their status-quo. Subsequently, luxury buyers are used to higher standards and values which can't be disregarded or neglected. As long as manufacturers guarantee these performances and values, there is no reason for switching to competitors.

Beta_mu [4] indicates the impact of extended charging time which is, as expected, mostly negative. However, some respondents were accepting longer charging processes which might be due to a limited usage (multicar) and/or to the limited concurrence at this time. Also, the trendiness and the nature of some luxury buyers who are innovative and seek primary novel goods might be a good clarification of this partial preference. For example, some clients are more flexible and can use another vehicle if the charging time gets longer. However, this should not exceed a certain time window. Hence, luxury manufacturers have the defy to develop new techniques and strategies that smooth a strong presence in the new market.

Regarding the reduction of Co2 emission (beta_mu[5]), the output shows the highest respondent preferences. The appearance of environmental friendly customers such as the LOHAS and the millennials strengthens the preference for ecological cars. Moreover, more and more traditional Luxury buyers are getting aware of environmental issues. This consciousness results in an adaption behavior like acquiring "green" goods. Unlike the results presented by various researchers like Davies et al., (2012), prosperous customers show a high consciousness about environmental issues without snubbing the benefits of luxuries. Regardless of their motivations and incentives (intrinsic vs. extrinsic; ecology vs. materialism) all customers show a high preference for "green" driving.

Accordingly, ignoring ecology and sustainability in the high-end market outcomes a total disaster for producers. Therefore, finding the right recipe including ecology and luxury characteristics such as enjoyment is a key for success in the future market. Also, the data shows immense opportunities for established firms through a strong existing loyalty and deep brand relationships (love, attachment, etc.) to maintain customers and good market shares.


beta_mu[1]
beta_mu[2]
beta_mu[3]
beta_mu[4]
beta_mu[5]
count

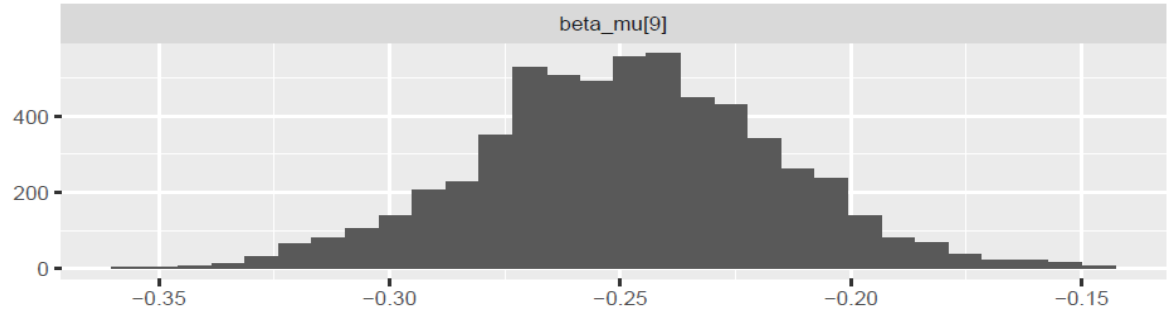


Figure 15 Histograms of attribute preferences (R-output)

The last estimated parameter is the preference for subsidiary (non- and monetary). Beta_mu[9] is negatively bell-shaped distributed. Studies of Davies et al. (2011), Jannsson (2011) showed the importance of these incentives in the mass market. Customers were interested in EVs primary due to cost savings (maintenance) and other financial incentives (tax exemption, etc.). However, prosperous buyers don't care about the peripheral governmental advantages they can get through purchasing ecological products. For instance, using bus lines, free parking or tax exemption don't incentive them and are not decisive in the decision- making. This is consistent with the understanding of luxury which relies on exclusivity, rarity, enjoyment and extraordinariness. Consequently, unlike the mass market, wealthy consumers fully ignore these measures. Subsequently, all the hypothesis are confirmed and deep-rooted.

The density plot has the advantage that the researcher can compare the chains and if they converged in a similar space due to distinct colors. the density plots for price and Performance estimations show a high chain convergence and that all three chains converged in the same interval (figure 16). This is the case for all other attributes.

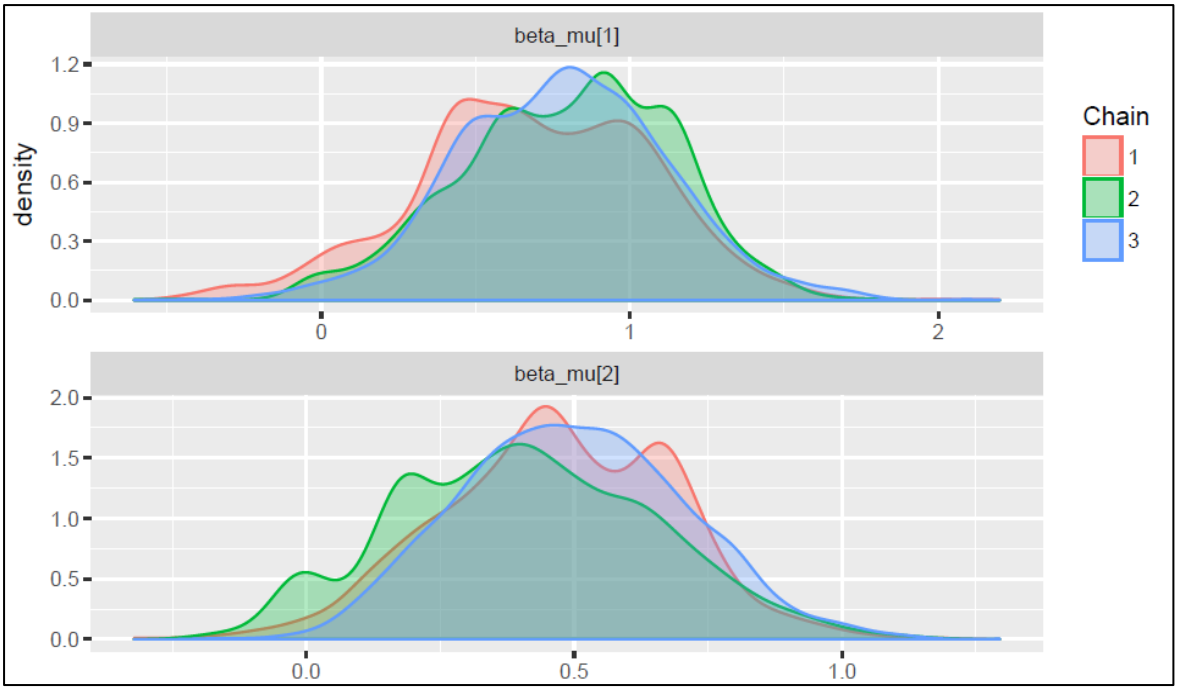


Figure 16 density plots (example of price and performance estimations)

In the same context of overlapping densities, ggmcmc allows to compare the last part of the chain (last 10%) with the whole chain. Commonly, they should be sampling in the same direction, meaning, the overlapped densities should be similar. Continuing with the first 2 attributes, price and performance, the last part has generally the same tendency as the whole chain, especially for 2nd and 3rd chains (figure 17). All other attributes have similar characteristics.

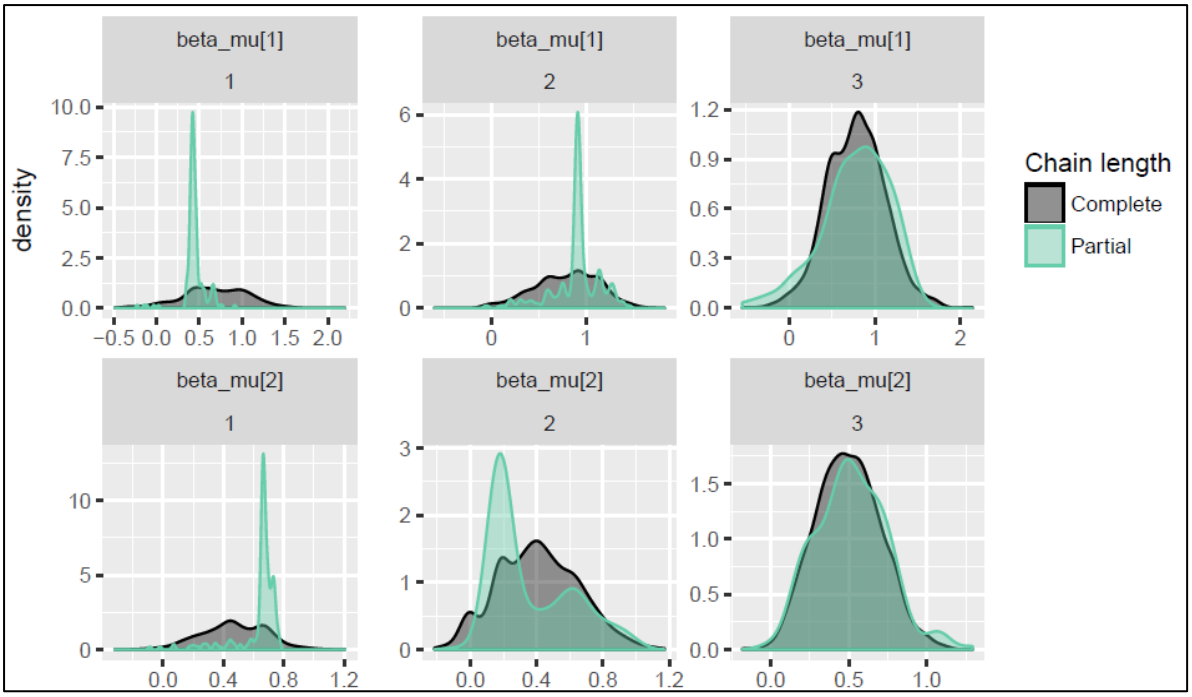


Figure 17 Partial vs. full chain comparisons

- **Trace plots/running means/autocorrelations**

  Trace plots are an essential part for evaluating convergence and diagnostic chain issues. It allows to see the time series of the sampling process. Important, is to have a random walk and not a tendency which implies a lack of convergence. In this case, all three chains have mixed very well and follow a random sampling way (figure 20). The distinct colors allow the between chain comparison.

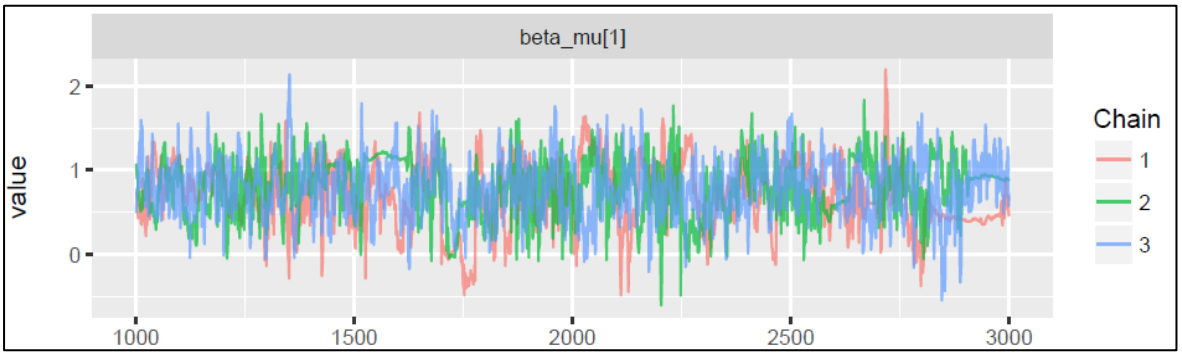


Figure 18 Trace plot (Price estimation)

Another way to judge the efficiency is the speed of the chain convergence, a plot with the running means. This is helpful to study the within chain convergence issues. The outcome is as expected, a horizontal line that quickly approaches the global mean, and all chains have comparable means (figure 19).

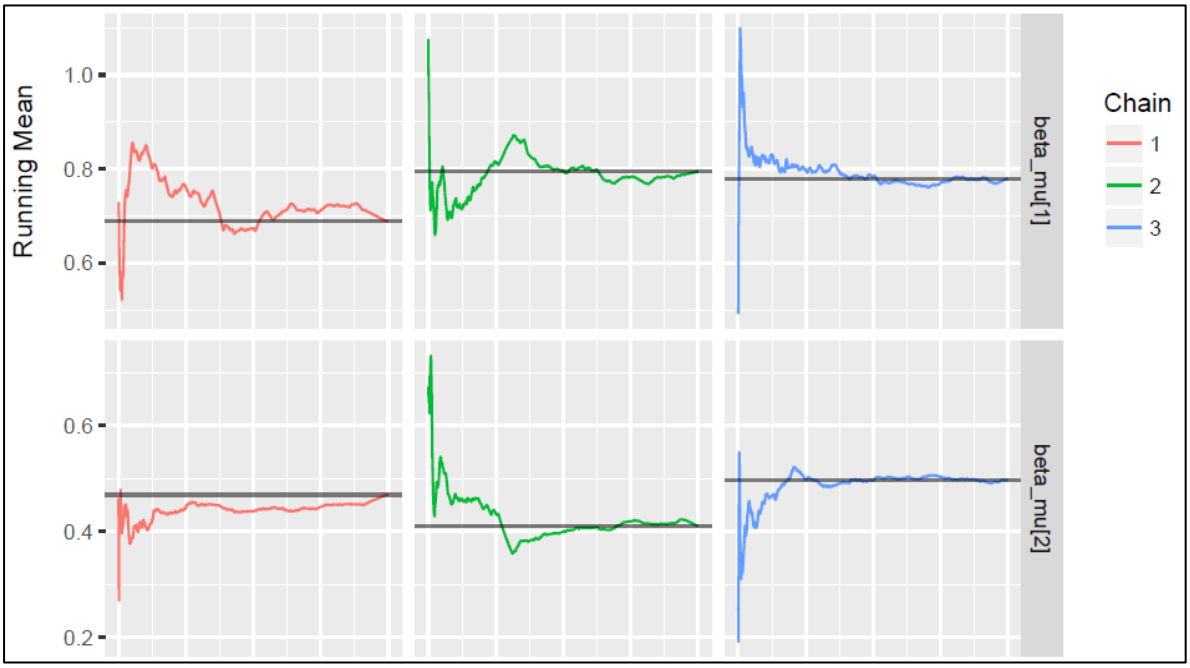


Figure 19 Running means (Price and Performance estimations)

Furthermore, the autocorrelation plot of the chains is a powerful tool to assess the quality of the chain. The outcome is a bar in the first lag (at 1) and converges to zero (figure 20). Most of the chains seem to have a good behavior and, so guarantee good estimations. However, autocorrelation is not definitively a bad signal such as lack of convergence might be an indicator of chain/ parameter misbehavior. It also indicates that a chain needs more time to converge than others.

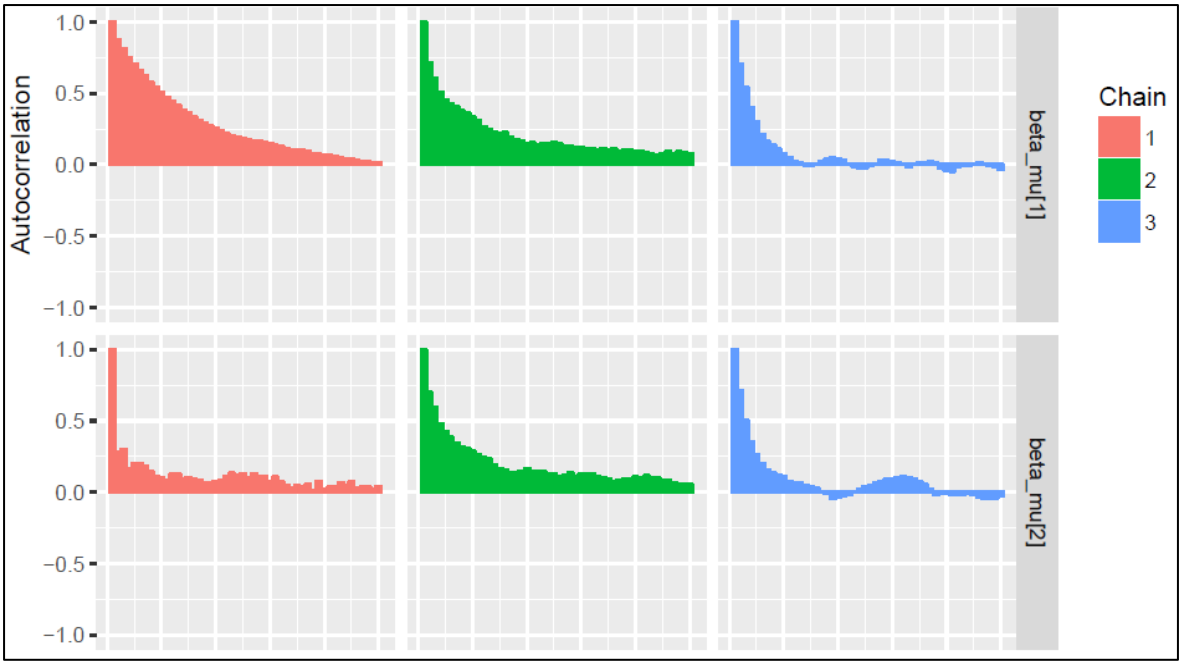


Figure 20 Autocorrelation plots (Price and Performance estimations)

In conclusion, all chains for the 6 car attributes have converged very well and the formal diagnostic tools ($\hat{R}$, Gewecke z-score) show efficient results. Accordingly, luxury car buyers are very interested in EVs and are willing to pay considerable amounts for performance in terms of acceleration and electrical range. Furthermore, they prefer lower Co2 emission which implies a high consciousness level. This is consistent with current researches which highly recommend ecology and sustainability in luxuries, even if the customer doesn't acclaim it openly (Bendell & Kleanthouse, 2007; Kendall, 2010; Cvijanovich, 2011; Bendell, 2012, Kapferer & Michaut-Denizeau, 2014). Subsequently, ignoring such aspects would prevent clients to buy their favorite brands and so, voluntary churn. Also, long charging times are less preferred despite that clients come generally from multicar households. Luxury electric vehicle producers, should perform both battery capacity and efficiency. These are crucial features toward achieving competitive advantages. The finding is primary for manufacturers and, especially market leaders such as Daimler, Porsche, Ferrari etc. since it shows a high customer loyalty level. However, fiding a good mixture of indulgence, trendiness in terms of ecology and functional values is the recipe for a lasting success. Most prosperous clients show a high to absolute loyalty. There is no reason for churning and switching to competitors if the favorite car fabricator fulfills their wishes and assures luxury values such as exclusivity (soaring prices) and tall quality (acceleration & aestetics), and an ecological component (reduction of Co2 emission).

Afterwards, the introduction of consumer characteristics such as Demographics and measures of both environmental friendliness and materialism is beneficial to get consistent and reliable estimations. The model computes coefficients on the individual level for every car type (EV,PHEV & ICE). To this issue, a Caterpillar plot is drawn to get better elucidations since it shows the general pattern of the results through ordering the Variables by effect magnitude. The Caterpillar plot (figure 22) show high effect of the income for all car types $\alpha_{Wage,EV} \sim \alpha_{Wage,EV} \sim \alpha_{Wage,EV}$. Surprisingly, is that all variables have similar influence and appreciation among all three car variations $\alpha_{i,EV} \sim \alpha_{i,PHEV} \sim \alpha_{i,ICE}$. This means, there is no clear preference pattern or big differences among luxury customers that can clearly predict their choices for a concrete car type. This might be due to the choice situations where the randomly presented attribute levels don't favorize one type over the other. Nonetheless, the output shows a high preference for a reduction in Co2-emission which, implicitly means $\alpha_{i,EV} > \alpha_{i,PHEV} > \alpha_{i,ICE}$ (under the assumption that other luxury values are guaranteed). Toward testing this finding, a cluster analysis would be an appropriate tool since the model estimates coefficients on the individual level (each person on each car attribute). Explicitly, a Model based approach because it assumes a variety of data models and applies maximum likelihood estimation and Bayes criteria to identify the most likely model and number of clusters. Specifically, the Mclust() function in the 'mclust' package in R selects the optimal model (figures 21, 23, 24 and 25) according to BIC for EM initialized by hierarchical clustering for parameterized Gaussian mixture models (Package 'mclust', 2017).

```
----------------------------------------------------
Gaussian finite mixture model fitted by EM algorithm
----------------------------------------------------

Mclust VEE (ellipsoidal, equal shape and orientation) model with 2 components:

 log.likelihood   n df       BIC       ICL
       2544.971 243 65 4732.894 4728.363

Clustering table:
  1   2
215  28
> fit$parameters
$pro
[1] 0.8830726 0.1169274

$mean
                [,1]          [,2]
 [1,]  0.783941600  0.550672259
 [2,]  0.471996755  0.340487599
 [3,]  0.056797154  0.006112243
 [4,] -0.002714476 -0.070573329
 [5,]  1.232269391  0.326555850
 [9,] -0.236492922 -0.313793194
```

Figure 21 clustering using 'mclust' package

The output is consistent with the Caterpillar plot. It suggests two groups which are unbalanced (around 88% of respondents in the first group). Moreover, comparing the average values for each cluster on every vehicle attribute, shows similar preferences with a minimal difference in their intensities. For example, both groups prefer expensive performed cars but the first one has tougher requirements for acceleration, electric range and Co2 emission reduction. However, the second group is somehow agiler in dealing with extended charging times and with the introduction of subsidiaries.

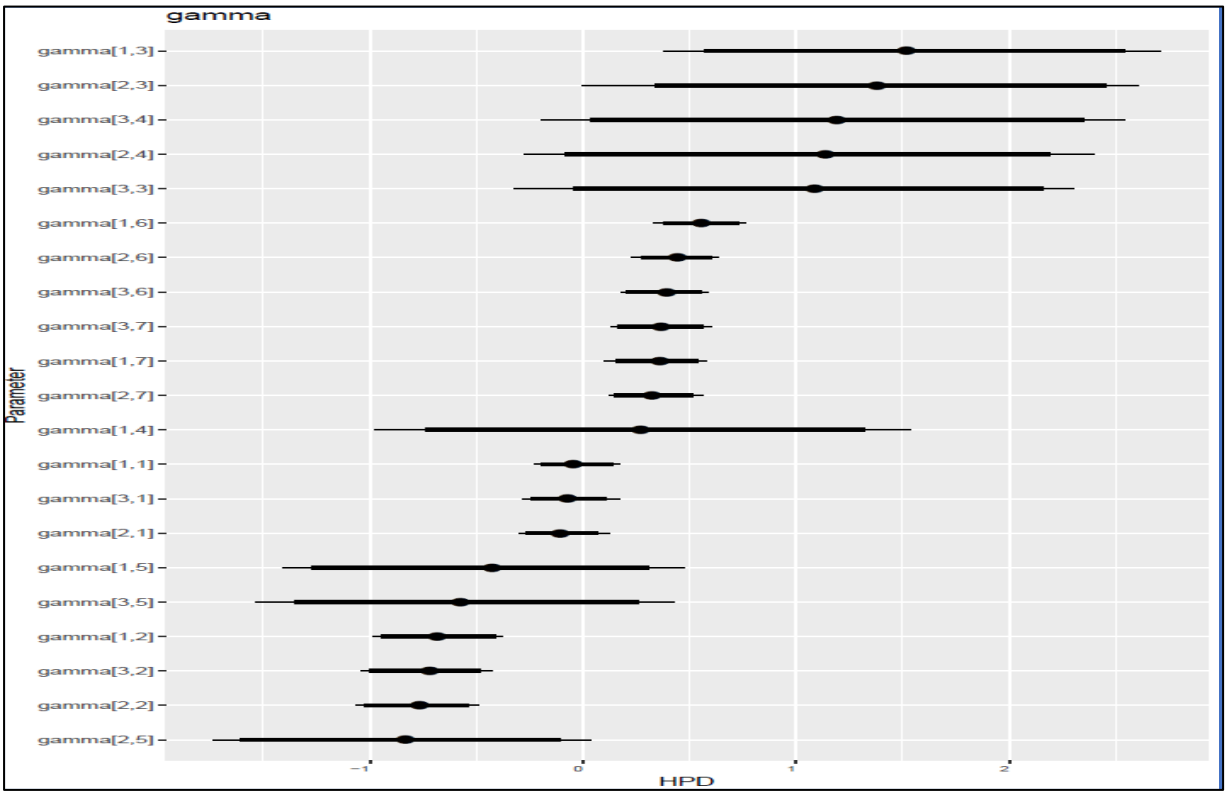


Figure 22 Caterpillar plot for demographics

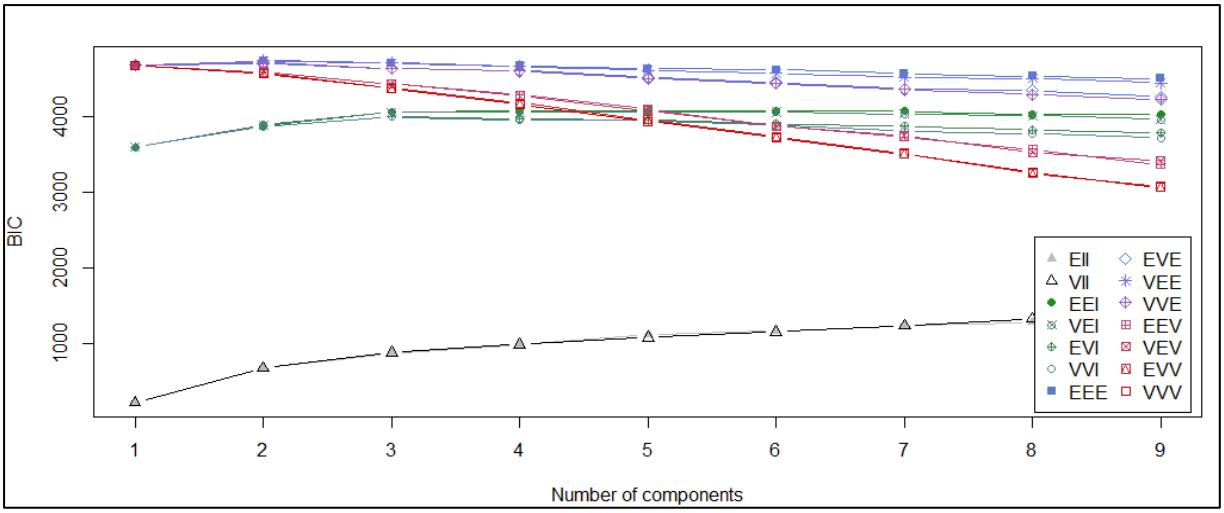


Figure 23 Bayesian information criterion (BIC)

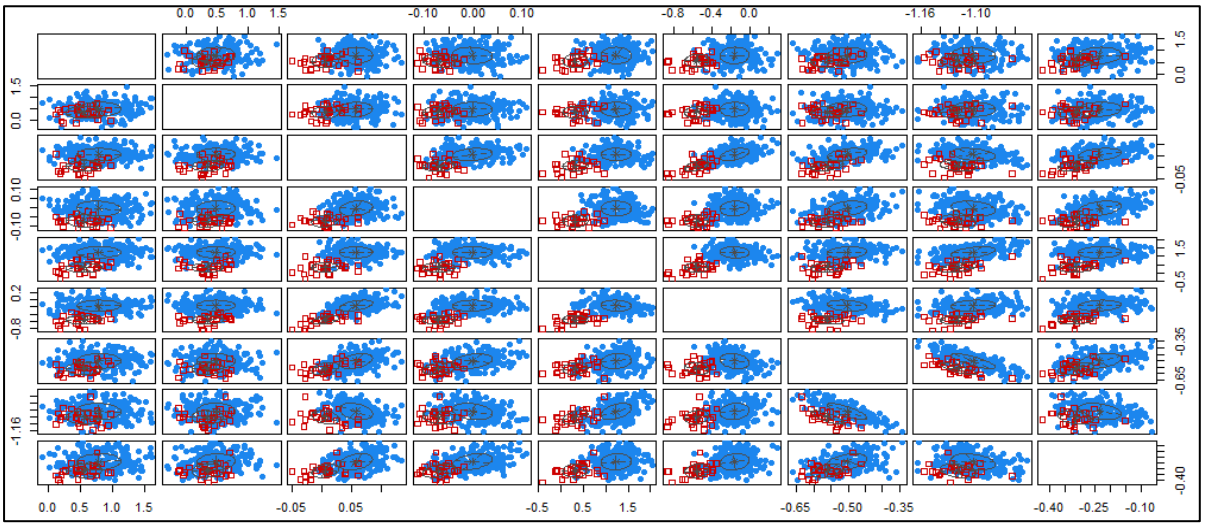


Figure 24 Classification plot

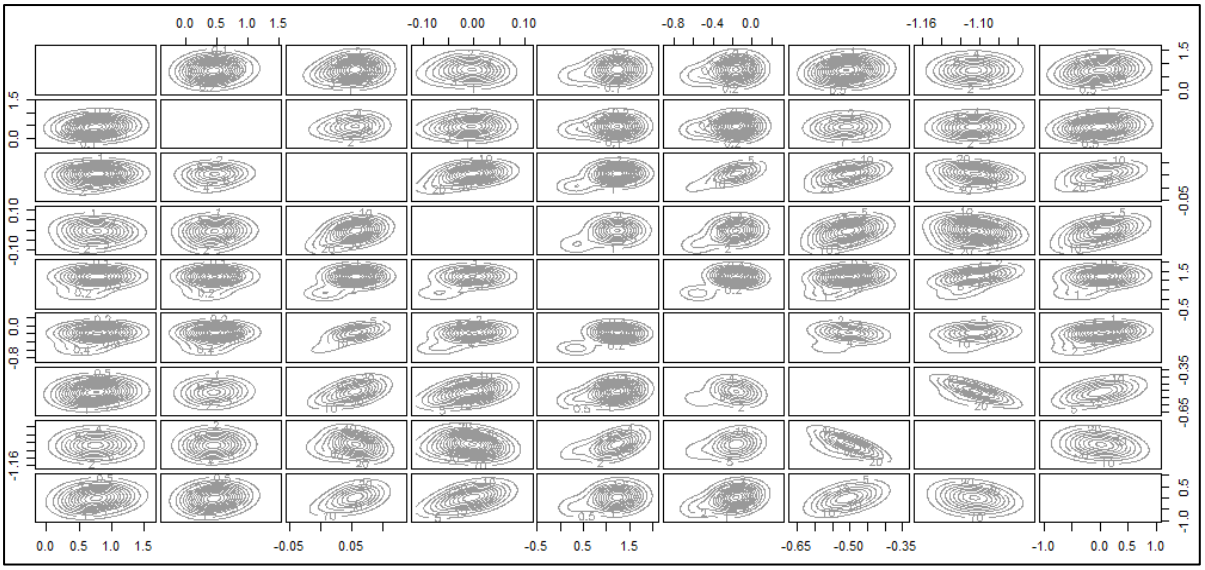


Figure 25 Density plot (R-output)

3.6 Conclusion

This work investigates the willingness to buy luxury EVs from the favorite car manufacturers. Furthermore, it aims to model the churn risk if producers ignore important aspects such as sustainability and ecology. Concrete brands were ignored due to the difficulty to, first cover all luxury car manufacturers in one study and second, to get sufficient luxury customers for each manufacturer and so, to get a representative sample. Also, this allows to get a generalizable model.

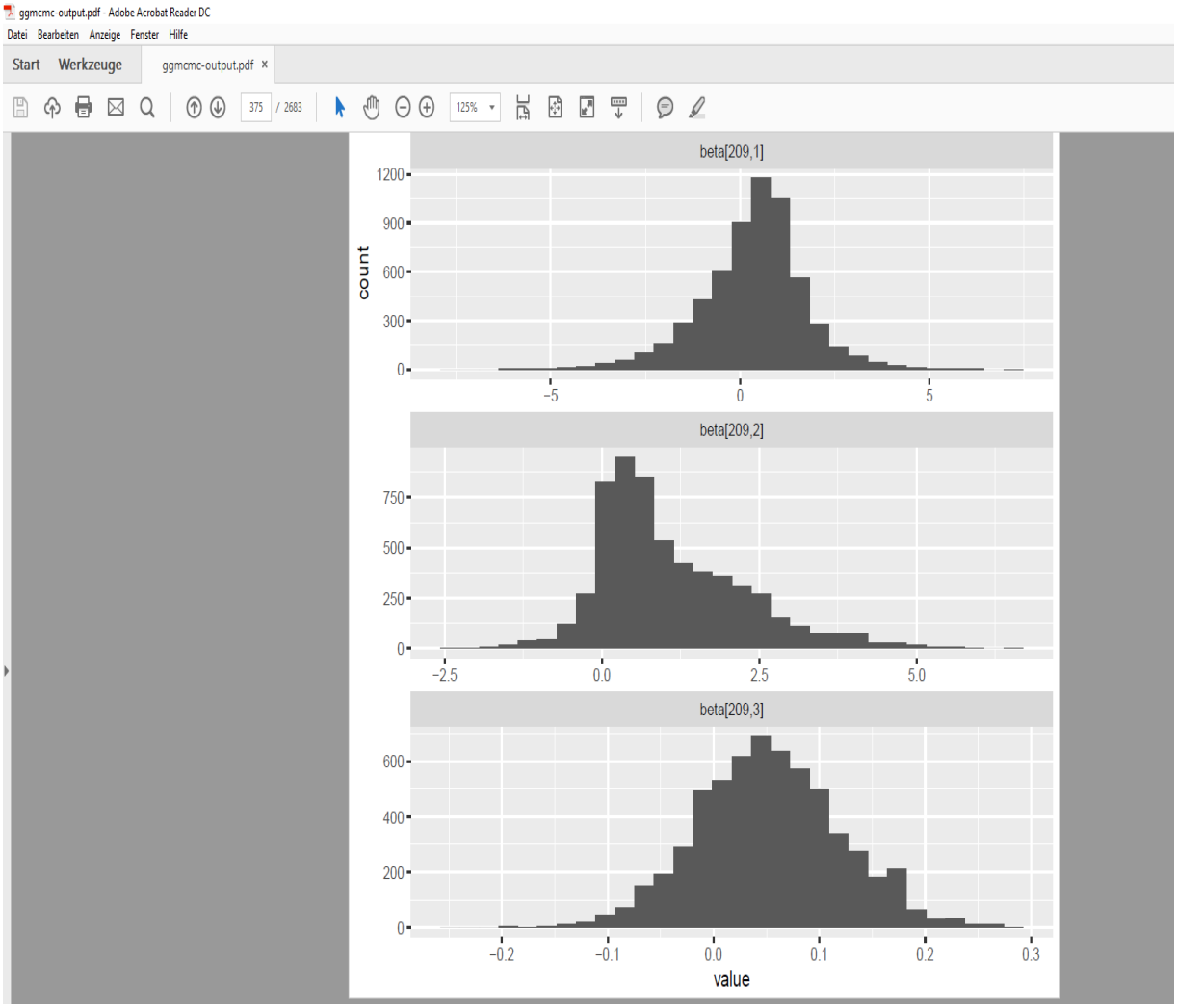
To conclude, prosperous buyers are generally environmentally friendly and, are therefore ready to adapt their behavior in a conscious way. However, spending enormous amounts on green products should guarantee some luxury benefits such as enjoyment and exclusiveness. The study shows that regardless of the individual ecology/materialism level, all customers are strongly preferring lower Co2 emission. Moreover, acceleration and soaring prices were significant factors influencing the decision making. This is consistent with the fundamentals of luxury in terms of high quality, high price, extraordinariness, etc. Also, the cluster analysis using coefficients for both individual and alternative specific variables show high preference similarity among all luxury customers.

The finding is primary for established luxury car manufacturers to keep their customers loyal and, to guarantee a leading market position. Producing EVs in the high-end segment has enormous potential and a huge effect on firms' success and survive. Nevertheless, not only product and customer' characteristics are relevant factors influencing the decision- making and, subsequently the loyalty, but also the brand value is significant. A Ferrari as an example offer their owners completely different values and sensations than a Mercedes, a BMW or even a Porsche, and vice versa.

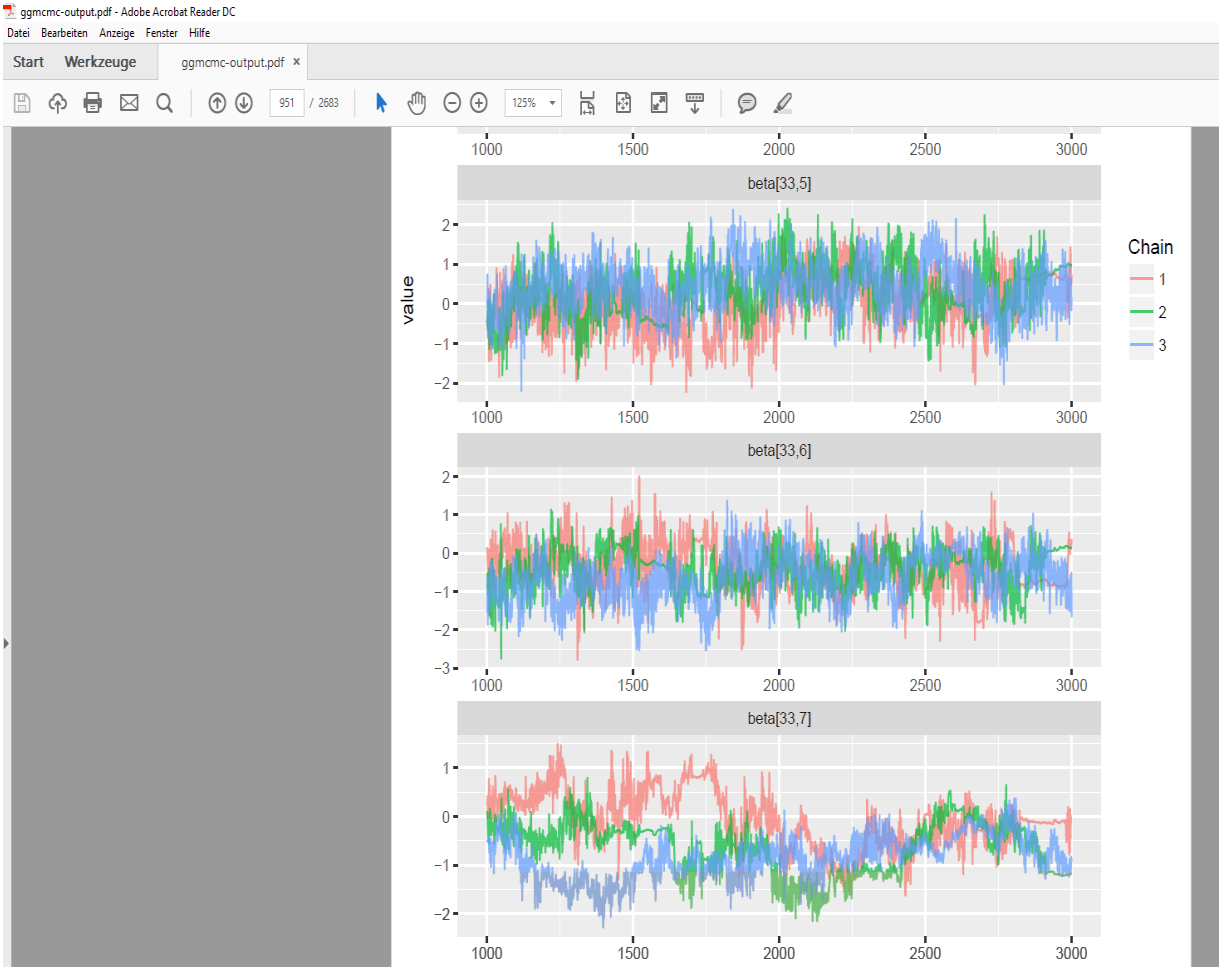
This massive acceptability for luxury ecological automobiles might also originate from the nature of prosperous buyers who are constantly seeking for trendy and new extravagant products that keep them privileged and guarantee a high arousal level (chapter 4.1.2). Additionally, such green products are well accepted and gladly seen. Accordingly, a high social status. Concerning churners, depending on the brand value and strength, their departing might be considered a consumption break. This could only be the case for some leading firms and under certain assumptions (update, catch up. Superiority and preeminence.). According to Nelson and Meyvis (2008), interrupting a pleasant experience reduces adaptation (familiarity) which implies a tall arousal level. Consequently, it makes

the consumption experience more enjoyable after that break. Analogous, if customers enjoyed their current luxury car and switch to competitor just for change and not due to remarkably superior features, they are more likely to have an unpleasant experience with the new vehicle. The change is to some extent the break. Afterwards, churners will identify the superiority of their favorite manufacturers, appreciate it more, and subsequently reemerge. Their consumption experience should then be more enjoyable than before the intermission.

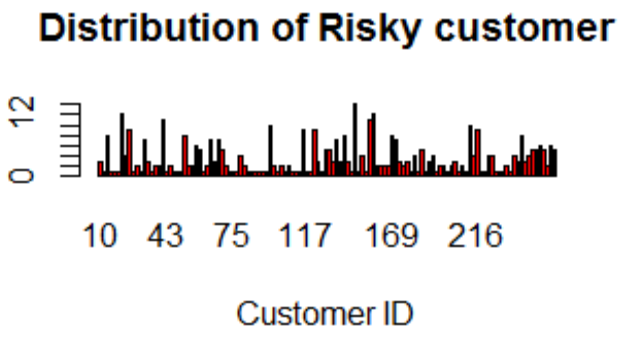
3.7 Appendix



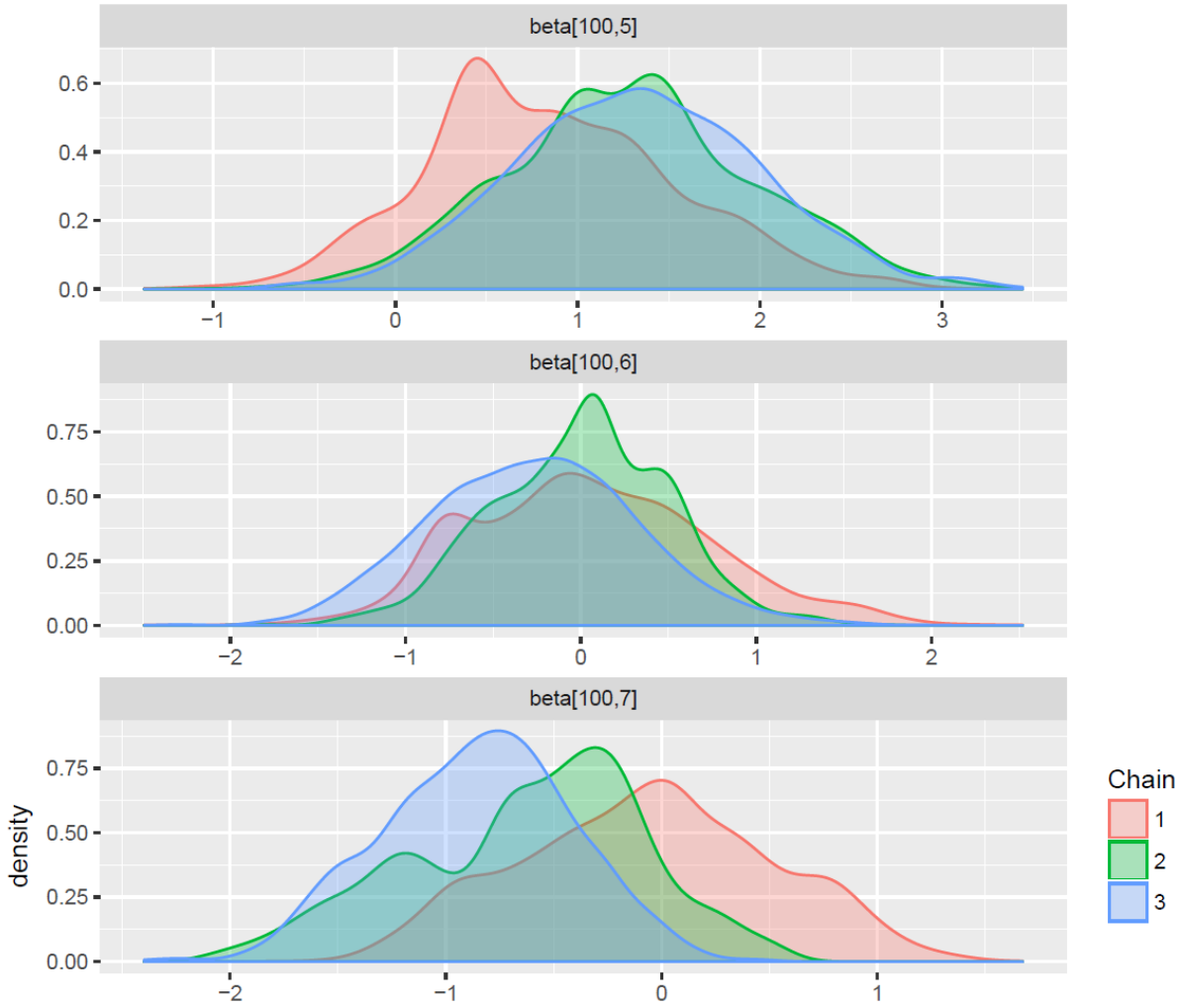
Appendix 2 ggmcmc- output for all individuals and their preferences on all features (2683 pdf pages)



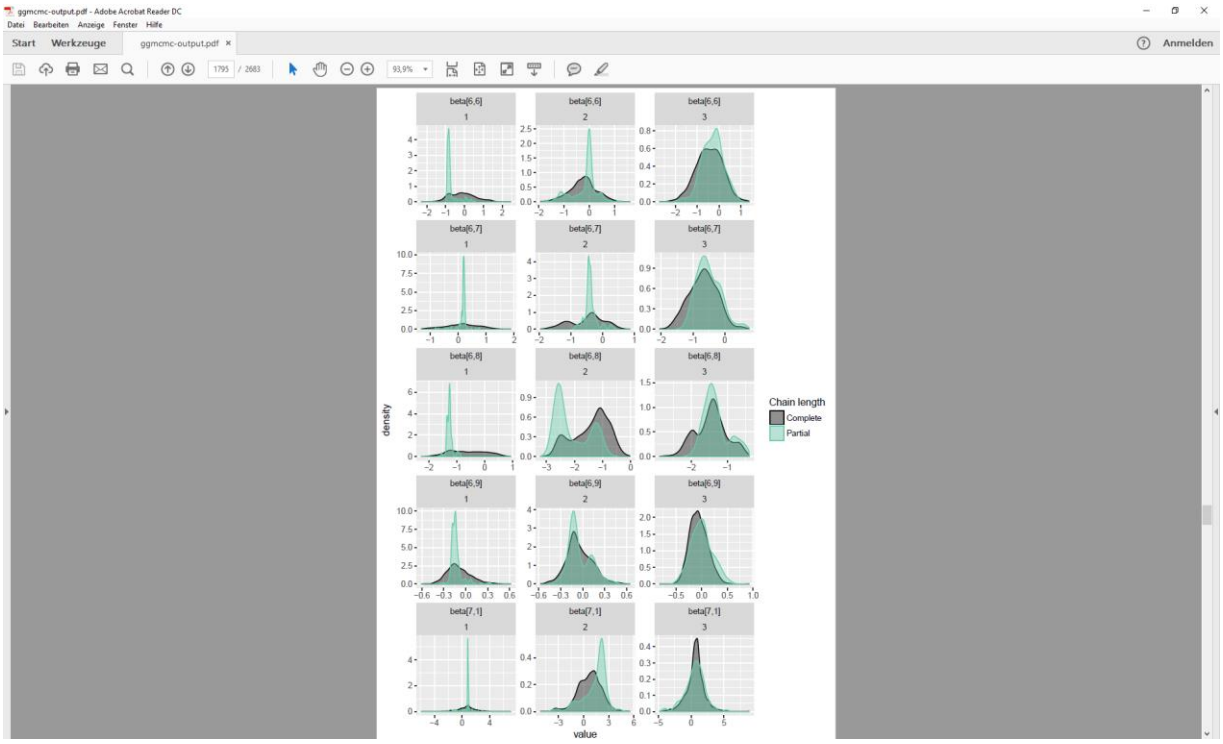
Appendix 3 ggmcmc output trace plots for individual 33 on 3 features



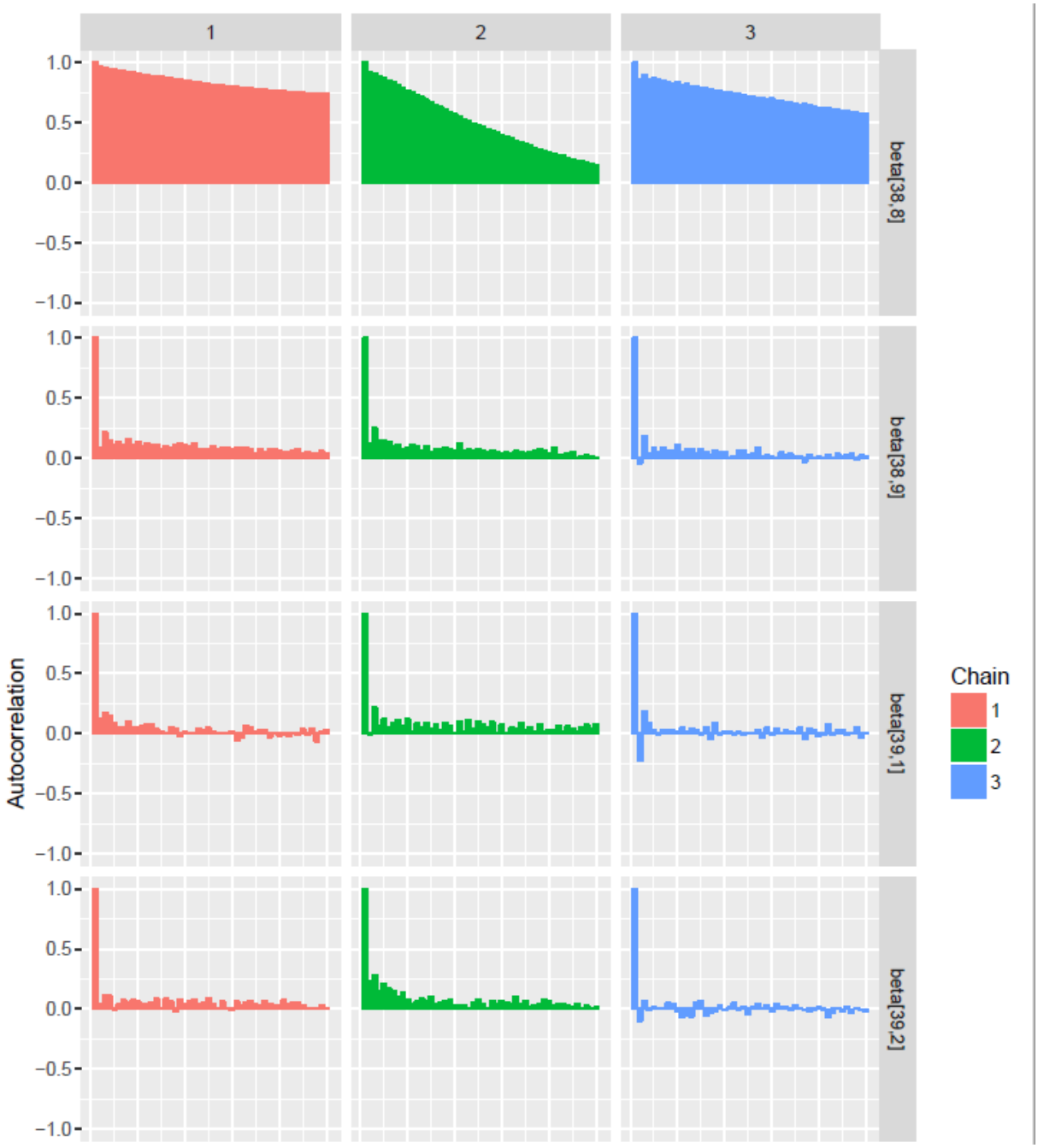
Appendix 4 distribution of risky customers (churners)



Appendix 5 Density plot of attribute preferences of ID 100 on 3 features (RStan-output)



Appendix 6 Partial vs. full chain comparison for person 6 and 7



Appendix 7 Running means (respondent 38 & 39)

3.8 Literature

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4 All about the paradise

Abstract

Consuming luxury products is the interaction of numerous factors, wishes and motivations. Lot of academic works and empirical studies (economic, marketing, sociology, psychology and history) were conducted to understand and characterize the market and the consumption of high-end products. Both the interdisciplinarity as well as the huge amount of academic works makes it more difficult for humans to differentiate between the research focuses, to draw the boundaries between the topics, and finally to derive proper results. Consequently, this work aims to analyze many academic researches on luxury, and to appropriately cluster them using structural topic modeling. The results confirm its' interdisciplinarity but also the existence of a large research gap within the field of luxury that should be investigated. Albeit the subject ecology and sustainability is less researched, it builds an important research hub since it is related to numerous topics. Moreover, the analysis shows an -exponentially- increasing academic interest in the luxury research from 2015.

4.1 Academic researches on luxury: An overview

The luxury industry is very important in terms of its monetary values, psychological benefits and advantages. For instance, the global market is continuously growing and reached approximately $1.2 trillion in 2017 (Bain, 2017). Subsequently, many academics and industrials explored this market in diverse ways to better understand customers, their motivations and the decision-making-process. Despite these multifaceted investigations, all researchers are agreed about the importance, the function and the dimensions of high-end goods.

The economic psychology (Leibenstein, 1950; Mason, 1981; Bran and Wicklund, 1989) consider luxury to be socially divisive. In his celebrated treatise on the "Leisure class", Thorstein Veblen (1899) argued that affluent individuals often acquire high conspicuous goods in order to advertise their wealth, thereby achieving higher social status. His work has spawned a major cornerstone in the field through the so called "Veblen effect" that occurs when people exhibit a

willingness to pay higher prices for a, functionally, equivalent good. Half a century later, Leibenstein (1950) confided this finding and identified a positive relationship between demand and price in the marketplace for luxury. In the same context, Eastman, Goldsmith and Flynn (1999) defined conspicuous consumption as the acquisition of goods that confer/ symbolize status for both the individual and the surrounding others. Similarly, Schiffman and Kanuk (2004) classified conspicuous goods in two groups: visually (easy identification like luxury) and verbally (highly interesting & easy to describe). Moreover, Chaudhuri and Majumdar (2006) stipulated that conspicuous in a consumption context indicates a wasteful and a lavish behavior. Vigneron and Johnson (1999) have affirmed these findings and presented a conceptual framework for prestige seeking consumers.

Farther, academics such as Thomson et al. (2005) investigated the concept of self-congruency and identified the 'actual-self' (perceived reality of the self) and the ideal-self (dreams, goals and striking self). They acknowledged their primary role in consumer decisions to acquire specific high-end products. Furthermore, Aaker (1999) and Grohmann (2009) empathized the importance of self-congruence in affecting customer response to the brand. Generally, shoppers seek products that better symbolize them with particular traits to express their selves (actual/ ideal).

The research chart in the marketing discipline is large. Thus, lot of works have observed the market of luxury, Consumer behavior and firms' strategies. Dubois and Duquesne (1993) for example, have defined luxury goods as expensive in relative and absolute terms. They also identified and characterized the relationships between buying luxury items and income. Other academics studied the motivation behind acquiring such goods and classified them into: intrinsic vs. extrinsic, personal vs. non-personal (Vigneron & Johnson, 1999), utilitarian vs. hedonic, material vs. experiential. In the same context, Wiedmann Hennings and Siebels (2007) presented a conceptual framework for luxury perception that includes four essential dimensions: financial, individual, functional and social. Likewise, numerous works investigated brand experience (Brakus, Schmitt and Zarantonello, 2009), brand attitude (E. Cretu & J.Brodie, 2007), brand involvement (Zaichkowsky, 1985), brand attachment (Thomson, MacInnis & Park, 2005), brand personality (Aaker, 1997) and brand image (R. Graeff, 1997, Martínez Salinas & Pina Pérez, 2007) and studied the impact of firms' dimensions on consumers' loyalty in different ways. They acknowledged these assets as key aspects for a firm's success. Besides, many academics focused on current trends, preferences and tastes and their impact on the luxury segment. For instance, Bendell and Kleanthous (2007), Bendell (2012), Kapferer (2013, 2014) and Hennings et al. (2013) documented environmental

friendliness and sustainability as serious challenges facing the market for high-end merchandise. Moreover, the linkage between these vicissitudes and the strategies followed by new entrants envisages a disruptive menace.

Other researchers have focused on the historical analyzes of luxury goods and their consumption. Berry (1994) for example, presented in his study “the idea of luxury” a mixture of historical investigation and conceptual analyzes. The focus of the latter was on the linkage between the symbolization of need and desire. Investigating insights from political theory, philosophy and intellectual theory, Berry (1994) came out with the indispensability of luxury values in all societies and cultures over time. Likewise, Lewis (2002) addressed the issue of luxury in ancient Arabs. He described the Arabic Society economically, scientifically and politically, and concluded that luxury is a part of the Arabic culture and so they are far away to be the so called “nouveaux riches” (Lewis, 2002; Hourani and Ruthven, 1991). Mosher Stuard (2006) described the luxury fashion consumption in early Italy and affirmed status and display as major motivations. The work of Berg and Eger (2003) builds the fundament for this research discipline since they affirm the interdisciplinarity of luxury (economy, society, design and culture). They studied the attitude change toward luxury and come out with a remarkable decline of its’ negative association with waste and corruption during the eighteenth century. As an illustration, they compared the old with the new luxury understanding in its’ definition (court vs. urban society), its’ goal (grandeur vs. comfort and joy), and its’ role (discrimination vs. cultural meaning, communication and sociability).

Bagwell and Bernheim (1996), Coelho and McClure (1993) have studied the phenomenon ‘Luxury’ from a completely different perspective. They tried to represent and formulate an econometric model. Bagwell and Bernheim (1996) examined conditions, under which “Veblen effect” emerges from the desire to achieve social status by showing wealth through conspicuous consumption. In their study “Veblen effect in a theory of conspicuous consumption”, the authors explored factors that induce such effects and investigated policy implications. Coelho and McClure (1993) have analyzed luxury goods and their price implementation. “Prestige pricing is setting a rather high price to suggest high quality or high status. Some target customers want the ‘best’ so they will buy at a high price. But if the price seems ‘cheap’, they worry about quality and don’t buy.” (Coelho and McClure, 1993).

This clustering seems to be logic and comprehensibly. However, a deep analysis shows many intersections and overlapping between some articles and topics which makes it difficult for the researcher to assign a specific paper to a specific topic. For instance, Dubois and Duquesne

(1993) treated simultaneously psychological aspects and marketing issues. But the extent of each topic in an article which allow to properly assign it to a theme is still unclear. Therefore, we aim first to apply text mining for a general analysis of the topic, and second to use structural topic modeling for a better classification of the articles over topics and themes.

4.2 Text mining

The world is changing, and information is continuously gaining importance. People are more and more surrounded with data that exceeds their own capacities for explanation and decoding. Subsequently, a new explorative tool was necessary to help them to react conveniently and to master their environment. Text mining is then an appropriate method for several reasons. First, it is interdisciplinary since it combines data mining, linguistics, computational statistics and computer science and uses standard techniques like text classification, text clustering, ontology and taxonomy creation (Feinerer, Hornik and Meyer, 2008- R package). Also, texts are maltreated despite their importance and potential as an information source. They have been always used as a default source of information storage among all cultures and nations. Therefore, they build a rich latent foundation of information. Additionally, their analysis is hard for humans and is costly. For instance, it is hard for human being to, simultaneously, read and analyze numerous articles and to come out with proper results. Text mining serves as a discovery tool in treating unstructured text documents. It applies machine-learning and statistical analyses and techniques to automatically identify patterns and relationships after transforming the texts in a structured format.

The methodology has been successfully used in numerous disciplines with various goals. Steinbach et al. (2000) applied it to analyze and group news articles. Miller (2005) was interested in e-mail filtering and in automatic labeling of documents in business libraries. Furthermore, Girȯn et al. (2005) and Nilo and Binongo (2003) used text mining in the field of linguistic stylometry. They derived the probability that an author x wrote a text y depending on his writing skills and style. Berners-Lee et al. (2001) developed an algorithm in the semantic web which propagates standardized formats (e.g. RDF/XML) for document exchange. This allowed agents to perform semantic operations on the files. In the knowledge management, Kostoff (2012) applied text mining on nanoscience/nanotechnology and on the science technology in china. He identified documents that are related to specific themes such as military, space or intelligence.

In marketing, text mining is being unceasingly applied. The increasing relevance of the internet and online payments favors the propagation of the so-called e-commerce and is therefore the best illustration. After an acquisition, web merchants ask their clients to review their purchase in terms of product/service attributes and the procedure. This is an important asset since many clients take care about those reviews before engaging in a specific behavior (buying or not). Additionally, firms can only profit from such reviews since they permit to derive a customer-based SWOT- analysis. Subsequently, manufacturers would be able to better adapt their strategies and tactics. For example, better handle with weakness and fit strengths as competitive advantages.

Nonetheless, the number of the reviews for a specific product can rapidly increase to thousands which poses a challenge for both manufacturers who produce various goods, and for online platforms that sell a variety of merchandises. As a result, their analysis becomes more complex and surpasses human capacities. Text mining is then an appropriate approach to treat such cases and to derive proper results. For instance, Hu and Liu (2004) conducted a study on five electronic products: 2 digital cameras, 1 DVD player, 1 mp3 player and a cellular phone. The reviews were collected from amazon. The authors were able to identify both positive and negative feature evaluations which is crucial for clients to make a convenient purchase decision and for firms/providers to ameliorate their production/ selling experience.

The pre-processing phase starts with the tokenization where words- and/or sentences are identified and clustered (figure 26, appendix 9). Afterwards, cleaning works such as removing punctuations, numbers, special characters and white spaces occur. Subsequently, a NER (named entity recognition) befalls. In this step, the algorithm tries to recognize and better assign the tokens (sentences or words). Following, a document-term-matrix (DTM) is created. All documents are listed as rows and all words in columns which allows the analysis and the visualization of the output (Feinerer, Hornik and Meyer, 2008).

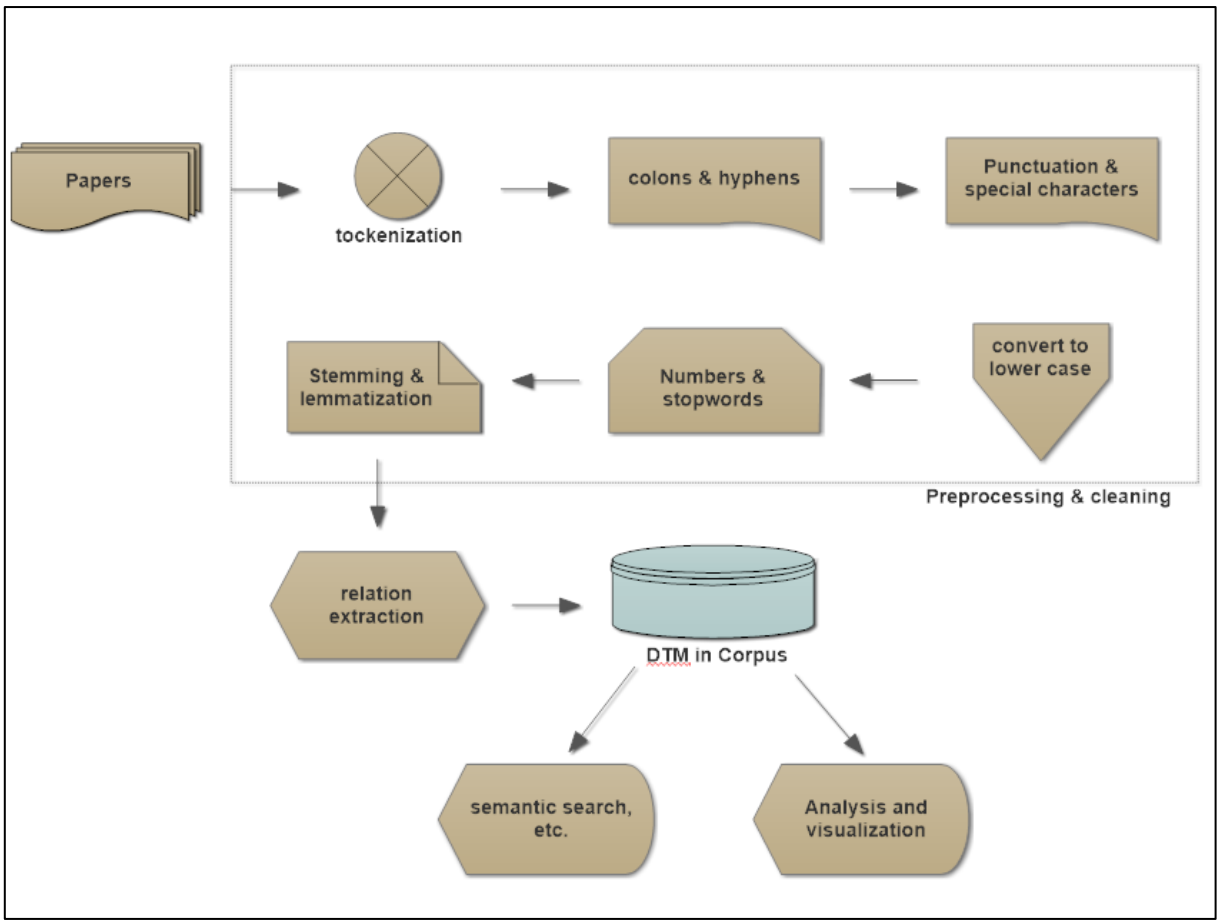


Figure 26 course of text mining analysis

To this issue, 568 articles that handles with luxury in general (medicine, marketing, history, technology, natural sciences, etc.) were downloaded from various platforms such as Science-direct, Emerald, google scholar, JSTOR and Ebsco-host. All articles have the word luxury either in the title or as a keyword. The papers were then called in R- studio and converted from .pdf to .txt for the analysis. Afterwards, the input was set for cleaning works. First, punctuation, whitespace and numbers were removed. Second, stop words (e.g. like, however, and, may, thing, etc.) were gutted. Important is also to care about the differences between the US- and the Aussie English like organize and organize, etc. In a next step, a DTM (document-term-matrix) is created with all downloaded luxury papers as rows and all words as columns (appendix 8). The DTM Figure 27 shows the word frequency which helps the researcher to get a better impression about the downloaded data. As an illustration, luxury and brand are the most frequent words with 58985 and 57901 appearances. Retail, store and buy have lower

rates with around 500 records. Also, terms like social, price and quality were present at the top level with around 1000 illustrations.

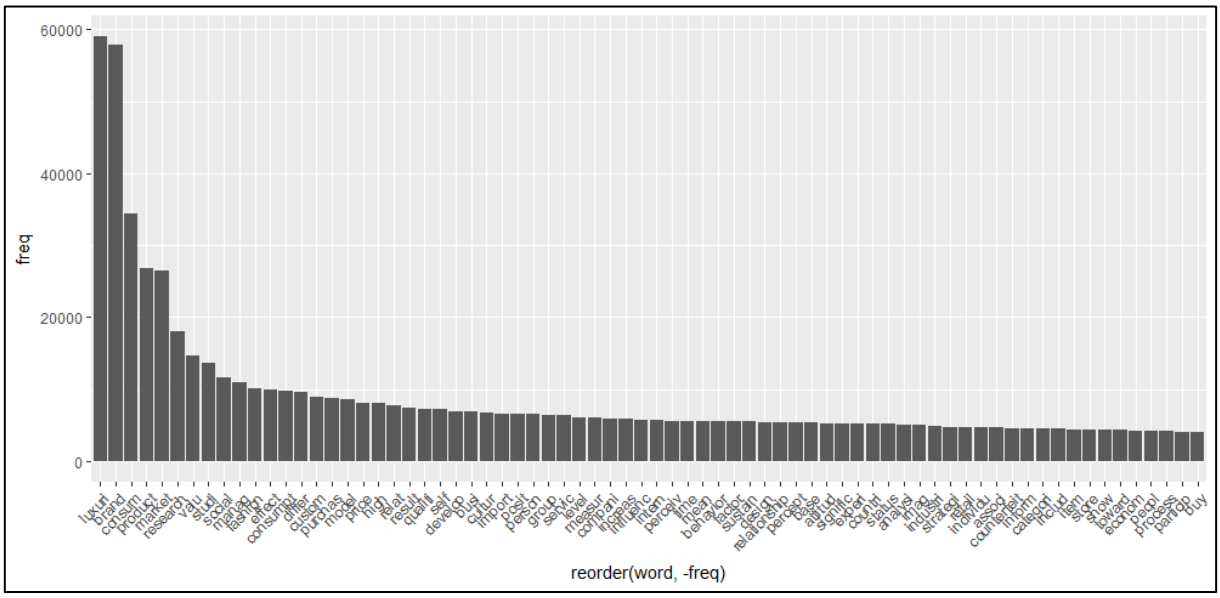


figure 27 word-frequency (R-output)

Further, for simplicity and clarity we used a word cloud (tm package) since the most used keywords will better stand out in a cloud. It is a potent communication tool that is easy to understand, to be shared and is impactful. For instance, word clouds are visually engaging than a table data and are widely used: researchers to better report qualitative data, marketers to highlight requirements and pain points of customers, politicians and journalists to understand several issues like people opinions. The choice was to focus on words with more than 2000 appearances (figure 28). The size of each word correlates with the number of occurrences. The graph helps to recognize the subject of the data without reading all papers and articles.

Looking at the cloud output, we recognize that our data handles with the luxury subject and with brands at the upper level. The articles label luxury brands and their characteristics in order to display both the boundaries and the differences to the mass market. Consumption (consume) is sturdily present in the academic works. Subsequently, the focus was on understanding the consumption pattern and on characterizing the acquisition of luxury products. We may then conclude that the majority of the downloaded articles investigated the characteristics of the high-end market and goods as well. Nonetheless, Researchers tried to understand the behavior

of luxury consumers. For instance, they explored social and cultural aspects to derive some values and factors influencing the buying decision. Remarkably, self, price, design, quality etc. which flows in the definition of luxury products are also present under the top words. As defined by numerous researchers (Dubois, Laurent & Czellar, 2005; Heine 2012; Langer & Heil, 2013) luxury goods should demonstrate key aspects like soaring prices, high quality and social values such as status, exclusivity and prestige. Subsequently, the word cloud sustains the aforementioned research categorization (chapter 4.2).

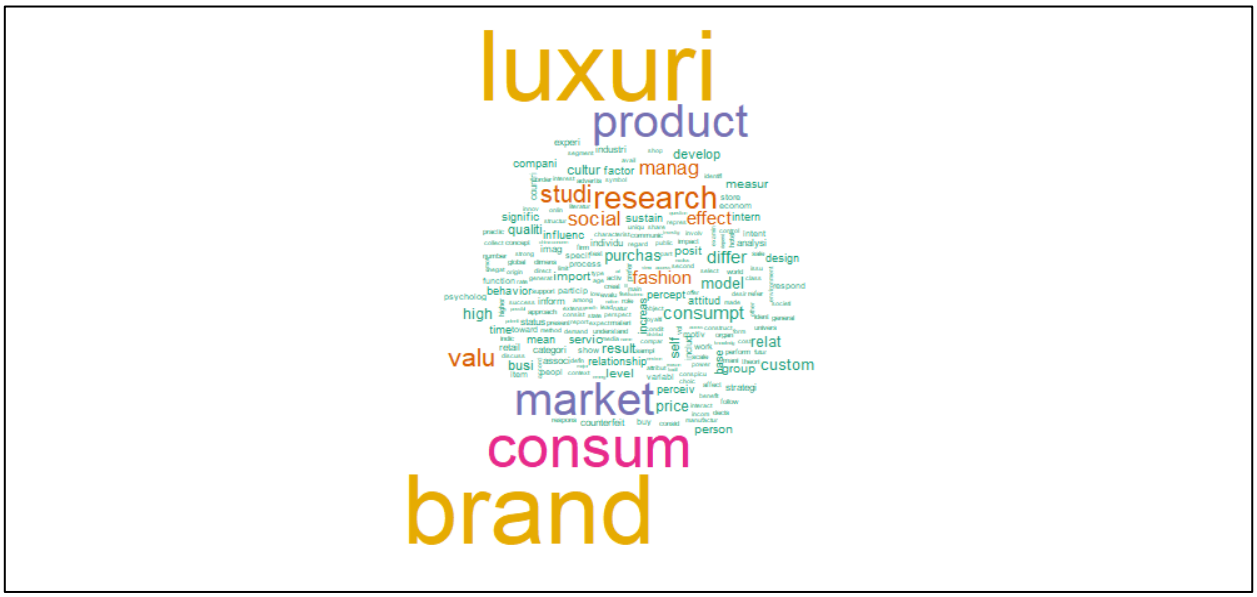


figure 28 word cloud: words over 2000 apparitions (R-output)

4.3 Topic modeling (TM)

4.3.1 LDA-model and topic identification

After visualizing the data with word cloud, we aim to cluster the articles depending on their research focuses and concentrations. For this purpose, we used topic modeling which is a method for unsupervised document classification and helps finding natural groups. The most popular and used approach in TM is the Latent Dirichlet allocation (LDA). It treats each document as a bundle of topics. For example, the topic sport would include words like athlete,

ball, player, stadium, etc. Likewise, LDA perceives each topic as a group of words. Consequently, each document may be assigned to many topics with different proportions. As an example, in a 4-topics-case we may find that document D1 is 20% related to topic 1, 40% to topic 2, 35% to topic 3 and 5 % to topic 4. LDA is then a mathematical approach that, simultaneously, determines the topic mixture and assign each document to various topics (appendix 10).

Before running the LDA-model, we used the optimal_k function which shows the harmonic mean of the Log-Likelihood against the number of topics. It gave back an optimal number of topics equal to 61 (figure 29). Afterwards, the LDA-model with Gibbs' sampling which belongs to the MCMC family (Monte Carlo Markov Chain) was run. After several warming iterations, MCMC starts sampling through the distribution. This drawing should converge and is, generally, too close to sampling from the true distribution. Therefore, the method is powerful and performant in practice (Darling, 2011).

In LDA, the researcher is mainly interested in finding out the document-topic proportions θ_d, the topic-word distributions β_k and the topic-word assignment $Z_{d,n}$. Following, the algorithm integrates out the multinomial parameters and computes the probability that a topic Z is assigned to a specific word w_i given all other topic assignments to all other words. On each loop, a topic is sampled foreach word instance in the corpus. The counts are then used to compute the latent distribution θ_d and β_k (Darling, 2011, Blei et al., 2003).

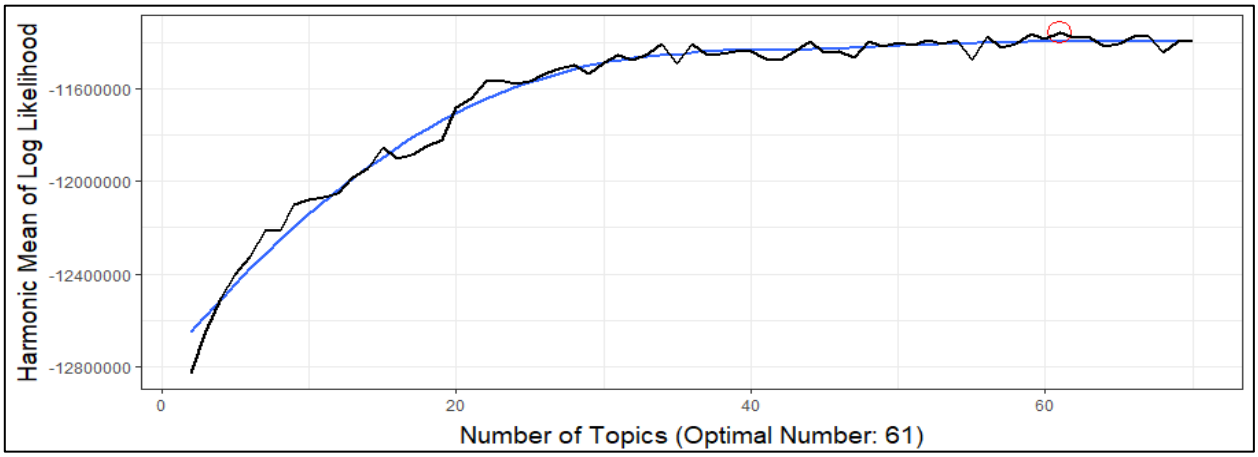


figure 29 Optimal number of topics (R-output)

We run the model among 5 days and saved the results in .CSV forms. First, it was necessary to check the document to topics correlations in order to make a convenient assignment.

Subsequently, we obtained a matrix with 568 rows that represent the documents and 61 columns which are the topics (appendix 11). Each article has different values that determine its relationship to each topic. These correlations are then an appropriate tool to assign each document to an explicit theme that is broadly present in it.

Appendix 12 shows the document to topic assignment. However, this clustering is still unclear and not helpful for researchers to make proper judgements and examinations since concrete topic information are not existing. Therefore, we called the top 5, 10 and 20 words for each topic (figure 30). The first 5 words are used to get a first impression about the theme. For example, topic 22 displays car, design, vehicle, etc. This allows to expect the automobile industry as a subject. Similarly, topic 16 has patient, health and care under the most vital words. Therefore, we may affirm that the subject of this topic is luxury medicine and health care. In most cases, the top 5 words was unnecessary to derive the issue of each topic. Subsequently, we called the 10 and the 20 keywords in order to test the convergence and the suitability of our philosophy. Continuing with topic 22, automobile, manufacturer, technology, automotive and communication were among the 10 keywords. This supports our connotation in the previous step (with 5 words). Afterwards, we displayed the 20 central words foreach topic for a better illustration and adapted our thoughts and judgements.

Finally, we filtered out the papers that are highly correlated with each topic and read them. Doing so, allows us to better test the expediency of our judgements and to adapt it, when necessary, to the content of the literature. As a result, we obtained a matrix with all papers and their correlations to concrete themes and subjects.

		Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	Topic 7	Topic 8	Topic 9	Topic 10	Topic 11	Topic 12	Topic 13	Topic 14	Topic 15	Topic 16	Topic 17	Topic 18	Topic 19	Topic 20	Topic 21	Topic 22
2	1	market	cultur	wine	collect	price	exam	consum	brand	custom	cultur	employe	product	sustain	particip	market	patient	sunscreen	status	countri	advertis	ware	car
3	2	countri	time	innov	self	market	student	research	luxuri	servic	ethnic	hotel	brand	counterfeit	product	research	health	ivori	conspicu	product	relat	glaze	geoduck
4	3	emerg	work	authent	possess	firm	power	purchas	fashion	restaur	global	manag	person	manag	consum	product	cancer	intern	consumpt	coo	incent	islam	design
5	4	invari	world	firm	gift	product	gay	social	product	emot	immigr	job	characterist	scale	effect	model	care	ugarit	social	origin	ontolog	parasit	vehicl
6	5	inform	mean	legaci	materi	profit	retail	self	consum	loyalti	islam	perform	hein	purchas	studi	differ	control	artist	class	made	compens	centuri	fisheri
7	6	cosmet	social	wineri	collector	demand	arab	studi	design	relationship	religios	work	ident	dream	evalu	effect	hospit	tradit	signal	evalu	knowledg	site	automobil
8	7	steenkamp	peopl	winemak	object	model	choic	attitud	retail	satisfact	women	organ	luxuri	contradict	condit	studi	treatment	style	gender	diffus	budget	period	manufactur
9	8	ventur	societi	qualiti	belk	sale	femal	behavior	market	qualiti	countri	hospit	trait	buyer	choic	result	medic	sun	pride	com	function	nest	technolog
10	9	interperson	relat	napa	life	competit	women	valu	store	valu	ident	mobil	definit	develop	prefer	level	mri	fig	promin	parent	synergi	paint	automot
11	10	global	mani	philipp	extend	entri	industri	consumpt	custom	experi	identif	devic	includ	item	research	high	registri	element	men	imag	class	bowl	communic
12																							
13																							
14																							
15		aquisition E	int. Luxury c	authenticity	materialism	competition	gay and fem	social statud	globalizatior	antecedents	muslim wor	lux firm staff	techniques &	luxury value	happiness &	market segm	luxury mede	Medeterrani	signaling sta	Coo effect	Ontology	early islamic	Automobile
16																							
17																							

figure 30 Screenshot top 10 words each topic

4.4 Creating a topic network

Graphics and visualizations are always an efficient way to better judge the output and the data. for instance, the word cloud (chapter 4.2) helped to obtain a clear understanding of the data and we were able to derive several conclusions and inferences. Similarly, our LDA-model delivers a matrix with 568 rows and 61 columns which contains intricate values. in this case, it is impossible for us to interpret the results. In the next step, we created a static network using the correlations between each topics' word probabilities. For simplicity, clarity and efficiency, we kept only significant relationships at the 95% level and have set correlations inferior to 0.05 % to zero. Then we used this correlation matrix to create an igraph data structure. Thereby, we removed all edges that have less than 10% minimum threshold correlation (appendix 13). Each number represents a topic and the size of the circle embodies its importance among our data. The yellow lines and their thickness clarifies the relationships between the subjects. The first impression is the existence of 3 main clusters: Topics that strongly related and build the big yellow cloud, topics that are relatively far but still correlated with the rest of the subjects, and other topics like areas 3,33,38,41 and 52 which are solitary. Remarkably, is that topics 15,2,7 and 41 are respectively the most present and central research focuses in the luxury literature. For a better interpretation, we created a community detection in topic network which is available in R (figure 31). The graph affirms our interpretations on the existence of 2 clusters (red & yellow) that are strongly interconnected and other singly clusters that don't fit with the rest.

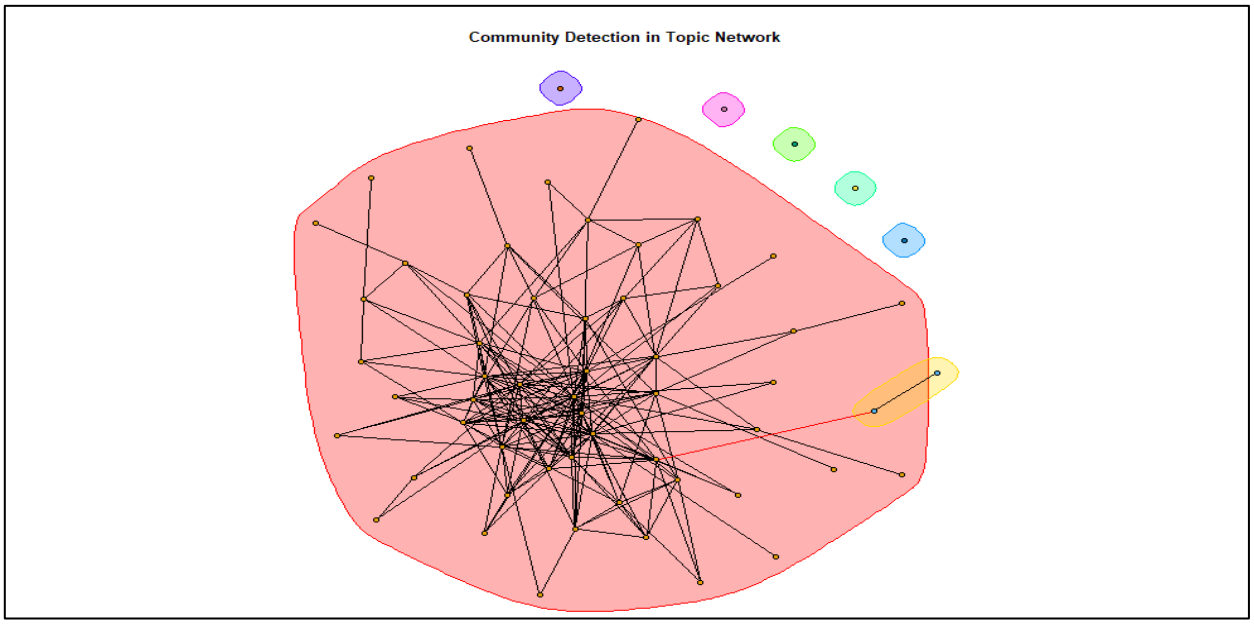


Figure 31 Community detection in Topic Network (R-output)

The final step is then to create a VisNetwork which is a dynamic visualization that allows an interactive network graphs in R. We convert our igraph structure into a list of nodes and edges that represent the topics and the correlations respectively. Afterwards we added a vector with the subject suggestions we derived from the LDA-analysis and plotted the Network (figure 32).

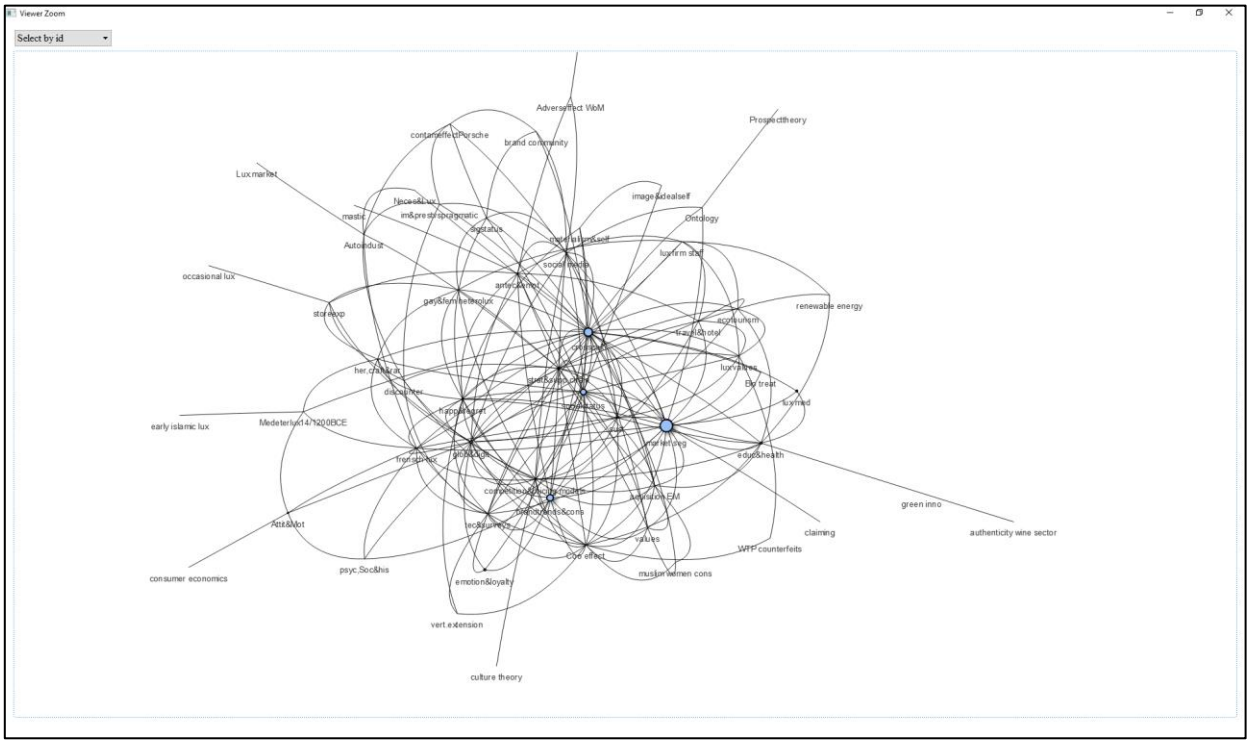


figure 32 All about the paradise (R-output)

The analysis of the 568 luxury articles through the LDA- model is now better interpretable. The VisNetwork affirms the output of previous steps like the existence of 3 big clusters. Remarkably, there are 4 major topics that are intensively investigated in the luxury literature: market segmentations, cross cultural studies, analyses of brand characteristics, trends and consumption patterns, and works on social aspects and values. furthermore, these subjects are strongly related and derive other topics like loyalty and emotions, luxury values and signaling status. The results are understandable since they correlate with the principles of luxury consumption such as the social, functional, financial and individual dimensions.

The luxury literature focuses principally on characterizing the market and on stemming a suitable segmentation. As an illustration, many authors like Wiedmann, Hennings and Siebels (2007, 2009) were interested in deriving a value-based segmentation of luxury consumption behavior. they concluded that social, financial, individual and functional aspects are major motivations to acquire luxuries. Vigneron and Johnson (1999) analyzed the influence of price on the prestige perception and subsequently, on the decision making. Ambler and Styles (1997) and, Albrecht, Backhaus, Gurzki and Woisetschläger (2013) investigated the importance of extensions strategies on both luxury and premium brands. In the same context, Fassnacht, Nikolaus Kluge and Mohr (2013) contrasted traditional versus luxury specific pricing procedures (strategic direction, analysis, decision and implementation). Subsequently, the authors succeeded in drawing the boundaries between luxury and premium markets. This confirms the strong relationship of this topic with other major subjects like brand characteristics, trends and consumption patterns, cross cultural studies etc.

Cross-cultural studies build the second most considered topic. The democratization of luxury and the increasing purchase craft makes it essential for both marketers and academics to reveal the darkness on the diversity of clients, their backgrounds, and their wishes to apply the right strategy. For instance, unlike western, Arab clients favor loud branded, extravagant and personalized products (e.g. golden cars) (Han, Nunes and Drèze; 2010). This chains with the VisNetwork since this topic is strongly related with market segmentation, globalization and digitalization, and social status. Furthermore, numerous empirical works on various countries and customers were conducted, to better illustrate this diversity. The output supports this statement since both subjects are strongly correlated. Moreover, in a cross-cultural context, luxury is, depending on financial, individual, functional and social aspects, subjectively defined. For example, getting water in some countries is difficult which implies a luxuriousness aspect. In some developing nations, people have other requirements and acquiring a compact car might be luxury. In contrary, the same vehicle can be considered as a usual possession in developing countries where individuals, generally, have better financial conditions. Even within the same society, a high diversity is reflected. The Maslow' pyramid is a good explication (Maslow, 1943, 1954, 1970a). Subsequently, the correlation of multiethnic studies with topics such as luxury values, image and ideal self, and especially with necessities vs. luxuries is fathomable.

A relatively lower importance was dedicated to explicit works on competition and pricing strategies/models in the high-end segment. This may be due to the nature of the luxury merchandise which is per default expensive. Furthermore, the leading role of psychological

needs and wishes as a motivation for the acquisition of such products may be a good explication of this detailed research lack. For instance, Fassnacht, Nikolaus Kluge and Mohr (2013) affirmed that luxury pricing are beyond all monetary values. It is more about finest quality, prestige, rarity and hedonic values. Also, this is confirmed by the VisNetwork that shows correlations between this topic and other subjects like luxury values, social values, cross cultural studies and market segmentation. Likewise, the willingness to pay for counterfeits is not explicitly considered. A possible explication might be the extensive focus on defining both the high-end market and its characteristics which, automatically, points toward the opposite direction (counterfeits).

Moreover, the coo-effect builds an important research hub in the luxury literature. It is not intensively considered but is related and derived from numerous potent topics and works like market segmentation. This is an important tenet for the market since history, symbolism, price and quality are fundaments of luxury goods and therefore, affect the willingness to buy expensive merchandise. The coo-effect is a quality/prestige indicator. For instance, prosperous buyers are more likely to prefer German cars, Italian fashion and French fragrances among other goods. This give those specific brands an additional dimension which is strongly related to aspects such as history, craftsmanship and authenticity. Moreover, many clients prefer obtaining their goods from the country of origin where the purchase act itself is considered as a unique experience. As an example, several prosperous buyers travel to Paris to visit the Louis Vuitton store, admire being there and purchase their preferred bag. They enjoy the entire experience from traveling to the purchase act.

Likewise, the topic supply chain and strategic management of luxury brands is an important research axis. This is comprehensibly since supply chain envelops quality issues, the coo-effect, product display/design, antecedents and motivations, and innovative stratagems. It helps luxury manufacturers to understand consumer motivations, contemporary trends, and therefore, adapt their views and strategies.

Eccentrically, the sustainability area received little focus in the academic literature. Despite numerous correlations to major topics like market segmentation, strategies and trends, luxury values etc., environmental friendliness seems to be more present in daily news and reports. Also recycling behavior as well as ethical attitude information are single topics that are less investigated. This might be due to the newness of this issue in luxuries as well as to some paradoxes between both themes. For instance, authors like Bendell and Kleanthous (2007), Bendell (2012), Kapferer and Michaut_Denizeau (2017), kapferer and Michaut (2016) and

Hennings et al. (2013) affirmed the indispensability of sustainability facets in the market for high-end products. However, Davies et al. (2012), for example, don't consider it decisive.

Moving to the vertices, we recognize some works on renewable energy that are related to other topics such as ecotourism, luxury medicine, travel and hospitality as well as to education and health. Additionally, various researches were conducted on the car industry (e.g. the contamination effect of Porsche) and are strongly related to topics such as materialism, conspicuous consumption, and strategies and supply chain. Remarkably is the truncated focus on green innovations in luxury segment which might have the same ancestries as sustainability.

4.5 The evolution of luxury research over time

After we characterized the conducted luxury researches and classified them into different topics according to word frequency and relationships, we are interested in finding out the evolution of these academic works (topics) over time. This allow us also not only to identify the topics that are gaining importance these days but also to identify new research movements. For instance, we can identify if this overlaps with some articles who are criticizing the lack of research on sustainability and ecology in the market and those who are empathizing the role and the potential of sustainability as a research field (Bendell and Kleanthous (2007), Bendell (2012), Hennings et al. (2013), Kapferer (2014), and Kapferer and Michaut-Denizeau, 2015).

For this purpose, we used our LDA-Gibbs-output and structured it in a way that we have all papers in the rows. The columns contain the topic assignments, the number of appearances each topic and the publication year respectively. Afterwards, we called it to R-studio and factorized the topics into "factop" for better visualizations. Figure 33 is a good illustration of the evolution of the academic research on luxury over time. It shows an increasing interest/ focus on this topic over time, except between 2000 and 2003 there was slight investigations compared to the entire period. Remarkably, from 2015 the market is getting briskly exciting and is intensively researched. The research line is exponentially increasing. A possible explication might be the increasing wealth that reached its maximum these days. Yeoman and McMahon-Beattie (2006) wrote that "the world is getting richer and the consumer has more real disposal income". Moreover, the globalization of luxury favorized both, an extensive consumption of high-end goods and a trading-up consumption pattern. Even middle-income people are steadily seeking to improve their lives. Besides, they are willing to pay higher amount in order to achieve

higher social level and to enjoy better goods/ services with better qualities. This is also confirmed by the findings of Truong, McColl and Kitchen (2009) who argued that the improved economic factors, the increasing disposal income as well as the growing wealth and low production costs increased the attractivity of the luxury market. it becomes the ordinary of the extraordinary people and therefore, a relative mass market. From a firm's perspective, the market of luxury goods builds an attractive field. in addition to high-end manufacturers, premium and mass brands are targeting it due to its' benefits such as prestige pricing which is related to, comparatively, higher profits and customer' loyalty. Nonetheless, the emergence of an increased number of start-ups has put the market under the loop. As a result, scholars are, increasingly, interested in investigating the market and in finding out the motivations behind this exhaustive purchase behavior as well as the production techniques and strategies.

the graphic allows a good visualization of the luxury research over time as well as an identification of the research wave and tendency. However, due to a high number of topics (61) and papers (568) it is still difficult to identify single topics and their evolution. For this issue, the DTM was filtered and only topics with more than 20 appearances were kept. This allows to analyze the most frequented themes in the academic research.

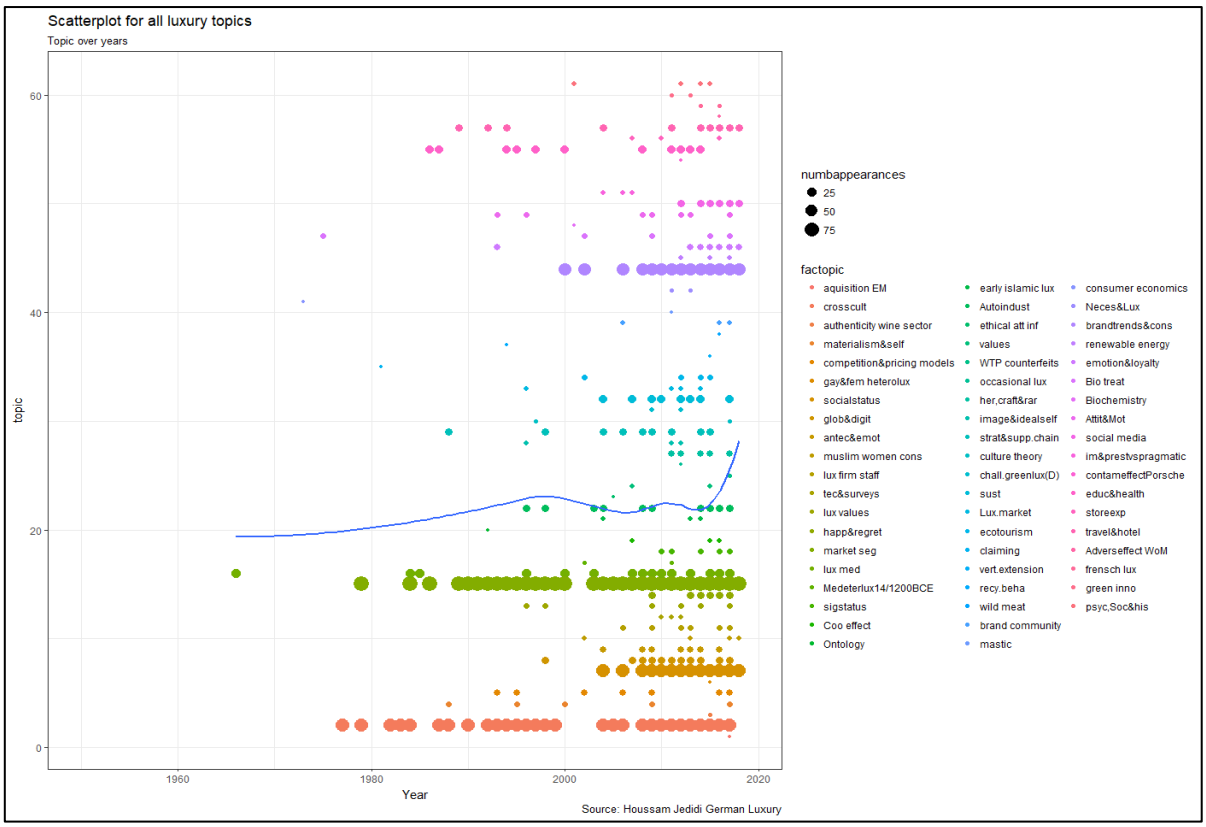


figure 33 Scatterplot for all luxury topics (R-output)

Both figure 34 and appendix 15 illustrate the most investigated luxury topics. The output confirms the results presented by the VisNetwork since Market segmentation studies builds the most investigated topic in the luxury research. Followed by international luxury consumptions and works on brand strategies. Remarkably, articles on medicine like the analysis if special treatments are luxurious, build the oldest but also the largest distributed theme over time. This is understandable since treatments of certain diseases is not only expensive, but also rare and difficult to achieve (at least at the begin, when a new treatment is discovered). Consequently, this overlaps with the fundaments of luxury like rarity, exclusivity, quality and soaring prices. Overtime, this specific treatment becomes accessible to numerous people through economies of scale and it becomes ordinary. After a while, a new disease appears and dealing with it builds the new luxury and so on. This explains the sinusoidal research curve. This is also related to the topic education and health which reached its' resonance between 1995 and 2010. The topic is still attractive and highly investigated since we moved from the royal luxury (e.g. Queens & Kings of France) to the luxury of the self-made money (Yeoman and McMahon-Beattie 2006). Also, the appearance of new luxury consumers such as the LOHAS is a major

factor influencing the evolution of this topic. They are well-educated and conscious consumers who are primary interested in sustainable products. Moreover, more and more traditional prosperous buyers are becoming aware of environmental issues and try to adapt their behavior. Finally, the novelty, the trendiness, the rarity as well as the high social acceptability of ecological luxury goods such as EVs, hospitality and fashion, increased their attractivity and subsequently, the willingness to buy. Thus, sustainability and ecology are continuously gaining in importance and worth.

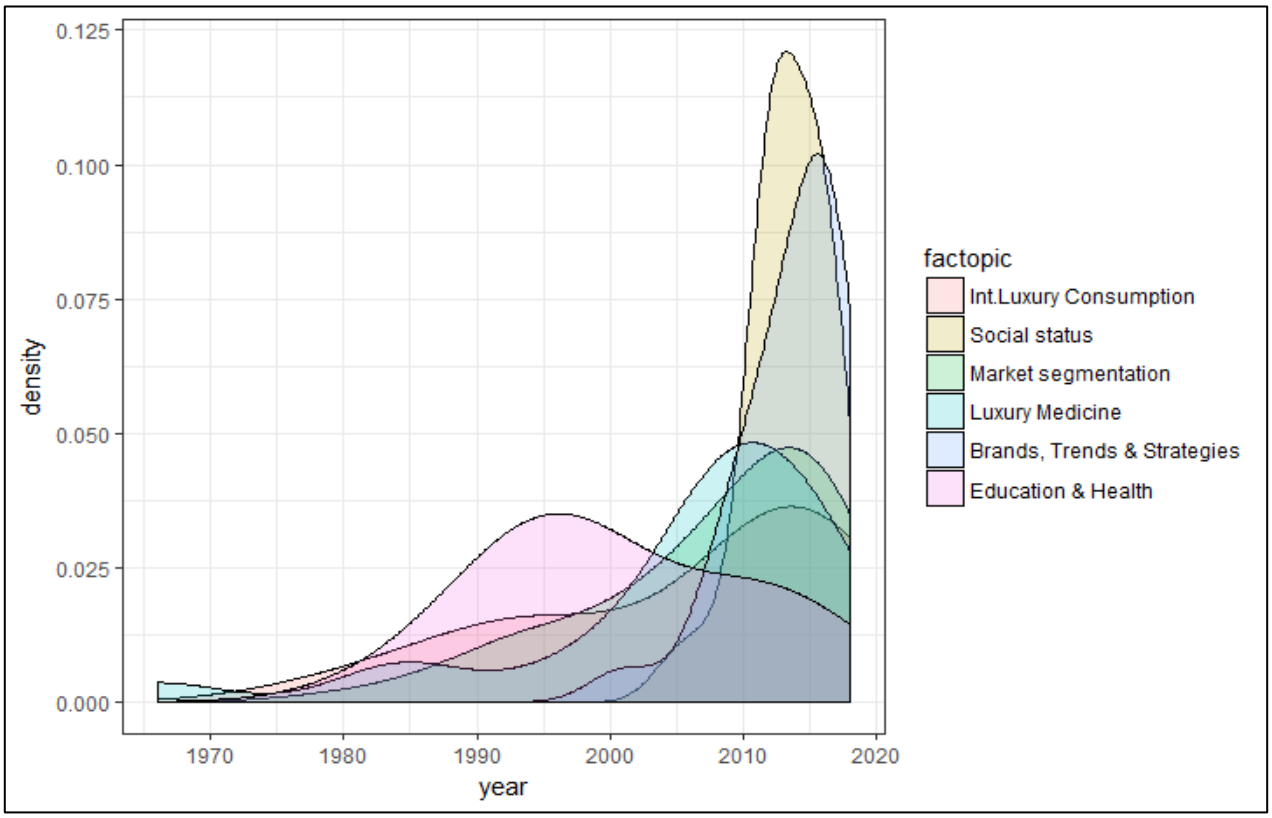


figure 34 density plot Topics with freq over 20

This is also strongly related to the intensive research on social status and brand strategies toward current trends and movements. Studies on social values such as recognition and gratitude are key motivations for luxury consumption. The increasing wealth and purchase power, the inclination toward a trading-up consumption for middle income clients as well as the appearance of new tastes and preferences (e.g. ecology) makes this subject more attractive for firms and scholars. For example, this clientele has different to opposing inspirations (ecology

vs. materialism) but are interested in high-end goods. As a result, it is meaningful to evaluate the different social values and motivations in order to derive suitable strategies and tactics. As an example, choosing whether to apply brand extensions (vertical vs horizontal) and which pricing strategy is a major issue these days. On the one side, numerous researchers like Groth and McDaniel (1993), Yeoman and Beattie (2005), Amaldoss and Jain (2005) and, Fassnacht, Kluge and Mohr (2013) investigated luxury brand strategies to conserve luxury values such as prestige, status and exclusivity and, to survive in terms of pricing tactics and extensions. On the other side, Truong, McColl and Kitchen (2009) warned firms from misusing brand- and product-line-extensions which can dilute the whole make. Similarly Kapferer (2013) highlighted the importance of such strategies in generating profit but, suggested three key aspects that should be took into consideration to avoid brand dilution. First, the prices of the entry line must reproduce the positioning of the brand compared to competitors and to premium manufacturers. Second, the new line has to contain the DNA of the parent brand. lastly, he arguesd that the price must signal the superiority to the premium segment. This explains the higher correlation (time & investigation) to the theme brand strategies (figure 34, appendix 15).

As mentioned above, we are interested in testing the suggestion of numerous authors such as Bendell and Kleanthous (2007), Bendell (2012), and Kapferer and Michaut-Denizeau (2014) that, despite its' indispensability, sustainability and environmental friendliness are less investigated in relationship to luxury consumption. Therefore, the LDA-Gibbs-output was filtered and only sustainability related topics (32: sustainability, 34: ecotourism, 37: recycling behavior, 45: renewable energy, 55: education and health, 60: green innovation) were reserved. The choice was based on the luxury literature which relates ecology, environmental friendliness and sustainability with recycling, green consumption and the use of renewable energy. Similarly, academic works are increasingly empathizing the role of education as a key motivation in consuming high-end merchandise. For instance, they enlighten the significance of LOHAs and the millennials in redefining the future market.

Except education and health which appeared in the early nineties, all other topics have their origin in the year 2000 (figure 35). Also, this can be potted from the previous step where only topics with more than 20 appearances were preserved. Except Education and Health none of these topics was present. This confirms the assumption that sustainability related subjects shape a new research focus that has been paid little intention.

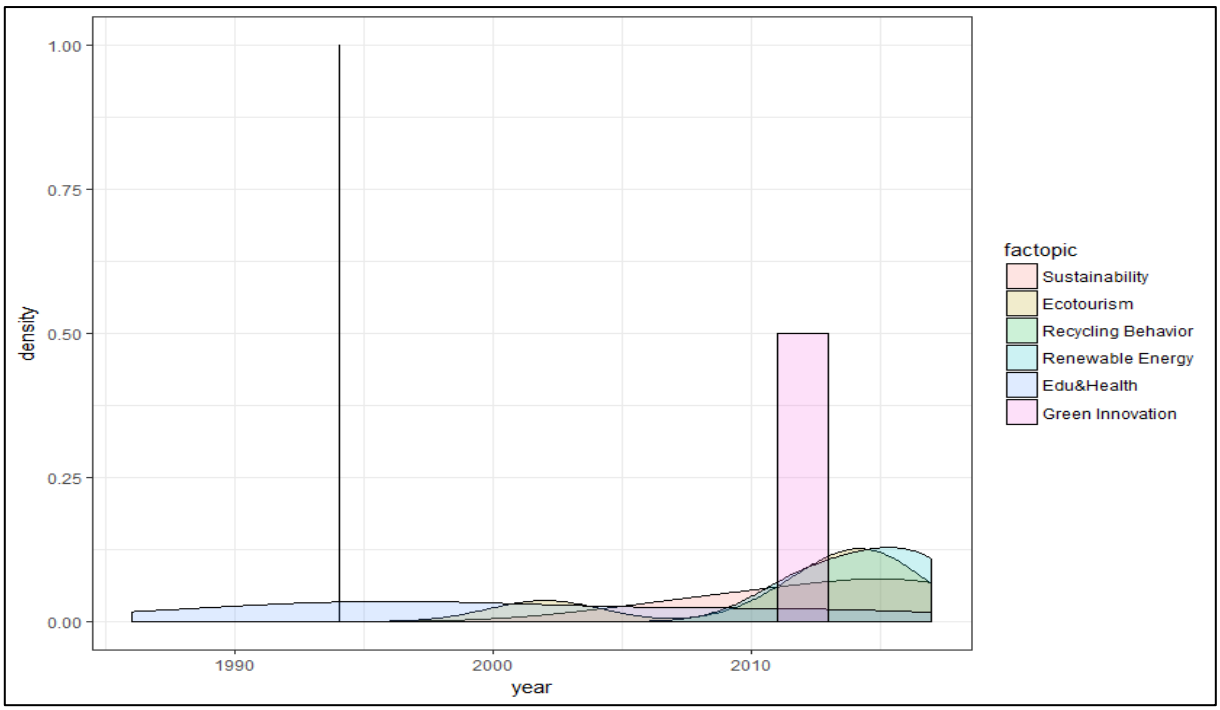


figure 35 Density plot of sustainability related topics

4.6 Conclusion

The luxury market is continuously growing, and the product supply is getting more sophisticated which makes it to a paradise for marketers, professionals, and customers. Independently of their requirements, goals and motivations, people show higher pleasure when acquiring expensive and exclusive goods. For instance, driving a Ferrari generates completely different feelings as when driving a Mercedes, a Maserati or even a Porsche. According to various researchers, people have reached these days the maximum wealth level and purchase power. Not only prosperous buyers have access to luxury goods, but also middle-income clients are increasingly interested in upgrading their life styles and therefore, following a trading-up consumption. They aim the superior quality, the social benefits and the individual joy delivered by high-end goods. Subsequently, marketers can make use of these advantages and try to adapt their strategies and tactics like extension strategies. For instance, meeting the intersection between peoples' wishes and firms' goals is the recipe for success. In this context, numerous academic works were conducted and tried to scrutinize the market from different perspectives and disciplines. This interdisciplinarity as well as the quantity place various challenges to interpret the studies and their focus. For instance, it opposes human and machine abilities and capacities. To this issue, we downloaded 568 luxury papers from different online portals and libraries (google scholar, Emerald insights, etc.). The first step was to get a first impression of the data through the text mining methodology. All papers handle with luxury brands at the upper level, followed with characterizing expensive goods and some motivational/social aspects. in hindsight, an LDA-model is run to appropriately cluster the downloaded research. The results show a high concentration on characterizing the luxury market as well as on understanding the drivers for such consumption. Moreover, an analysis of the topics over time show a large distribution of luxury subjects like luxury medicine, education and health, and studies on worldwide luxury consumption. Remarkably, topics such as sustainability, green innovation, recycling behavior and ethical behavior received little to no attention. This might be due to the newness of such issues in the market and to some contradictions in their understandings. The environmental friendliness is a hot topic in todays' newspapers and reports. Also, more and more people are becoming conscious and aim to adapt their behavior. Equally, various prosperous clients are attracted by the newness and the exclusivity of such products. Subsequently, understanding various consumers, their motivations as well as the new wishes is essential to participate in redefining the future luxury market.

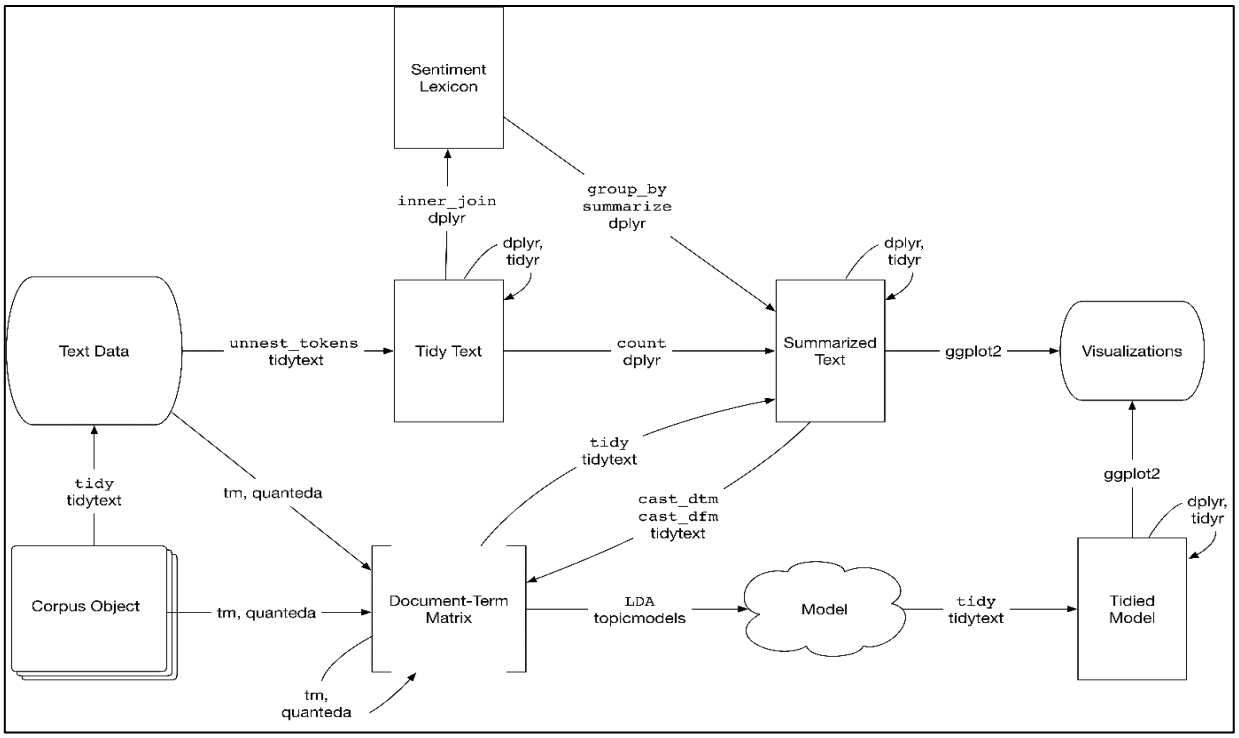
This study using text mining and LDA- models poses a challenge for human capacities since we are unable to simultaneously read such an enormous number of articles, understand and summarize them, and to, appropriately, cluster them according to their content. Even if some people have the skill to accomplish this task on a moderate number of articles, their interpretations and clustering won't be as efficient as using LDA- models. For instance, people (un-)consciously integrate their sentiments and opinions in the interpretation procedure. Subsequently, the results would be biased.

Our results suggest the existence of 61 topics among the 568 luxury papers. Studies on market segmentation, cross-cultural context, social values and brand strategies build the most important research focus of the luxury literature. This overlaps with the fundaments of high-end goods. The analysis of the research evolution over time shows a notable investigation since 2015. This is due to the increasing wealth as well as to the democratization of luxury that makes is accessible to numerous consumers. Luxury become somehow, the new -relative- mass market and the ordinary of the extraordinary. Therefore, the market turnover, different firms' concepts and the outstanding consumption facets increased the market' attractivity for all players like researchers, consumers and companies. Also, this correlates with the increasing importance of researches on sustainability and ecology which build an important research hub. Despite the lower investigation, this topic is strongly related with the most important subjects of the luxury research. For instance, high correlations not only with major topics such as trends and brand strategies, social values, market segmentation but also to topics such as education, innovations, and luxury firm staff. This support the idea that sustainability and ecology are decisive for the continuity and the survive of luxury companies. But also, ecology values and principles should be considered in the entire value chain. Hence, combining luxury fundaments with a confident sense of responsibility makes firms innovative and facilitate a potent presence in the luxury market.

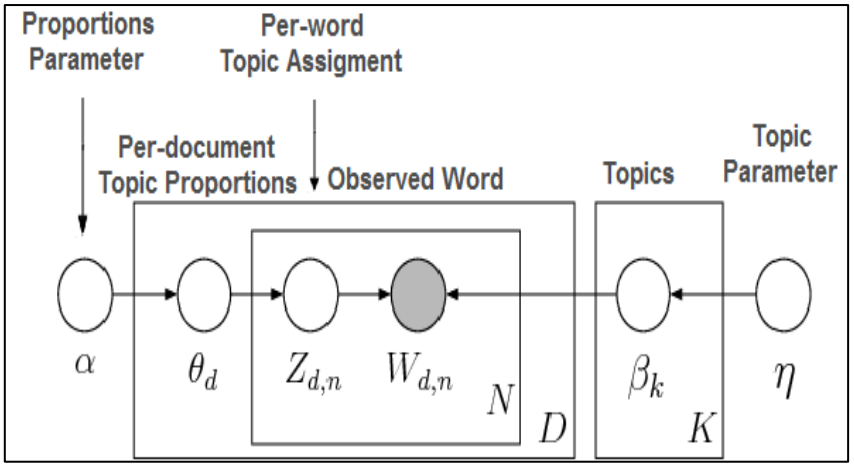
4.7 Appendix

```
> dtm
<<DocumentTermMatrix (documents: 568, terms: 71347)>>
Non-/sparse entries: 617888/39907208
Sparsity           : 98%
Maximal term length: 1057
Weighting          : term frequency (tf)
```

Appendix 8 DTM overview (R-output)

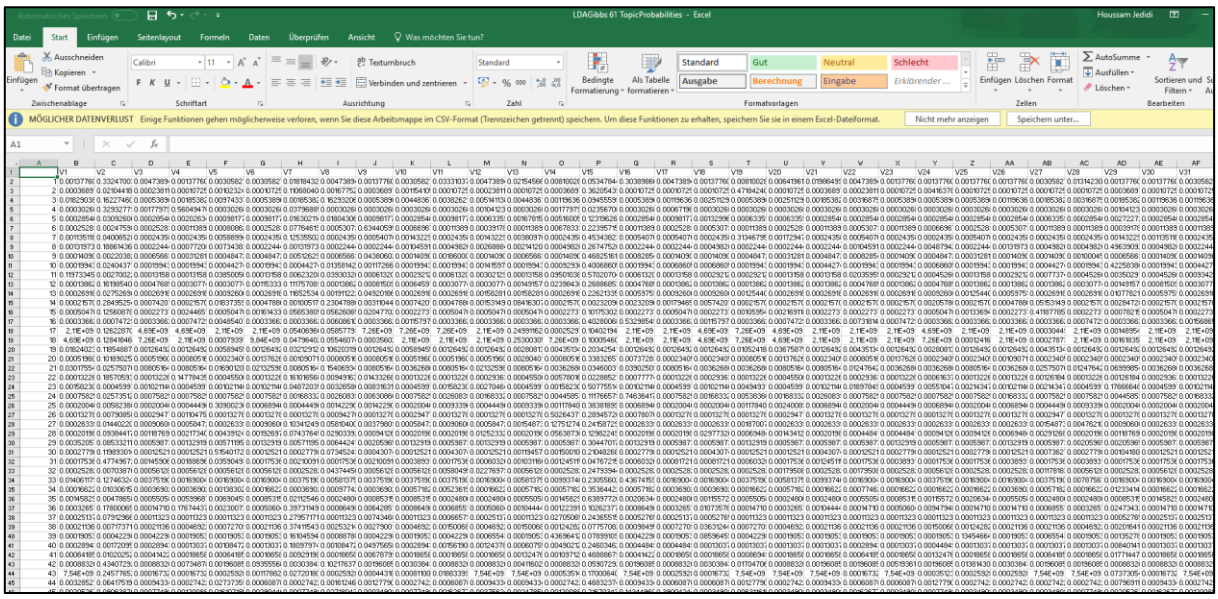


Appendix 9 Text analysis incorporating topic modeling (tidytextmining.com)

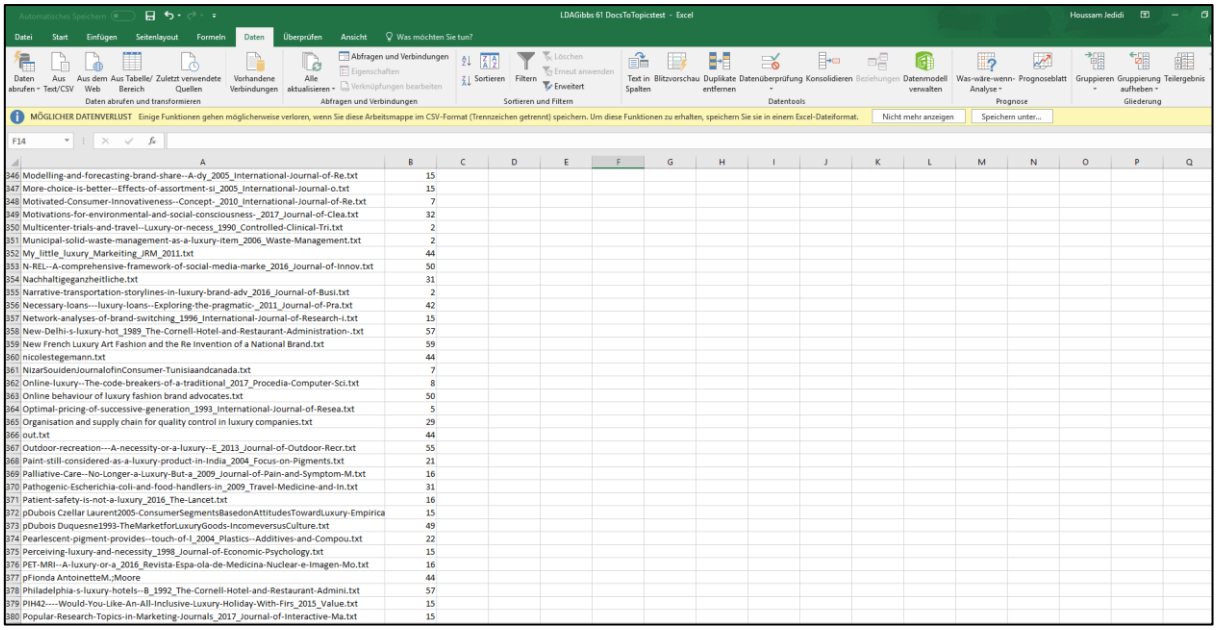


βk→topics ; each β distribution over terms (total k)
• Zd,n: topic assignment for each Word. Drawn from a dist. with parm θ.
• Wd,n: nth word in the dth doc
• α: contains mean/shape/ sparsity
• *η (eta) comes from a Dirichlet dist.*

Appendix 10 Topic modeling using LDA (Blei et al., 2001; Blei et al., 2003)

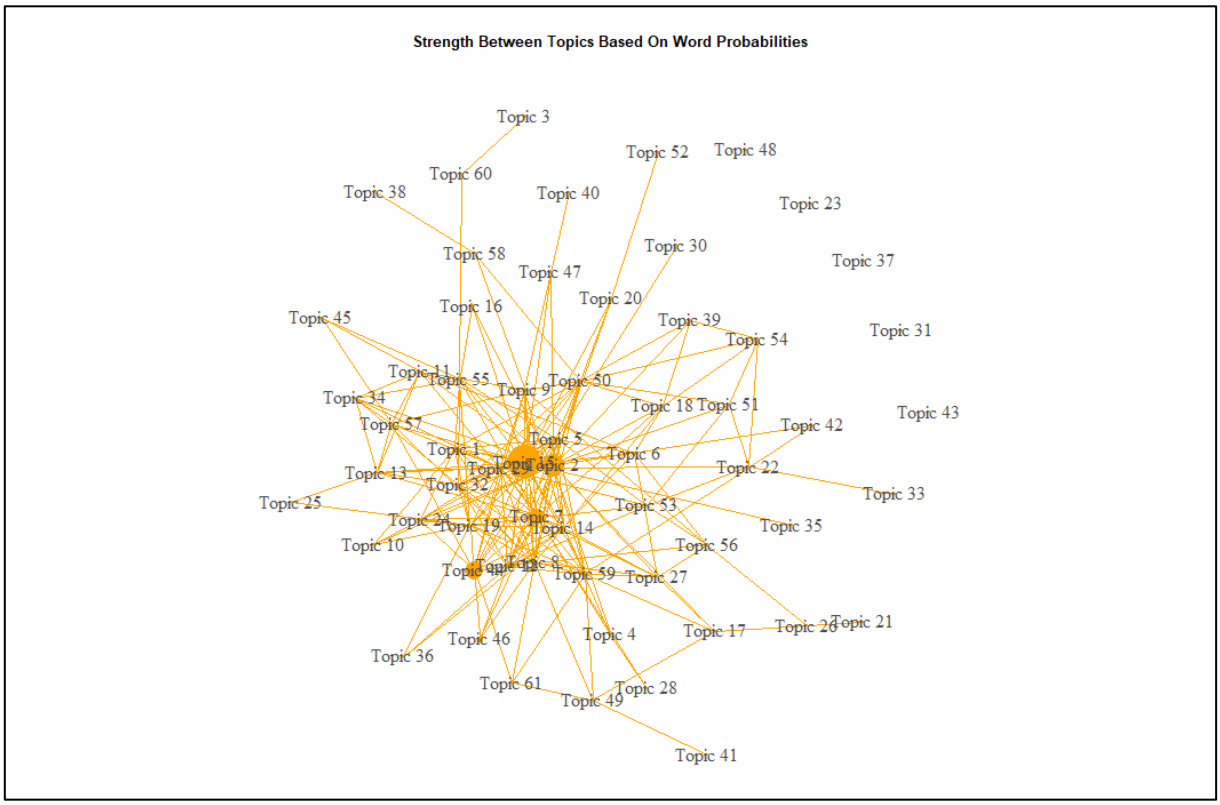


Appendix 11 screenshot topic probabilities over documents

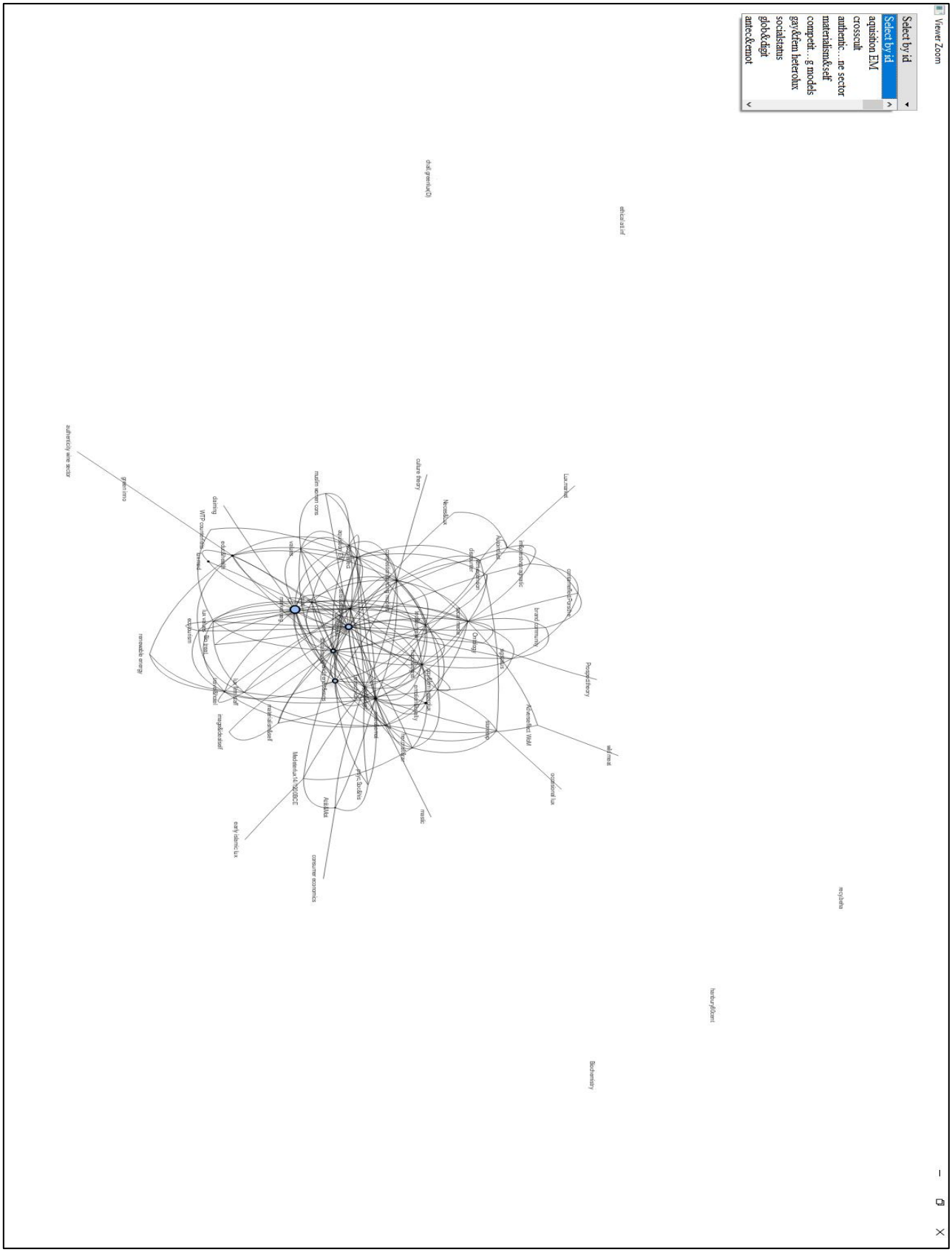


	A	B
346	Modelling-and-forecasting-brand-share--A-dy_2005_International-Journal-of-Re.txt	15
347	More-choice-is-better--Effects-of-assortment-si_2005_International-Journal-o.txt	15
348	Motivated-Consumer-Innovativeness--Concept-_2010_International-Journal-of-Re.txt	7
349	Motivations-for-environmental-and-social-consciousness-_2017_Journal-of-Clea.txt	32
350	Multicenter-trials-and-travel--Luxury-or-necess_1990_Controlled-Clinical-Tri.txt	2
351	Municipal-solid-waste-management-as-a-luxury-item_2006_Waste-Management.txt	2
352	My_little_luxury_Markeiting_JRM_2011.txt	44
353	N-REL--A-comprehensive-framework-of-social-media-marke_2016_Journal-of-Innov.txt	50
354	Nachhaltigeganzheitliche.txt	31
355	Narrative-transportation-storylines-in-luxury-brand-adv_2016_Journal-of-Busi.txt	2
356	Necessary-loans---luxury-loans--Exploring-the-pragmatic-_2011_Journal-of-Pra.txt	42
357	Network-analyses-of-brand-switching_1996_International-Journal-of-Research-i.txt	15
358	New-Delhi-s-luxury-hot_1989_The-Cornell-Hotel-and-Restaurant-Administration-.txt	57
359	New French Luxury Art Fashion and the Re Invention of a National Brand.txt	59
360	nicolestegemann.txt	44
361	NizarSouidenJournalofinConsumer-Tunisiaandcanada.txt	7
362	Online-luxury--The-code-breakers-of-a-traditional_2017_Procedia-Computer-Sci.txt	8
363	Online behaviour of luxury fashion brand advocates.txt	50
364	Optimal-pricing-of-successive-generation_1993_International-Journal-of-Resea.txt	5
365	Organisation and supply chain for quality control in luxury companies.txt	29
366	out.txt	44
367	Outdoor-recreation---A-necessity-or-a-luxury--E_2013_Journal-of-Outdoor-Recr.txt	55
368	Paint-still-considered-as-a-luxury-product-in-India_2004_Focus-on-Pigments.txt	21
369	Palliative-Care--No-Longer-a-Luxury-But-a_2009_Journal-of-Pain-and-Symptom-M.txt	16
370	Pathogenic-Escherichia-coli-and-food-handlers-in_2009_Travel-Medicine-and-In.txt	31
371	Patient-safety-is-not-a-luxury_2016_The-Lancet.txt	16
372	pDubois Czellar Laurent2005-ConsumerSegmentsBasedonAttitudesTowardLuxury-Empirica	15
373	pDubois Duquesne1993-TheMarketforLuxuryGoods-IncomeversusCulture.txt	49
374	Pearlescent-pigment-provides--touch-of-l_2004_Plastics--Additives-and-Compou.txt	22
375	Perceiving-luxury-and-necessity_1998_Journal-of-Economic-Psychology.txt	15
376	PET-MRI--A-luxury-or-a_2016_Revista-Espa-ola-de-Medicina-Nuclear-e-Imagen-Mo.txt	16
377	pFionda AntoinetteM.;Moore	44
378	Philadelphia-s-luxury-hotels--B_1992_The-Cornell-Hotel-and-Restaurant-Admini.txt	57
379	PIH42-----Would-You-Like-An-All-Inclusive-Luxury-Holiday-With-Firs_2015_Value.txt	15
380	Popular-Research-Topics-in-Marketing-Journals_2017_Journal-of-Interactive-Ma.txt	15

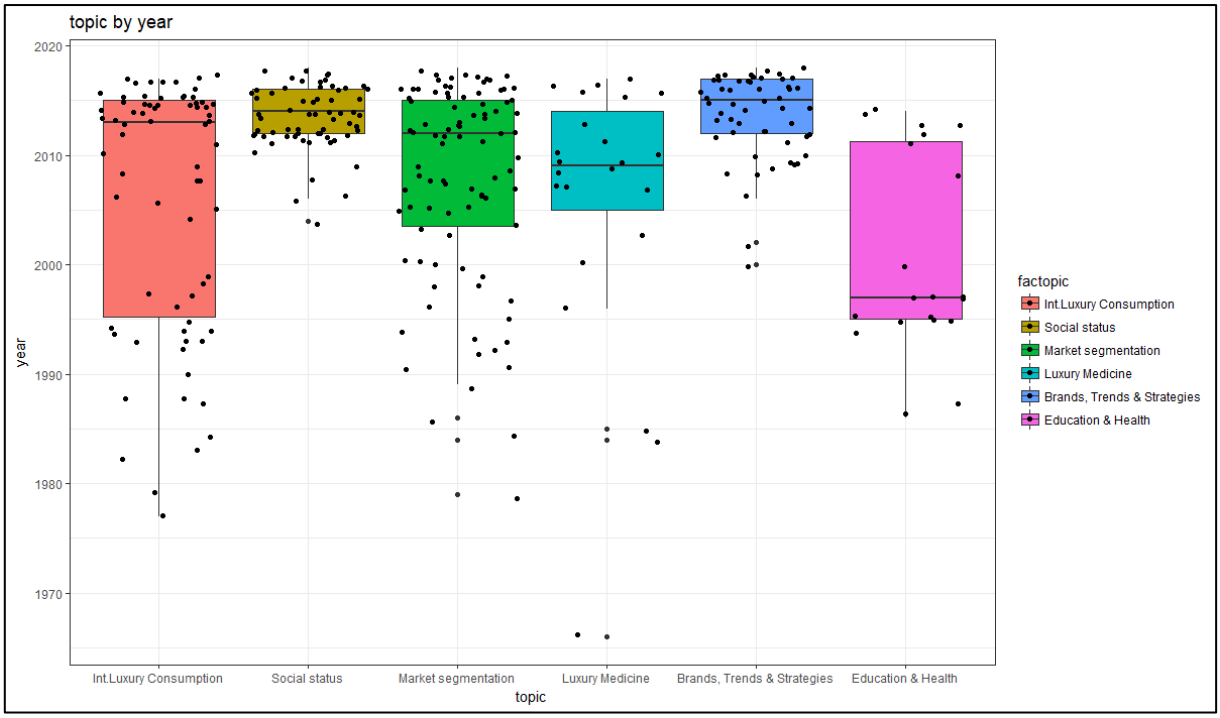
Appendix 12 Screenshot document to topics assignment



Appendix 13 Network data structure (R-output)



Appendix 14 VisNetwork (R-output)



Appendix 15 Scatter plot selected topics with freq. over 20

4.8 Literature

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5 The bilateral consumption facets

5.1 Abstract

Independent on the nature of the purchase (experiential vs. material; intrinsic vs. extrinsic; tangible vs. intangible), customer happiness and satisfaction with their action is determined through the overlap of their wishes and estimations (pre-purchase) with the output they get through the consumption (post-purchase). Furthermore, the categorization of goods into experiential and materialistic (Gilovich, Kumar & Jampol, 2014) seems to be inappropriate since the same object can be both as well vis-à-vis the individual needs, beliefs and norms. For instance, a car could be a pure experiential purchase for people who have a deep liaison with specific brands (highly involved). They know much about the construction, the features and therefore, appreciate it. Their pleasure might either increase or decrease with time depending on numerous factors such as financial aspects (operating and maintenance costs), and individual and social preferences like the change in sensitivities and tastes due to the emergence of new psychological requirements (novelty or status). Nonetheless, the same car as an example could be treated or seen as usual transport mode if the owner has no or a slight knowledge about the good. Unlike numerous studies (Van Boven & Gilovich, 2003; Van Boven & Gilovich, 2004; Van Boven, 2005; Carter & Gilovich, 2014; Gilovich, Kumar & Jampol, 2014), this work aims to show the complementarity of hedonism and utility in determining the nature of the product depending on customers' abilities, needs and expectations. Moreover, happiness and well-being are relative, and outcome when requirements are to some extent satisfied. Important is to mention that luxuries build a special case where both planes (possession & experience) are overlapping and made-up to reflect the highest values and feelings.

5.2 Literature review on customer' needs, happiness and satisfaction

5.2.1 Early theories and derivations

Throughout the last era, the philosophy that people have certain needs which are essential for life, development and continuity has been studied and encountered. Beginning with the empirical psychology that incorporates two different traditions. First, the experimental psychology after Hull (1943) who used psychology in terms of innate needs to understand molar

behavior. For instance, he presented a set of primary needs such as hunger and thirst which push the organism to action. Once satisfied, the organism becomes healthy. In cases where this drive-state is condensed, the stimulus-response procedure dominates the learning process (learning by doing). Subsequently, Hull's theory associates the drive-state and the stimulus-response approaches to predict subsequent behaviors and, builds therefore the fundament of many following studies. This approach was criticized by Ryan and Deci (2000) due to its inefficiency in predicting numerous behaviors like curious explorations and spontaneous activities. The second tradition is derived from Murray's work "Explorations in personality: a clinical and experimental study of fifty men of college age" (1938). He empathized the primacy of needs at the psychological level and defined them as acquired rather than innate. According to Murray, needs build a construct in an unidentified brain area which stands for action towards unsatisfying situations (Murray, 1938). Meaning, every cause that energizes action is categorized as a need. Many researchers such as, Nix, Ryan, Manly and Deci (1999), and Deci and Ryan (1991, 2000) disagree with this approach since the satisfaction of many prominent impetuses (as presented by Murray) doesn't guarantee optimal functioning.

Another conflict originated from the "dramatic" shift from theories of motivations toward the cognitive theories (Ryan & Deci, 2000, p. 228). the former assumes that people initiate and reserve their behaviors and activities to the extent that they believe this would support them to reach the anticipated end-state. The latter underlies goals as dominant motivational aspect. Subsequently, instead of choosing the content of the goal and try to achieve it, the focus became on goal selection and pursuit. In conclusion, the struggle is more about the origin, the nature and the constitution of basic needs (Ryan & Deci, 2000, Johnston & Finney, 2010). On the one side, Hull (1943) defined needs more on the physiological level as innate and essential nutriments. On the other side Murray (1938) builds the second cluster who treated needs as learned and acquired. They are psychological rather than physiological. However, all classifications and approaches agree that satisfying needs results in wealth (figure 36).

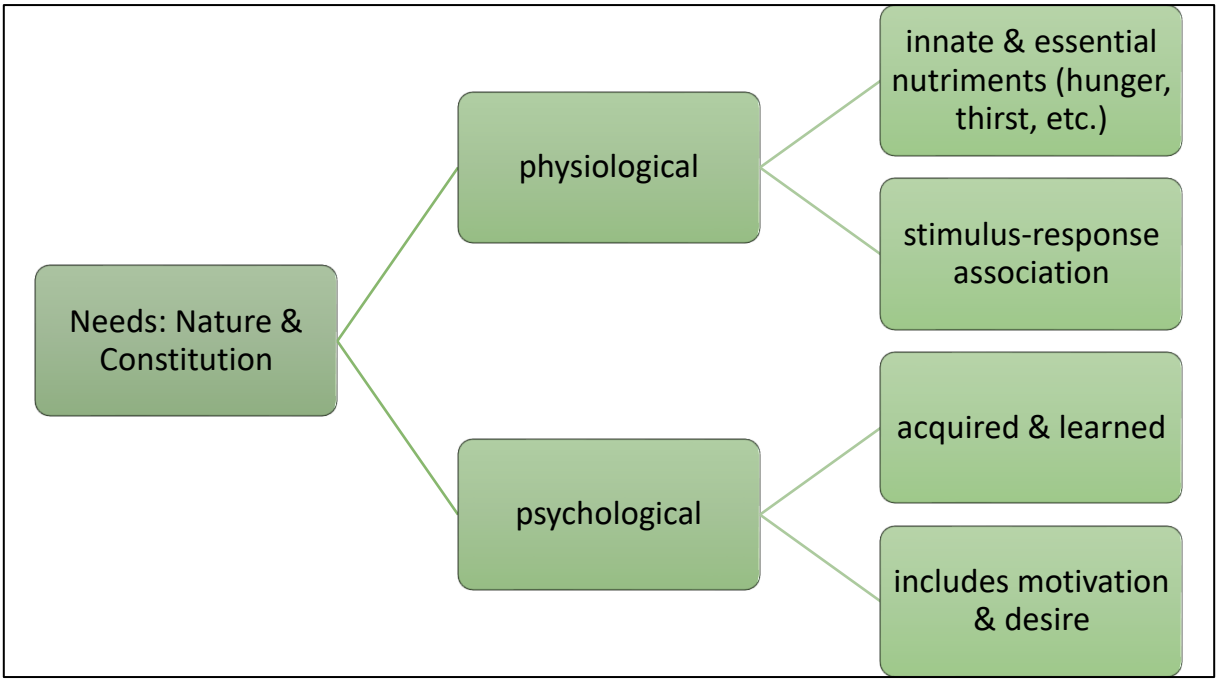

figure 36 Nature and constitution of needs: An overview

This confusion and discrepancy (physiological vs. psychological; innate vs. acquired) was to some extent solved by Maslow (1943, 1970a, 1970b). He combined all explanations and introduced needs as a hierarchical 5-stage-model. The baseline includes the safety and physiological needs like food and water and, builds therefore the basic requirements. The upper level is constituted by psychological requirements such as Belongingness and love, and Esteem. according to Maslow (1943), basic and psychological needs motivate people as long as they are not filled. Their intensity positively correlates with the lack duration. This means the longer a person has no water, the stronger his thirst becomes. Such requirements are termed deficiency needs. The fifth and the last step includes self-fulfillment requirements (self-actualization) and can only be achieved after an individually and a relatively (total or partial) satisfaction of the lower stages. Known as growth or being needs (B-needs). these requirements are continuous over time and may produce deeper feelings once they have been launched. It is important to mention that the emergence of upper needs depends on individuals' abilities, skills and environment. Also, peoples' requests may randomly oscillate between all levels under the assumption that a certain satisfaction of low-order-needs has been already occurred. Even though this model submitted some improvements and expansions including cognitive and aesthetic needs (7 stage model) (Maslow, 1970a) and transcendence needs in a

later phase (8 stage model) (Maslow, 1970b), it still builds the fundament of Needs and their evolution.

5.2.2 The self-determination-theory

Numerous theories were driven from both Hull' and Murray's approaches for a better understanding of needs and their influence on behavior and action. The literature (Howell & Hill, 2009; Johnston & Finney, 2010; Gonzales-Cutre, Sicilia, Sierra, Ferriz & Hagger, 2016) confirms that SDT is an appropriate theory in examining the relationship between needs and well-being. For instance, the Self-Determination theory agrees with Murray (1938) that needs are defined at the psychological level rather than the physiological one, and is consistent with Hull (1943) introducing needs as innate organismic necessities and not acquired nor learned. Unlike drive theories which underlies the primacy of goal orientation, Deci and Ryan (1991, 2000) argued that humans have a natural tendency and trajectory toward vitality, integration and health. They aim to pursuit goals and relationships that support their need satisfaction (more about the content than the goal itself). The more they thrive in finding such opportunities, the higher their psychological outcome will be. Subsequently, the authors exposed a set of three basic needs (Autonomy, Competence & relatedness) whose satisfaction (all of them) is primary for well-being and happiness. Autonomy refers to the desire for choice and the preference between activities and goals. People tend to avoid external influences and want to master their environment. The need for competence describes the wish to feel performing. Individuals want the see themselves doing very well and making "right" decisions. It is more about the wish to rehearsal effectiveness and success. Finally, the need for relatedness describes social aspects and images, either identification or differentiation, depending on ones' goal.

Another strength of the SDT is its consistency with other philosophies like personality theories, especially the less empirical. White (1959) for example assumed the innateness of needs. Moreover, he affirmed the existence of an energy source in humans which is responsible for a big part of his actions. Besides, the Self-Determination theory supports the idea that people differ in predicting need satisfaction and the quality of the experience (since personality theories assumes heterogeneity among people and their abilities) (Gonzales-Cutre, Sicilia, Sierra, Ferriz & Hagger, 2016).

Needs are then universal, and people differ in evaluating their practices depending on their social environment, past experiences and involvement. Although need satisfaction results happiness, Deci and Ryan (2000a, 2000b) criticized the utility of this approach when the number of needs increases.

Years later, Gonzales-Cutre, Sicilia, Sierra, Ferriz and Hagger (2016) tried to extend the SDT introducing novelty as an additional basic need. The Idea originates from Csikszentmihalyi' s work (1990) who empathized the role of novelty in life. He argued that its absence leads to bored feelings when doing a task (in leisure or in work). Subsequently, the experience is more likely to produce a maladaptive outcome. Moreover, literature on attention and interest (Silvia, 2006, 2008), Sensation seeking (Zuckerman, 1979; Roth & Hammelstein, 2012), Curiosity (Kashdan, 2004), and on perceived diversity (Sylvester et al., 2016) empathized the importance of novelty as an intrinsic motivation. Linking these findings with the foundation of the SDT, Gonzales-Cutre et al., (2016) introduce novelty as an intrinsic motivation that pushes people to extend and exercise their capacities, exploring and learning.

5.2.3 The concept of energy: happiness and subjective vitality

The concept of energy was first studied by Freud (1900) through the introduction of the "economic model". He considered the psychic energy as a limited source since it diminishes through defense or resistance. This finding was supported by numerous academics in the psychodynamic tradition such as Jung (1960), Lifton (1976) and Perls (1973). Moreover, a strong linkage between energy and vitality was found by psychometricians such as McNair, Lorr and Doppleman (1971). They affirm the existence of an energy/ vitality which is positively associated with spiritual health and is negatively related to feelings of weakness and illness. Similar findings were presented by Stewart, Hays and Ware (1992).

Early works support the idea of distinguishing between vitality and happiness. For instance, Nowlis and Green (1964) applied a factor-analysis on self-reported affects which ordered happiness and vitality in two varied factors. Similarly, cluster-analysis done by Purcell (1982); Shaver, Schwartz, Kirson and O'Connor (1987) affirmed that, though closely related, both concepts build different clusters: Vitality (enthusiasm, fanaticism, zeal, etc.) and happiness (cheerfulness, satisfaction). Also, a P- factor-analysis identified considerable differences in factor patterns between happiness and vitality, but also many junctures were found. Despite

these findings, academics like Thayer and Moore (1972); Thayer (1987, 1996); Lazarus (1991) and Nix, Ryan, Manly and Deci (1999) consider such differentiation meaningless and not guaranteed since happiness and vitality are close and sufficiently correlated.

Moreover, Ryan and Frederick (1997) studied the valence of subjective vitality and happiness under two different conditions: self-determined vs. controlled motivation (intern vs. extern). They reasoned that a positive output is positively correlated with the presence of autonomy. Meaning when people are internally motivated, induced and involved, the task results persistent and more intense vitality and happiness compared to the other condition. For example, when a student is aware about some issues (e.g. critical financial status), he is more likely to study harder to achieve higher education level and, therefore a better profession. If he succeeds in performing this task, the happiness extent clearly exceeds the output in other conditions (e.g. parental pressure). According to Nicolao, Irwin, and Goodman (2009) happiness and well-being are highly correlated, overlapped and give an overall sense that life is good (Myers, 1992; Sutton and Davidson, 1997). Furthermore, the construct of happiness is measurable, predictable and comparable (Diener 1984; Diener et al., 1999).

H_{1a}: intrinsically motivated people tend to have higher happiness with their consumption/ acquisition (SDT)

H_{1b}: The need for novelty correlates positively with the happiness derived from a consumption/ purchase.

It is important to mention that luxuries build the upper level of each category. Therefore, such products are sophisticated and exceptional. Independent of the nature of the needs or of the involvement level, acquiring such merchandise results in a -relative- high happiness level. For instance, purchasing a Ferrari outcomes contentment, pleasure and happiness regardless of individual connection to the brand as well as of his expertise.

5.2.4 Experiential vs. materialistic purchases on happiness: An anecdote

The research on happiness is large and covers a wide chart, from neurological mapping (LeDoux and Armony, 1999) to cross cultural surveys (Veenhoven, 1993). Psychologists like Kahnemann, Diener and Schwarz (1999), Van Boven and Gilovich (2003) were riders in shifting the academic research from medical conditions to the focus on identifying the causes that increase happiness. Also, economists such as Frank (1985) and Veenhoven (1993) consider happiness as an advantageous foundation that helps understanding human welfare and decision-making. As an illustration, all empirical studies were focusing on increasing and ameliorating product features and attributes, to better fit consumers' needs, subsequently, well-being. When succeeding in fitting customers' needs and requirements (maybe a touch above), firms are more likely to attract more clients, to upsurge market share and therefore, loyalty and profit increase.

Despite some critics such as peoples' inability to -properly- report their subjective well-being (Nelson and Meyvis, 2008) and that contextual factors and question framing, or even transient moods influence the self-reported happiness (Schwarz and Strack, 1999), numerous works were conducted to study customers' happiness through product purchasing. Additionally, purchases were clustered in:

- ✓ Intrinsic (self-congruency) vs. extrinsic (impress others) (Kasser and Ryan, 1996)
- ✓ Hedonic (pleasure) vs. utilitarian (practical aim) (Kivetz and Simonson, 2002)
- ✓ Possessions (tangible) vs. experiential (intangible) (Van Boven and Gilovich, 2003; Gilovich, 2003; Van Boven, 2005)

On the one side, academics like Scitovsky (1976) pointed out that the purchase act influences happiness when buying "joyless economy" in terms of material goods such as a car or a house. It results comfort which eliminates pain but produces little happiness. However, pleasure and joy are driven from arousing, pleasurable and short-lived experiences. Correspondingly, Dawson (1992) announced that materialistic people scored lower on well-being and have generally a less satisfaction with life. In the same context, Easterlin (2003) pointed out that pecuniary market objects have no influence on happiness. As well, Frank (1999) studied whether some purchases might provide lower adaptation than luxury goods which, he considers, provide consumers with an infinite hedonic sensation through quality, features and social aspects like recognition and status. He came out with the result that an increase in the stocks of material goods produces virtually, "no measurable" gain in the psychological and

physical well-being. Haidt (2006) agrees with this idea and recommends to “accumulate less and consume more” to increase joy.

Van Boven and Gilovich (2003) affirm the existence of a positive correlation between self-well-being and experiential purchases which leads to satisfaction. Moreover, they pointed out that the fortunate majority with a discretionary income prefer experiential purchases to feel happy. However, individuals with limited income level worry about basic needs and derive more happiness through acquiring material goods. For instance, a teenager would prefer a PS4 over a wellness stay to enjoy and share his possession with friends and family. Similar findings were presented by Tatzel (2003) who concluded that once basic needs are fulfilled, the income increase won’t affect well-being in a significant strong way unless it is used to meet higher psychological needs. Correspondingly, an increased income produces greater well-being at lower income level were basic needs are not yet fulfilled (Diener & Diener, 1995; Diener & Seligman, 2004; Howell & Howell, 2008).

Gilovich (2003), Gilovich, Kumar and Jampol (2004), and Van Boven (2005) suggest that experiential purchases deliver more happiness than their material counterparts due to their nature. Possessions are tangible, lasting over time and, therefore the familiarity effect and the adaptation level are high. Subsequently, they lose attraction rapidly. Though, experiential purchases are finite and limited in time. Thus, they last longer in memories and become more and more attractive (memories, social interaction and status). For example, vacations have a curative effect that perseveres long, especially after people return to work (Nicolao, Irwin, and Goodman, 2009). Additionally, experiences have higher social acceptability than possessions. For illustration, people desire to hear/talk about the last holiday and share their experiences. Nicolao, Irwin, and Goodman (2009) studied the influence of the purchase nature (mat vs. exp) on happiness. They conducted 3 experiments. In the first 2 cases people recalled positive vs. negative and experiential vs. material purchases. Happiness was measured in each case. The last test was in a labor and under time pressure. The authors concluded that experiences produce higher happiness by purchases that turned out positively and often stronger negative feelings by procurements that turned out negatively. Moreover, they settled that, unlike negative material purchases, negative experiential ones might lead quiet unhappy life. As a clarification, when people are unhappy with a possession (bicycle, TV) they can either store or sale it. However, for people who are unsatisfied with their experiential purchases (vacation, dinner) it turns out difficult to disregard them because they are deeply memorized as unpleasant events.

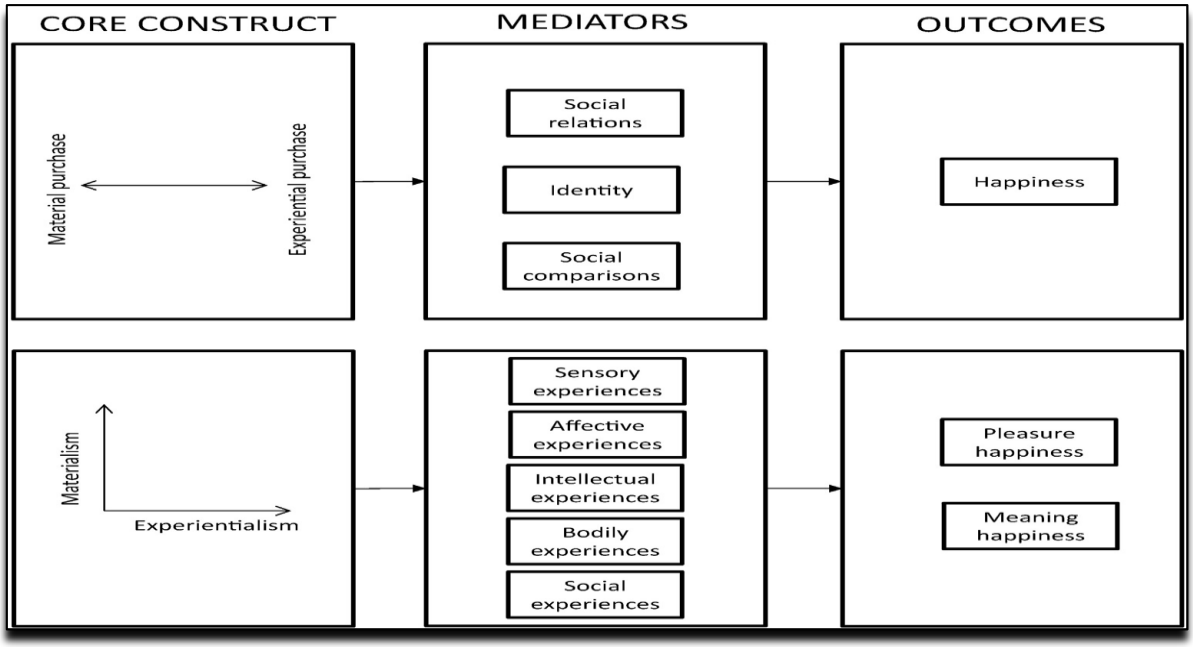

figure 37 contrasting views of materialism, experientialism, and happiness (Schmitt, Brakus & Zarantonello, 2015)

On the other side, Frank (1999) found out that some material goods can increase happiness. He argued that trading material wealth rise the pleasant day to day life. For instance, someone who buys his preferred brand/product will continuously derive happiness through consumption. The extent of this subjective well-being depends on his involvement, loyalty and consumption over time (regularity, related costs such as maintenance, evolving/changing preferences and tastes).

Additionally, Yu et al. (2016) affirm that consumers with high self-discrepancy derive more happiness from material obtaining, especially in luxury. Unexperienced prosperous buyers are more likely to acquire certain brands with specific characteristics to identify themselves with the traditional luxury consumer. This allow them to reach the social status and recognition they are looking for. Succeeding in this task provides happiness and joy. The extent of their subjective well-being depends on peoples' capacities and involvement. Afterwards, they become more experienced and mature. Subsequently, certain needs such as status through possessions are to some extent filled and the self-discrepancy level shrinks. At this level, people tend to experience something new and unordinary to, simultaneously, differentiate themselves from new entrants and identify themselves with the experienced elite.

Yu et al. (2016) analyzed the factors moderating the purchase happiness and concluded that demographics, contextual variables, intentional activities (Sheldon & Lyubomirsky, 2004),

overall life quality (Veenhoven, 2005), particular situations, (Raghunathan & Irwin, 2001) and comparison with reference group, idyllic state, prior situations (Selim, 2008) are major factors. Numerous experiments with products that possess both functional and hedonic facets were conducted. Self-discrepancy was introduced as a mediator for happiness. The authors showed that participants with higher SD-level achieve more happiness through possessions. They argue that once psychological needs are fulfilled, happiness emerges.

Moreover, the involvement level is a key aspect and moderates the outcome from a purchase. The literature differentiates between two types of involvement: situational (SI) and enduring involvement (EI). Both are related to arousal and to product interest but differ in motivations and in temporal pattern. SI occurs in specific cases such as the purchase act (Richins & Bloch, 1986). It is a momentary phenomenon that vanishes quickly after the acquisition or when the outcome has been experienced. For example, before booking a vacation people inform themselves about the trip, country to visit and sightseeing. This involvement disappears either after booking, or at the latest after the holiday. However, EI is an ongoing interest in a product (-category) that surpasses situational effects (Rothschild, 1979; Richins & Boch, 1983, 1986; Kapferer & Laurent, 1985). This builds a stable behavior/trait that lasts over timer. Even if this involvement succumbs some changes, this is more likely to occur over a prolonged period. For instance, young parents intensively inform themselves about baby food, products and some regular disease traits. This comportment persists over years and even when kids grow up, parents are still well informed. Also, a woman who likes high-end handbags and has a profound relationship with a creator is well informed about the production, firms' strategies and backgrounds. When acquiring the desired bag, happiness and well-being emerges and last longer. Each time she uses the bag is precepted as a different experience that engages new exceptional feelings. Similarly, passionate people treat their cars (not necessarily luxury cars) as a family member: clean it regularly, care about maintenance and tuning, enjoy driving it each time. It is an experience rather than a usual possession.

H_{2a}: the involvement level moderates the nature of the product (possession/ experience).

H_{2b}: higher involvement results stronger happiness for both material and experiential purchase.

Schmitt, Brakus and Zarantonello (2015) criticized the recommendation of Van Boven and Gilovich (2003), and Gilovich (2003) that people should shift their consumption from material

to experiential to increase happiness and joy. They acknowledged a false dichotomy between those purchases since: 1- The products and their financial values are quite different (functional vs. hedonic/ tangibility vs. intangibility/ extrinsic vs. intrinsic) and people pay for a good/service and not for a sunset talk. Also, the same person may alternate between various purchase types according to his/her needs and involvement. For instance, he/she could prefer a vacation over a car (assuming all have same financial values) because he/she comes from a multicar household (intangible over tangible), a watch over a dinner because he/she likes watches and is well informed (intrinsic over extrinsic), and a 3 days trip to the côte d'azur over a bike because he/she wants to feel privileged within the family and friends (hedonic over functional). 2- These two types are not essentially “opposite ends of the same continuum.” (Schmitt, Brakus and Zarantonello, 2015). They are more complementary. subsequently, both types provide joy and subjective well-being. The degree or the extent people are happy depends on individuals’ background, motivations and goals. 3- They are not a comparable type of purchases. For instance, Gilovich et al. (2004) are comparing ordinal possessions (t-shirt/ laptop) with extraordinal experiences like luxury travel and dinner. Also, ignoring consumers’ involvement and demographics is a major critic point. Subsequently, Schmitt et al. (2015) presented a conceptual model of the consumer experience that distinguish two value-creating purchase and consumption dimensions: materialism & experientialism (figure 37). Also, they presented the construct of “brand experience as a key mediator between consumption and happiness”. For example, the authors cited the watch example where consumer’ expertise and goals outline his happiness level. In conclusion, they affirm that the construct of band experience introduces all goods possessing both experiential and material facets. Determining the nature of the purchase being a pure possession, an experience or even both depends on peoples’ knowledge, financial status, consumption way (regular vs. occasionally) and, on previous acquisitions. As an illustration, many people buy a car for mobility. They don’t have much information about various brands and varieties in terms of features. They consider it as a mean of transport. However, there are customers who are more involved, well-informed and have deep relations to certain manufacturers. Not only the purchase act or moment, but also the consumption is somehow a continuous pleasant experience. Driving the favorite car engenders permanently feelings of happiness, cheerfulness and joy. Even people who have no relationship to their possessions (e.g. cars: only for mobility) are supposed to develop a deeper liaison under different time constraints. For instance, they are more likely to enjoy their properties when having feelings of loss. This is also consistent with the fundaments of the -cumulative- prospect theory (Tversky & Kahneman, 1992). We expect here the time (consumption type) to be an important mediator of happiness.

H_{3a}: Product familiarity is a major aspect affecting the perception of the product as an experience or a pure possession.

H_{3b}: Time constraints (feelings of fear) mediate the happiness and the relationship people derive from a possession.

5.3 Empirical study

As mentioned above, luxury builds the upper class of each category. Moreover, the perfection (Quality, history & exclusivity) as well as the excellence (pleasure, Status & joy) of such goods lead to -relative- high happiness feelings. Besides, recruiting potential luxury buyers for such a long and comprehensive survey (including experiment) posed a major difficulty. Subsequently, the decision was then to exclude luxuries (high positive feelings per default) as well as to target students (Bachelor & Master).

For this purpose, 80 German undergraduate students were recruited. They were asked to fill a subset of measurements on the need for autonomy, for competence and for relatedness. These measures were adopted from the SDT (Self Determination Theory) according to Johnston and Finney (2010). Besides, the need for novelty as an extension to the SDT is also measured since it plays a leading role in the purchase decision (Gonzales-Cutre et al., 2016).

- **Study 1**:

  Students were asked to think about two purchases they have done the last 2-3 years. The first one should be a tangible product whereas the second an experiential one. Afterwards, they were asked to accomplish a subset of questions on product involvement adopted from Zaichowsky (1994). Having a clear idea on consumers' interest and curiosity for certain product categories helps the researcher to get a better understanding of both, the purchase decision and the yield from the acquisition. After that, students evaluated their happiness with each purchase (Westbrook & Oliver, 1981). All measures used a 7-points Likert scale.

For a better evaluation and interpretation, we asked the respondents to judge the happiness derived from the material over the experiential purchase at three levels: in general, immediately after the acquisition and when remembering it now.

The most retrieved purchases are cars, notebooks and smartphones for the material buying, and vacation for the experiential one.

The regression analysis of the happiness level derived from a material acquisition on the fundamental needs from the SDT as well as the need to experience something new and unusual and on product involvement has enlightened their importance (table 14). People who have stronger SDT scores, meaning higher autonomy, lower relatedness and higher competence skills are significantly happier when acquiring a new good. Nonetheless, the need to experience/possess something new as well as consumer' knowledge about the product (including brand relationship) significantly affect the happiness from the acquisition/consumption. For instance, people who showed a robust relationship with certain products were clearly happier with their purchases. They are well informed, know exactly what they are looking for and, therefore appreciate more their achievement. Regret or fear feelings are less likely to occur since they know much about the product and, especially, about the concurrence. Their behavior is intrinsically driven and consistent with their own beliefs, judgements and appreciations. Subsequently, the happiness/ satisfaction with the acquisition/consumption is significantly higher. Therefore, hypothesis H_{1a}, H_{2a} are confirmed.

```
Residuals:
     Min       1Q   Median       3Q      Max
-1.30147 -0.31665  0.03852  0.35146  1.18036

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.665948   1.310477   1.271  0.20762
SDT          0.028042   0.010308   2.720  0.00812 **
Novelty      0.026790   0.012135   2.208  0.03036 *
Matinv       0.024372   0.009438   2.582  0.01179 *
Gender       0.245566   0.129495   1.896  0.06182 .
Age         -0.018952   0.035931  -0.527  0.59945
```

Table 14 happiness with material purchases

This is also consistent with the fundaments of the regret theory that proclaims customers to do some mental comparison before the consumption experience. Afterwards, the contrast of the perceived and the expected performances determines

the extent of the happiness (Taylor, 1997). Unlike various authors who categorized the yield in “cool satisfaction” (Woodruff, Cadotte & Jenkins, 1983), “negative-” and “positive disconfirmation” (Anderson & Sullivan, 1993), this work adopted the happiness scale measure of Westbrook & Oliver (1981).

The second regression handles with the experiential purchase. As mentioned above, all respondents mentioned vacation as the unique purchase they connect with intangible acquisition. The results show an overall positive appreciation of holidays which is understandable (table 15). As an illustration, all people are happy about free time, relaxation and enjoying the moment. However, SDT measurement has a significant negative impact on the happiness driven from this experiential procurement. This might be due to the purchase nature, since people travel together (couple, friends or family) for vacations which lower all SDT planes: autonomy, relatedness (reverse score) and competence. For example, the choice of the destination (and other choices) is strongly related to previous experiences but also to reports and hearsays from friends and colleagues. Also, the mainstream travel in group and many situations are not necessarily under the own control or intrinsically obsessed. Subsequently, the dependence on other traveler weakness autonomy and competence, but strengthens the relatedness.

The most significant factor affecting the happiness level through an experiential purchase is the involvement level. Before booking a trip or a vacation, people exhaustively start to inform themselves about all details such as sightseeing, accommodation etc. This kind of involvement is called situational involvement which is strongly present around (just before/during) the event. Over time people forget the details and fail to retrieve the information. They vanish rapidly. Therefore,

Hypothesis H_{1b} and H_{2a} are confirmed.

```
Residuals:
    Min      1Q  Median      3Q     Max
-3.1629 -0.2024  0.2102  0.5342  0.9542

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  5.488777   1.926833   2.849  0.00568 **
SDT         -0.041441   0.015423  -2.687  0.00890 **
Novelty      0.013754   0.018189   0.756  0.45194
Erlebinv     0.047142   0.006663   7.076  7.1e-10 ***
Gender       0.149317   0.200091   0.746  0.45788
Age          0.043548   0.055063   0.791  0.43155
```

Table 15 Happiness with experiential acquisitions

In the next step we were interested in comparing the extent of happiness driven by both acquisitions: Material and experiential. Therefore, we asked respondents to evaluate their satisfaction with the purchases in two ladders: after the consumption and now when remembering them.

When thinking about the purchase, the result show considerable negative impact of the need for novelty on the perception of happiness to be higher for material over experiential acquisition. Meaning, people who strongly demand novelty and innovativeness judge their material buying as less gorgeous when remembering now. This seems to be logic and overlaps with the results of Gilovich (2003), Gilovich, Kumar and Jampol (2004), Van Boven (2005) and, Carter and Gilovich (2014) who suggest that experiential purchases deliver more happiness than their material counterparts due to their nature. Possessions are bodily and permanent. Hence, the familiarity effect and the adaptation level are high. Subsequently, they lose attraction rapidly.

However, respondents who are well involved with a certain category and are, to some extent, considered to be experts evaluate the happiness driven from their possessions to be significantly higher than, for example, a vacation. For instance, people who like cars, investigate much time to be up to date. They treat them as a family member and care about each detail. Also, the fact that they regularly add some changes (e.g. tuning, maintenance) they keep their arousal level high enough. Afterward, the happiness level is held high enough over time and the consumption is converted to an experience (appendix 16).

When people evaluate the overall happiness with both goods, only the involvement level mediates the output. Higher happiness for experiential purchases correlates positively with the mania and the desire for new experiences and vice versa (appendix 17). When evaluating the overall act, people fail to retrieve details and oversee unpleasant events. In this stage, well involved people (tangible/intangible) rapidly judge the consumption and the retrieve of information follows the shortest way among the source monitoring path (Pham & Johar, 1997).

Consequently, the involvement level mediates the happiness level driven from a purchase act or a consumption. For pure possessions, the results have shown that both the need for novelty as well as need for autonomy, competence and relatedness are key aspects intermediating the satisfaction and well-being with a purchase act. When people acquire the wished product, and the expected performance -at least- overlaps with the precepted one, a certain satisfaction occurs, and people are joyful with their

item. In this case, the interest is distributed over a large period and the information are neither rapidly nor randomly collected. Hence, this intrinsically driven behavior enhances the gladness with a possession.

However, the interest in events or experiences lies in a fleeting period (generally around the event). Both, this situational involvement as well as the acquisition itself vanishes rapidly but the memories last for an extended time. Subsequently, these feelings of loss (unlike possessions) might make experiences more attractive when thinking about (or remembering) them. Therefore, hypothesis H_{1a}, H_{2a} and H_{2b} are also supported.

❖ **Study 2**:

Findings of Gilovich (2003), Gilovich and Van Boven (2004), Gilovich, Kumar and Jampol (2004), and Van Boven (2005) highlighted the time effect on the happiness derived from an experience. For instance, they acknowledged that, unlike possessions, vacations are limited in time and vanishes rapidly. Subsequently, people are affected by this constraint and assess such acquisition as delivering higher happiness than tangible goods that last over time. For example, people don't buy a car for 1 week or a notebook for 2 days. Both the familiarity and the tall adaptation for possessions lower the perceived happiness.

For this purpose, the main idea was to convert a pure possession (no emotional relationship) into an experience through time constraints. Students were asked to answer some questions about the involvement level for cars in general. Afterwards, imagining, they have an old car which is used for mobility (realistic since most students have limited financial means and buy cars to drive to work or university). Then, they evaluated their driving behavior, forecasted their joy when driving the car as well as the overall consumption (experience or still a possession) in 3 scenarios:

- Friend/family member comes in 1 week and borrow your car for 1 week.
- Friend/family member comes in 1 week and borrow your car for 1 month.
- Friend/family member comes in 1 week and take your car forever.

It is important to notice that a reverse method is also possible. Meaning, it is easy to convert an abbreviated time experience such as a vacation in the cote d' Azur (as suggested by Gilovich, 2003) into a lasting event through living there. Afterwards, assessing the satisfaction and comparing the results to the short-term perceptions. we expect similar paths of the adaptation and familiarity effects.

Foreach experiment we plot the happiness histogram to get a better idea about the general perception. Figure 38 shows a non-significant change in the overall joy between the 1-week and the 1-month experiments. This might be explained by Nelson and Meyvis (2008) who affirmed that people are bad in predicting or evaluating their adoption process/behavior. Also, the time difference is to some extent negligible and people take into consideration that they will get their cars back. For instance, most respondents occasionally use their cars (principally in the weekends) and the effect of lending it for 1-week or 1-month is somehow analogous. However, losing the car forever pushes people to investigate more time driving their cars and expressively enjoy the consumption more than in usual conditions. Besides, most respondents avowed a deeper relationship as well as an excessive usage of the product in this condition.

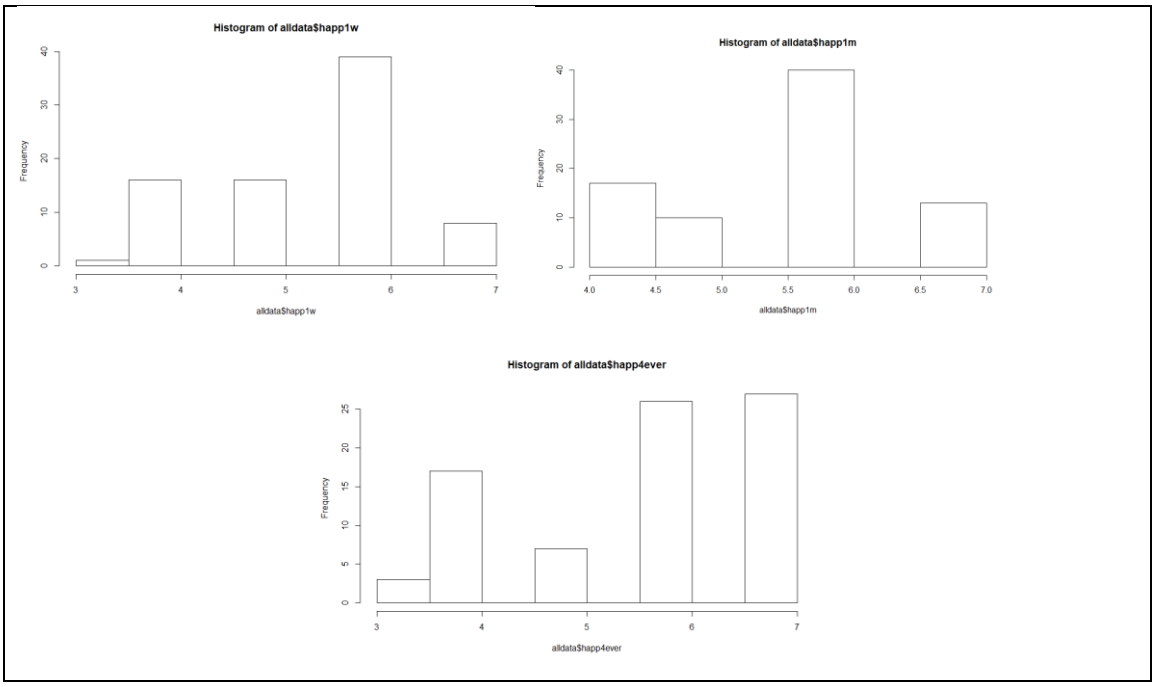

Figure 38 Happiness perception (3 experiments)

Afterwards, regression analysis on happiness in each experiment has been run. For the 1-week and 1-month experiments (table 16), an overall deeper liaison to the car occurs when lending it. This is understandable since having the feeling to lose a possession makes it more attractive. This also sustained by various theories such as the regret theory or the -cumulative- prospect theory. Besides, product involvement level is

significant factor influencing the happiness resulting from a consumption. Brand attitude could also be a good predictor. However, the survey would be elongated, and respondents are less likely to participate. Moreover, we suggest that brand attitude/attachment are implicitly related to involvement. For instance, people, especially students, who likes cars and are well- informed like more than one brand (e.g. Audi, BMW, Mercedes) and can switch between them according to their instantaneous needs (dynamic utility derivation). The most important aspect affecting the happiness level is that the conversion of the car from a pure possession to an experience. For instance, people who are well involved are more likely to consider driving their cars in this week as a wonderful experience. This is presented in both conditions (1 week/month)

```
Residuals:
    Min      1Q  Median      3Q     Max
-1.7109 -0.5378  0.1615  0.5460  1.4038

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  4.63646    2.03421   2.279   0.0256 *
SDT         -0.01739    0.01492  -1.166   0.2476
Novelty     -0.01150    0.01836  -0.627   0.5330
carinv       0.02608    0.01022   2.552   0.0128 *
drive1w      0.52672    0.11177   4.713 1.16e-05 ***
Car          0.28193    0.20931   1.347   0.1822
Gender       0.30133    0.19217   1.568   0.1212
Age         -0.07305    0.05723  -1.276   0.2059
```

```
 Residuals:
    Min      1Q  Median      3Q     Max
-1.9316 -0.4741  0.1199  0.5462  1.6260

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  5.266160   2.093339   2.516 0.014112 *
SDT         -0.006848   0.015873  -0.431 0.667423
Novelty     -0.017102   0.019535  -0.875 0.384236
carinv       0.028137   0.010833   2.597 0.011380 *
drive1m      0.337961   0.088624   3.813 0.000287 ***
Car          0.310562   0.223257   1.391 0.168494
Gender       0.314524   0.202649   1.552 0.125032
Age         -0.108393   0.060277  -1.798 0.076331 .
```

Table 16 1-week/month experiments

When having stronger fear feelings, all people (un- and involved) tend to hang more to their possessions which makes it to a pure experience. Subsequently, the consumption of the same good becomes more enjoyable and impressive. Besides, respondents who own a car tend to develop a deeper liaison and to appreciate more their driving experience in this week (table 17).

The results are logic and lucid since respondents who already practiced or owned certain assets, are more likely to properly judge their consumption. Interestingly is, that the product involvement has no effect on people's behavior when having the impression to lose something they owned or used to consume. Also, the output shows that the gender effect is significant. Women seem to have deeper liaison to their possessions than men. For instance, in the week before they give up their cars, they intensively drive

them and clearly enjoy the consumption. Another possible explication is that females are more sentimental. They might develop a deeper liaison to their cars or their predictions are more sensitive and dazed.

```
Residuals:
    Min      1Q  Median      3Q     Max
-3.1629 -0.6318  0.3032  0.7658  1.8069

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  6.97015    2.93350   2.376   0.0202 *
SDT         -0.01778    0.02160  -0.823   0.4132
Novelty     -0.02966    0.02656  -1.117   0.2677
carinv       0.01572    0.01481   1.061   0.2921
drive4ever   0.26610    0.10578   2.516   0.0141 *
Car          0.66693    0.30700   2.172   0.0331 *
Gender       0.58556    0.26917   2.175   0.0329 *
Age         -0.11131    0.08218  -1.355   0.1798
```

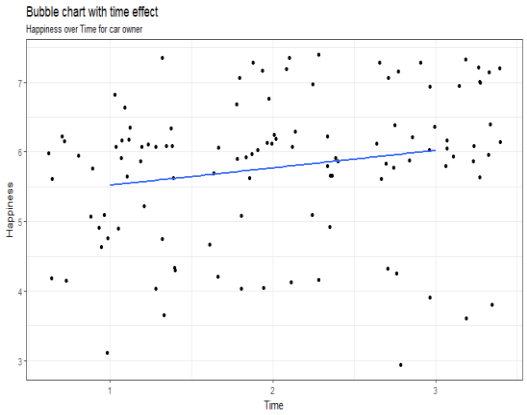

Table 17 Loosing the product forever

5.4 Conclusion

The literature distinguishes between two purchases: tangible vs intangible; functional vs. hedonic and material vs. experiential. Moreover, most researchers such as Gilovich (2003), Gilovich and Van Boven (2004), Gilovich, Kumar and Jampol (2004), and Van Boven (2005) consider that experiential purchases deliver higher satisfaction and happiness feelings compared to tangible goods. Their argumentation enclosed adaptation and familiarity effects. Possessions last over time and people are therefore rapidly familiar with them. Subsequently, the arousal level decreases and the product drops in attraction. Besides, they argue that experiential purchases such as vacations or a candle light dinner have higher social acceptability than their counterparts. Also, such acquisitions are not easily comparable and therefore, people would feel better having a special vacation with unique events. Even if someone else booked the same trip, there will be always significant differences that people would retrieve to feel exceptional. This work suggested that product involvement, the need for autonomy, competence and relatedness (reversed) as well as the need for novelty have a considerable influence on the happiness driven from a purchase (material or experiential). People who are well informed and have a deeper involvement with certain categories are more likely to derive higher but also extended well-Being feelings when consuming/getting the desired procurement. For instance, people who are interested in photography know a lot about different manufacturers and about the technical product data. when getting the preferred camera, they feel happy and taking photos is more likely to be an experience that deliver joy feelings lasting over time. However, someone who don't care about this category is going to buy a camera only to take pictures during a trip or a vacation. Then, it will be stocked in the drawer. Subsequently, antecedents such as needs, and involvement have a massive impact on how people evaluate their purchases. For instance, driving the favorite car is an experience for ardent, and an unpretentious mode of transport for uninvolved customers. Similarly, traveling to a certain destination or booking a summer vacation generate deep and positive feelings for someone who care a lot about travel, discovering and sightseeing. Hence, it postulates a regular summer activity and a habit for those who are not intrinsically interested in or those who used to do it with family (e.g. kids who ought to travel with parents during school holidays).

Besides, this work suggests that time influences the consumption behavior and therefore, mediates the happiness level. The main idea is using time to convert a pure possession (car) to a pure experience. Through 3 experiments, the results affirmed that having feelings of fear

(to lose possession) translates a possession to a non-lasting-event like vacations. Subsequently the happiness level increases. Moderate time restrictions (1-week and 1-month) have similar propensities and still under own control. For example, in both cases the product involvement was significant factor influencing the consumption manner and therefore, the overall perception. However, when told they will, definitively, give up their cars, a universal comportment occurs and personal values or skills such as involvement or needs disappear. Independent of their own beliefs and principles, all respondents behave similarly in a way that they intensively drive their cars and try to enjoy the consumption as long as possible.

The results are crucial for both manufacturers and academics. Well-being or positive feelings derived from a purchase are not only related to product category such as material or experiential. Both acquisitions might produce positive feelings depending on individuals' needs and antecedents. Also, this categorization seems to be inappropriate since one purchase might have divergent meanings for different clients.

Besides, this work highlights the time influence on how people perceive a consumption. The finding is important for manufacturers since regularly introducing new features, updates or regulations on their merchandise might ameliorate the consumption experience and therefore, influence the happiness driven from purchasing or consuming a product. Subsequently, customers are more likely to develop a deeper, stronger liaison to the brand, and an absolute loyalty emerges.

The bilateral consumption facets

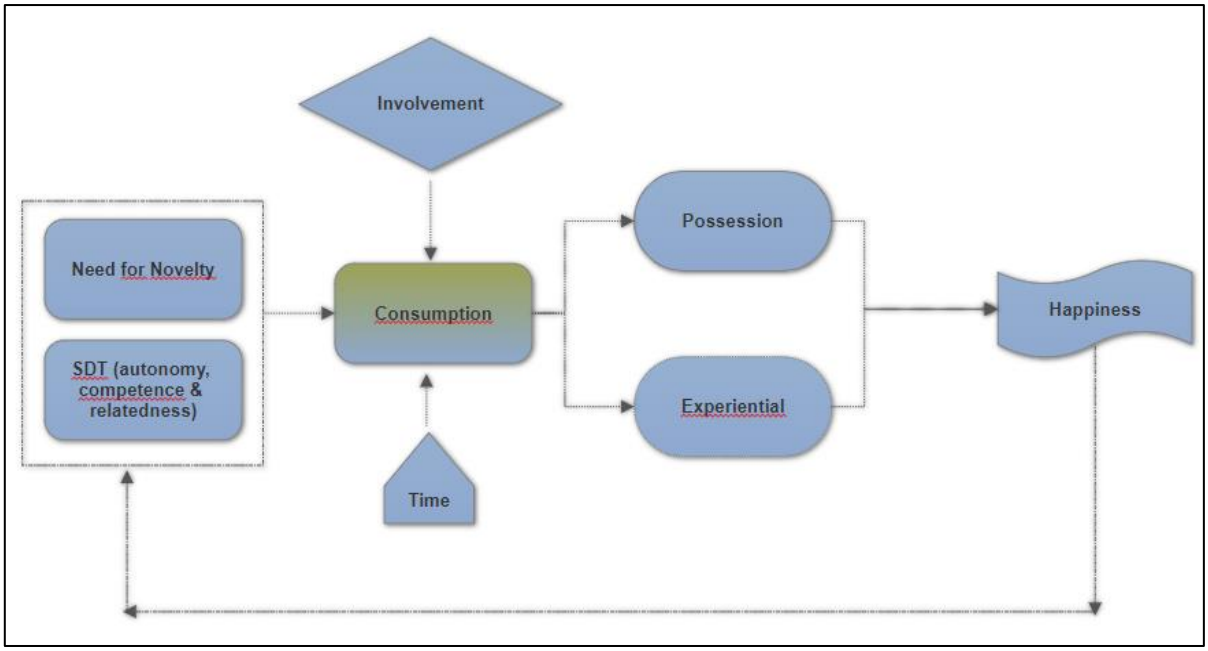

Figure 39 Antecedents of happiness

5.5 Appendix

```
Residuals:
    Min      1Q  Median      3Q     Max
-0.4639 -0.2589 -0.1192  0.2579  0.9034

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.738284   0.849168   0.869 0.387467
SDT          0.005745   0.006748   0.851 0.397336
Novelty     -0.006114   0.007880  -0.776 0.440300
Matinv       0.022149   0.006374   3.475 0.000863 ***
Erlebinv    -0.021149   0.002994  -7.064 7.92e-10 ***
Gender       0.138137   0.086858   1.590 0.116072
Age         -0.042124   0.023740  -1.774 0.080164 .
```

Appendix 16 overall happiness: possessions over experiences

```
Residuals:
    Min      1Q  Median      3Q     Max
-0.6107 -0.2849 -0.1307  0.2739  1.0579

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.097724   0.924232   1.188 0.238796
SDT          0.002843   0.007345   0.387 0.699816
Novelty     -0.017137   0.008576  -1.998 0.049423 *
Matinv       0.024448   0.006937   3.524 0.000737 ***
Erlebinv    -0.017696   0.003259  -5.431 7.03e-07 ***
Gender      -0.006867   0.094536  -0.073 0.942294
 Age          -0.037984   0.025838  -1.470 0.145836
```

Appendix 17 happiness: possessions over experiential when thinking about it now

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6 Conclusion

The luxury market has undergone many vicissitudes and the consumption has been shifted from people who were born in gold to those who made the money. In early times, the acquisition as well as the access to extravagant and exclusive products was limited to the king and his family. For instance, even states people and senators couldn't afford such merchandise. In this epoch, status and differentiation (king and his family from the rest) were among the most important motivations. The contemporary luxury has been driven by the industrialization and therefore, its' democratization. More and more people have the financial means to acquire high-end products and the number of luxury firms has been expanded. During this era, people were fascinated by the superior quality of the merchandise as well as its' social and economic benefits. As an illustration, possessing an expensive, limited and high-qualitative good allow clients to identify themselves with an honored group, the elite. In the last few years, the wish for environmental-friendly goods is getting advanced. Both, the appearance of the LOHAS as well as the consciousness of certain experienced clients makes them to a significant and potential group which should not be ignored.

The luxury literature debated the influence of ecology as a trend but ignored subsequent results. This work investigated ecology as driver for disruptive innovations in the market. Ongoing from existing theory on mass market, we identified the course and the characteristics of this concept. Afterwards, using existing practical examples, the transferability of disruptive innovations to the luxury market was investigated. The results show that these are disruptive times for luxuries. Moreover, the wave is driven by start-ups that are combining ecology, high-tech and creativity. Nonetheless, an empirical study was conducted to characterize and identify target customers. The finding suggests that, despite their opposing motivations, young unexperienced as well as experienced prosperous clients are interested in acquiring ecological luxury merchandise. For instance, new entrants are rough and seek the fundaments of indulgent merchandise such as prestige and status. The trendiness and newness of these goods (e.g. EVs) plugs this prerequisite. However, experienced clients might be divided in two subgroups: (1) those who become more conscious about environmental issues and, try therefore to adapt their behavior. (2) clients that are unconcerned about ecology, even though, they purchase luxury eco-friendly products. Such behavior allows to differentiate themselves from the majority of wealthy buyers that consume referential brands (e.g. Ferrari Cars, Rolex

watches, Louis Vuitton bags, Hermes Pret a porter etc.). Subsequently, consuming eco-friendly luxury products keeps them privileged.

The next step was dedicated to model the churn risk for luxury manufacturers when ignoring sustainable issues. This allowed to, empirically evaluate environmental friendliness from a customer perspective. The choice of the automobile industry is meaningful. First, it builds the most important luxury sector. Second, the gender effect is trifling compared to other categories like jewelry and fashion. The study affirmed the findings of the previous chapter and show high preferences for luxury electric vehicles. Additional to lowering the CO2 emission, functional and hedonic attributes such as soaring prices and improved acceleration were among the decisive features shifting the decision making in favor of the preferred brand. Ignoring these attributes causes a switch to the competitor. Afterwards, attribute preferences of every respondent were computed for a cluster analysis. The output supported the existence of two affluent customer' groups who are interested in luxury EVs. Moreover, the first group contains around 90% of the respondents and displays stronger requirements for increasing prices, Co2 emission reduction, acceleration and range. Subsidiaries (non- monetary) have no impact on the WTP for luxury sustainable cars. This is understandable since prosperous buyers are paying soaring prices to acquire exclusive goods and introducing advantages like tax exemption is ignorable and not attractive.

The 4th chapter investigated topic modeling methods to explore and analyze the luxury literature. Additional to an exponentially increasing research amount (beginning from 2014), the model confirms a lack of studies on environmental friendliness and ecology. Furthermore, it highlights the primacy of this topic since it builds the most important research hub in the luxury literature. For instance, it is strongly related to dominant topics such as market segmentation, strategies and branding, cross-cultural, competition and pricing, and education. Therefore, the output legitimizes the choice of ecology in luxuries as an upper research theme. Afterwards, luxury literature has been plotted in function of time. The chart affirms the newness as well as the primacy of sustainability works as they are steadily gaining importance and being progressively investigated. Subsequently, it becomes crucial for manufacturers to implement sustainability aspects in their value chains. Also, as shown in the previous 2 chapters, businesses should not expect any profit from implementing such values, rather ignoring them causes a disaster.

Due to the increasing empathy placed on Well-Being and happiness, the 4th chapter was dedicated to exploring consumers' happiness driven from an acquisition. The aforementioned

luxury trends as well as the change of values force companies to reassess their strategies and techniques. For instance, empathizing experience selling was a dominating issue, since it results higher customer happiness. This chapter first analyzed existing literature on the nature of goods (experiential vs. material) as well as their effect on Well-Being. By means of an empirical investigation, we showed that personal characteristics (SDT/Need for Novelty as well as involvement) are major factors influencing how people consider a good to be a possession or an experience. Besides, the results suggest time as a mediator. For instance, through time constraints it was possible to convert a pure possession to an experience. Finally, regardless of the product type (possession / Experience), consumers' happiness and satisfaction depend on the feedback loop (dis- /confirmation) through a comparison between the real and the estimated outcome. The focus was not on luxury goods, since they highly score on both the hedonic and the functional values. Subsequently, they build a special case where experience and possession perfectly overlay. For instance, independent on peoples' needs and knowledge acquiring a Tag Heuer, a Ferrari or a Hermes Bag is neither related to pure functional nor to pure experiential facets, but to both. A Ferrari is not only an exclusive and expensive car but also a delightful experience each time. This study is more relevant to premium brands that aim to compete on the luxury market.

7 Literature

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Mainz den 23.10.2018

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Curriculum Vitae