Human vs automatic advice: what's the future of personal counselling for cosmetic products?
Focus on the Portuguese market

Teresa Poças

Dissertation written under the supervision of Gonçalo Saraiva

Abstract

Dissertation title: Human vs automatic advice: what's the future of personal counselling for cosmetic products? Focus on the Portuguese market

Author: Teresa Raquel Alves Poças

Keywords: Cosmetics, Counseling, Decision-Making, Salesperson, New Technologies, Artificial Intelligence, Human Advice, Automatic Advice

From the studies conducted, it was observed that the cosmetic industry has shown exponential growth in recent years, and the increasing use of social networks has influenced this phenomenon. Also, they have led to changes in consumer buying behavior, including the increase in online shopping. Due to the increase in the importance of the self and the concern with having a good appearance, consumers expect more personalized service and advice. In response to these expectations, companies have invested in the pursuit of machine learning technologies. These technologies can offer automatic advice without human intervention and, at the same time, they cause changes in the purchase decision-making process.

In this context, this study addresses the receptivity of these technologies in the Portuguese market, using "HiMirror" technology as a benchmark, to help companies to define their sales and marketing strategy. The Technology Acceptance Model was used as a basis for testing consumer acceptance and it was observed that consumers find this technology useful and the perception of utility positively influences their propensity to use it in-store. Personality traits, such as creativity, fashion sense, and rationality, were analyzed to find clusters about the intention to use this technology and to find the best target for these services. Finally, it was analyzed in which buying situations and for what kind of products consumers prefer to be advised by machines rather than humans.

Resumo

Título da dissertação: Aconselhamento humano vs automático: qual o futuro do aconselhamento pessoal para produtos de cosmética? Foco no mercado português

Autor: Teresa Raquel Alves Poças

Palavras-chave: Cosmética, Aconselhamento, Tomada de Decisão, Vendas, Novas Tecnologias, Inteligência Artificial, Aconselhamento Humano, Aconselhamento Automático

Dos estudos realizados, observou-se que a indústria de cosmética apresentou um crescimento exponencial nos últimos anos, sendo que o incremento da utilização das redes sociais influenciou esse fenómeno. Para além do mais, provocaram também alterações nos comportamentos de compra dos consumidores, nomeadamente o aumento das compras online. Devido ao reforço da importância do "eu" e ao aumento da importância da aparência, os consumidores esperam um atendimento e aconselhamento mais personalizado. Em resposta a essas expectativas, as empresas têm investido na procura de tecnologias baseadas no "machine learning". Estas tecnologias são capazes de oferecer aconselhamento automático sem intervenção humana e, ao mesmo tempo, causar alterações no processo de tomada de decisão da compra.

Neste contexto, este estudo aborda a recetividade destas tecnologias no mercado português, com base na tecnologia "HiMirror", e tem como objetivo ajudar as empresas a definir a sua estratégia de vendas e marketing. O Modelo de Aceitação de Tecnologia foi usado como alicerce para testar a aceitação dos consumidores e concluímos que os mesmos consideram esta tecnologia útil e que a sua perceção de utilidade influencia positivamente a propensão do seu uso em loja. Os traços de personalidade, ou seja, a criatividade, o senso de moda e a racionalidade, foram analisados de modo a encontrar clusters sobre a intenção de uso desta tecnologia. Por último, foi analisado em que situações de compra e para que tipo de produtos os consumidores preferem ser aconselhados por máquinas em vez de humanos.

Acknowledgments

The moment of the thesis is a very peculiar stage of a student life, where each individual needs to manage their time and their work completely by himself. It's a wonderful moment to brainstorm, to consolidate all the knowledge acquired throughout the years and to discover himself as a person and as a future professional. Thus, I want to express my profound gratitude to my family for giving me the opportunity to enroll in my master's degree and to have time to complete this study. Secondly, I want to thank my friends for giving me support during this process and, thirdly, I want to express my deep gratefulness to Gonçalo Saraiva, my advisor, who gave an amazing contribution to structure this study. Finally, I want to formally thank to Universidade Católica Portuguesa for the amazing educational experience provided during these two years, which had a very significant impact on my personal and professional growth.

The greatest benefit of the arrival of artificial intelligence is that AIs will help define humanity. We need AIs to tell us who we are." – Kevin Kelly

Table of contents

Introduction

The cosmetics industry has been growing exponential in the last years and a lot of companies are entering this market. The European make-up market had total revenues of $13,577.3m in 2018, representing a compound annual growth rate (CAGR) of 3.5% between 2014 and 2018. Market consumption volume increased with a CAGR of 2.0% between 2014 and 2018, to reach a total of 1,447.4 million units in 2018. The market's volume is expected to rise to 1,558.2 million units by the end of 2023, representing a CAGR of 1.5% for the 2018-2023 period.

The range of products offered in the industry is massive and new things appear everyday with different promises, which makes it very difficult for the consumer to understand what product suits them and how to use it. Thus, an enormous amount of beauty gurus appeared on Youtube with the aim to explain how to use cosmetic products and to share makeup tips and ideas. Consumers have demonstrated to trust in their opinion and they are loyal to their content.

Besides youtubers and online influencers, salespeople have a huge importance in this industry because customers tend to ask for their help when looking for products in store. Considering this, brands have been training sales people to be available at department stores to influence the consumers to buy their own brand. Also, with the arise of social media, brands have been able to connect directly with the final user, at any moment, through their own websites, apps and social media accounts. Besides communicating in real time, brands are now able to connect with the consumers during the use stage, which allows companies to collect more specific data from the consumers in order to give them recommendations or even automate the use and purchase of additional products. This ability to communicate directly with the consumers helps companies to meet their expectations of a more personalized and diversified service. They are also seeking for multifunctional products, which can be offered through technology.

In order to meet customers' expectations, tech and cosmetics industries have been working together and some impressive innovations emerged. "Hi Mirror", originally launched in 2016 by the New Kinpo Group, offers an Amazon Alexa voice-controlled smart mirror that provides beauty advice for users. The HiMirror integrates AI to offer a daily skin analysis and personalized recommendations as well as augmented reality to allow users to virtually try on

makeup. Shiseido acquired two AI startups in 2017 – MatchCo and Giaran – that scan selfies and offer personalized products and tips, supporting mobile sales. Shiseido has even patented "artificial skin," which could be used for testing skin pharmaceuticals and cosmetics. ORIG3N also brought a revolutionary technology that consists in a Beauty DNA Test, a gene profile that helps to explain how your skin and hair may look, feel, and react to various conditions and can serve as basis to recommend the most suitable products for the customer needs and intentions when buying beauty products ("13 Trends Shaping the Face of Beauty in 2018", CBINSIGHTS). These technologies are created with mature algorithms and with access to a tremendous amount of data.

Since this industry is so complex, and it offers an enormous amount of product categories and diversity of alternatives, these solutions are able to add a tremendous value for the consumer in the moment of deciding. Besides the possibility of making the decision-making process easier, it can also improve the quality and accuracy of the decision since it can offer an extremely personalized advice adapted to the individual preferences, both offline and online. The support in the decision-making process can happen both in store and at home and, in the near future, the distinction between online and offline is expected to disappear. Nevertheless, even though the investment done by companies, these technologies are not being used in mass and they are still unknown for the majority of the customers.

Considering the high investment required to implement these technologies, companies need to be aware of which ones will have a better result for the client and how receptive they are for it before deciding their digital transformation strategy. AI and facial recognition together can provide personalized tips for the customer considering its skin type, facial shape, lifestyle and preferences, helping or substituting the role of the specialized salespeople that listen the customer in store and offer them advice, tricks and the opportunity to try on different products. AI is already integrated in many activities such as illness diagnoses, evaluation of eligibility for loans and mortgages, researching legal cases (Brynjolfsson and McAfee; Ford; Schwab) and 'determining everything from bail amounts to sentences. It is already visible that algorithms are influencing individual lives because even if it doesn't decide by itself, it has an important role in influencing important decisions which affect individuals' possibilities and/or opportunities. (Abhang Mehendale, Nadheera Sherin).

However, the consequences of changing the sales strategy should be seriously considered. This implementation in stores can decrease the efficiency and satisfaction of the client due to the lack of human touch or it can improve due to an increase in the credibility of the service and the quality of the experience. Analyzing these variables can be very valuable

for companies to decide how to start implementing these new technologies in their stores, both online and offline, guaranteeing the best experience for the customer and worthy financial returns.

Relevance of the topic

The relevance of this topic is mainly based on the fact that the digital transformation is having a systematic structural impact on the retailing value chain, but the existent new technologies are very expensive and cosmetic companies need to understand if they should make the investment as soon as possible by understanding how receptive the market is. Furthermore, it's urgent to test if consumers prefer suggestions done by machines or by human beings, since technologies are starting to become mature enough to offer an accurate advice service. Since interaction with consumers while using products is quickly gaining importance, it's necessary to integrate technology in the products in order to allow that level of interaction. Also, with this integration companies can easily collect data of the consumer using stage, something never done before, and use it to recommend and motivate future purchases.

However, privacy is each time more important for consumers and they can feel disturbed and annoyed by brands if these platforms are not used in the right measure. Plus, they might prefer having contact with another human-being in the moment of the decision-making. Since humans have similar characteristics between each other, they might consider the advice from one of its kind more pleasant, credible and comfortable. Understanding in which measure new technologies should be integrated in customer service can add tremendous value for companies. Also, using these technologies can actually become a differentiation factor and give origin to a business of implementation. If consumers in Portugal are interested in trying these technologies and if it increases their willingness to buy products from brands and retailers, importing these products and convince brands and retailers to use them could be a business opportunity.

Nonetheless, this study can be extremely helpful for cosmetic companies to understand consumers perceptions towards these alternatives to offer advice and to contribute for an accurate decision towards the possibility of implementing these technologies in their commercial channels.

Aim and Scope

The aim of this study is to analyze the evolution and integration of new technologies in the cosmetic industry. It will be chosen a technology that might influence the decision-making process in order to understand if it is reliable and efficient and if it could possibly replace the role of sales assistant. Considering the data collected about the consumers perceptions of this technology, conclusions will be taken about the propensity of consumers to take advantage of systems that are based in artificial intelligence and machine learning. Furthermore, the perceptions of automatic and human advice will be compared, ceteris paribus, for different buying situations. Lastly, recommendations will be made for companies based on perceptions of respondents towards this type of machines and based on their level of readiness and willingness to use.

In order to increase the accuracy and practical use of this study, it was decided to limit the market to Portugal because, first, it was easier for the researchers to gather data and, second, it's a market that doesn't massively use the technologies being studied.

Research questions

The following research questions perform as guidelines to conclude if there is receptiveness for these technologies in this specific market:

RQ1) How are cosmetic purchases influenced nowadays?

RQ2) How receptive are consumers to these innovations?

 RQ2.1) How they perceived the ease of use and usefulness?

 RQ2.2) How credible are machines for the consumer?

 RQ2.3) Will consumers prefer a store that uses these technologies rather than a store that doesn't?

 RQ2.4) Do consumers prefer to be advised by a human or an automatic system?

 RQ2.5) Are consumers willing to pay for advisory technologies in cosmetics?

RQ3) Are individuals with fashion-sense more receptive to use this product?

RQ4) Are creative individuals more willing to use this product?

RQ5) Are rational individuals more willing to use this product?

Conceptual Framework

The following image illustrates what is expected to find through this research, namely how the variables considered might relate to each other and influence the dependent variable, which is the consumer receptiveness to automatic advice.
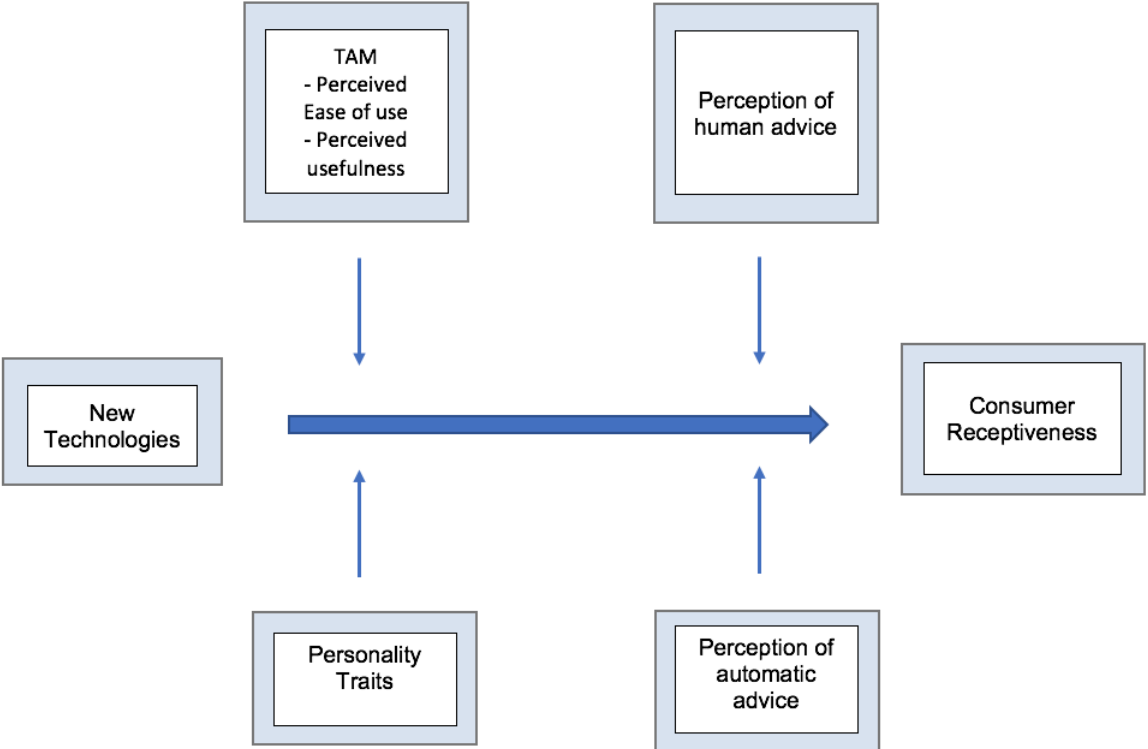

Figure 1 - Conceptual Framework

Literature Review

The consumer decision-making process

The consumer choice theories highlight three different types of decision process: a habitual process, a process with moderate processing, and a process with extensive processing (James R. Bettman, Eric J. Johnson and John W. Payne 1991, Howard and Sheth 1969; Hansen 1972; Howard 1977; Engel, Blackwell, and Kollat 1978; and Bettman 1979). The complexity and difficulty required for the process will increase as the number of alternatives and attributes increases, if some specific attribute values are difficult to process, if there is a pronounced uncertainty about the values of many attributes, and as the number of shared attributes with the competitors becomes smaller (James R. Bettman, Eric J. Johnson and John W. Payne 1991).

Considering that cosmetic companies have been offering more diversified and personalized products and that consumers seek multifunctional attributes in new cosmetic products (Weber & de Villebonne, 2002; Kumar, 2005; Kumar, Massie & Dumonceaux, 2006; Dodson, 2008; Liao, Hsieh & Huang, 2008), the number of attributes to consider during the decision-making process regarding cosmetics is higher and, thus, more difficult. Since it is accepted by the majority of the scientific community that the individuals decide based on bounded rationality (Simon 1955), meaning that individuals have limitations on their abilities for processing information, it is extremely important to analyze the information processing considerations and the heuristics used by them to understand the decision-making process. (James R. Bettman, Eric J. Johnson, John W. Payne)

So, making information available may not be sufficient to share the desired message because consumers can process it in different ways (Russo, Krieser, and Miyashita 1975). In order to optimize the efficiency of brand communication, it's necessary to take advantage of the power of heuristics. Personalized messages are meant to eliminate tedious tasks for the customer and it gives the marketer the opportunity to better identify the user's needs and goals based on past behaviors (2009, Alan L. Montgomery & Michael D. Smith b). Also, personalized advertisement can manipulate people's choices, based on the detailed knowledge of a person, including how he/she thinks, feels, and reacts to certain kinds of situations (2015, Dirk Helbing), which might increase the company power.

The buying behavior: focus on the cosmetic industry

Buying behavior is defined as "the decision-making process and physical activity involved in acquiring, evaluating, using and disposing of good and services" (Junaid & Nasreen, 2012, p. 90). Research in the consumer-behavior field has been proving that the information decision-making processes are distinctive to the consumer behavior because the second-one, respectively, considers situational factors, besides the causal processes that drives the decision.

The key to comprehend the cosmetics buying behavior is to find the explanation of consumers purchase intentions. Jeanette Nikdavoodi proposes a framework with the drivers of purchase intention in the cosmetic industry, namely attitude, subjective norm and consumer innovativeness. Research shows that evaluating the consequences derived from making a purchase decision as positive is a basic condition for consumers' buying behavior.

According to Im et al. (2003) consumer innovativeness is "an individual's inherent innovative personality, predisposition, and cognitive style toward innovations that can be applied to consumption domains across product classes" (p. 65). Various studies (e.g., Midgley & Dowling, 1978; Foxall & Goldsmith, 1988; Im et al., 2003; Bartels & Reinders, 2011) provide evidence in the positive relationship between consumer innovativeness and consumer new product adoption behavior. According to Jordaan & Simpson, fashion-conscious females that are appealed to beauty are more innovative in their behavior, in which, would correspondingly motivate the purchasing behavior (Goldsmith et al., 2010).

The majority of empirical studies in the area have found that early adopters of innovations have more education, more income, and higher status occupations than do non-adopters (Mary Dee Dickerson and James W. Gentry, 1983, Adcock, Hirschman, and Goldstucker 1977; Bell 1963; Boone 1970). Hirschman defines the concept of "consumer creativity" and incorporates it in a model of role accumulation and innovativeness. She makes seven propositions relating consumer creativity to innovativeness; the underlying theme is that high levels of consumer creativity are hypothesized to lead to increased adoptive and use innovativeness (Jeanette Nikdavoodi, Mary Dee Dickerson and James W. Gentry, 1983). Barnett (1941) and Rogers (1961) found evidences of the relation between low origence/high intellectence to innovation, which related measures of mental ability such as mental rigidity, intelligence, rationality, and ability to deal with abstractions to innovativeness (Mary Dee Dickerson and James W. Gentry, 1983). Also, in this industry, the importance of other peoples'

influence on the cosmetic consumers cognitive structure is extremely high, as consumer may use social comparison processes to motivate the consumer behavior (Joy & Venkatesh, 1994; Perrett et al., 1998 Etcoff, 1999).

Online Shopping Behavior

"Behavior is the apparent, noticeable response in a given situation with respect to a given target. Online Shopping Behavior is a kind of individual's overall perception and evaluation for product or service during online shopping which could result in bad or good way" (Li & Zhang, 2002). The predominant group of costumers in the beauty and personal care industry are young people that are digitally plugged in. They prefer buying products online instead of wasting time in stores. Consumers used to hesitate to buy online products that required touch and feel experience, which was the case of beauty and personal care products, though, nowadays they are able to buy online for this segment as well (Archna Prasada, Krithika Rb, Susshruthi Gudimetlac).

According to the Nielsen Global Online Consumer Survey, 90% of consumers trust recommendations from people they know, while 70% trust consumer opinions posted online (Legwinski,2012). However, a Study of Digital Shopping Behavior of Women with Respect to Beauty and Personal Care Products considers that new methods of Virtual trials can help mitigate possible perception problems from the customers. Nowadays, consumers tend to go to the store to get trials done and then they make the purchase online.

Regarding how consumers investigate the products in this category, studies have revealed that most people don't search for a brand name when they search for health and beauty products. They search instead for specific attributes of the products or their ingredients, which enhances the importance of helping the consumers understanding what and why is better for them (Archna Prasada, Krithika Rb, Susshruthi Gudimetlac, 2019).

The credibility of salespeople and their power of influence

"Salesperson credibility includes expertise and trust. Expertise is the belief that a salesperson possesses sufficient technical skills and knowledge to pursue the mutual interests

of the customer and the salesperson" (Aaron Arndt, Kenneth Evans, Timothy D. Landry, Sarah Mady and Chatdanai Pongpatipat).

The credibility of salespeople has an important role in the efficiency of personal selling (Arun Sharma, Thompson and Evans 1969; Weitz 1981; Krapfel 1985) because consumers are more receptive to salespersons who they perceive as credible (Jones et al. 1998, Sharma, 1990 ,72). Moreover, the higher the credibility, the higher the likelihood of the message being deeply processed and, thus, accepted by the clients. When the message is accepted, the receiver memorizes the content and does not associate it with the source of the message, which makes acceptance crucial in order to efficiently deliver a message (Arun Sharma, Hovland and Weiss 1954-55, Levitt, 1965).

Artificial Intelligence and Machine Learning

AI came to offer an important contribution through the improvement of the forecasting techniques by using pattern recognition instead of curve fitting. The software used to apply pattern recognition technique in the decision-making field is the knowledge-based expert system and the artificial neural networks (Simina Maris, Titus Slavici, Petre Nenu, Liliana Baciu, 2017). The ANN is considered one of the most accurate decision-making tools and it works with neurons that are software elements which emulate human neurons by processing some input data and returning a function of it. One of the biggest advantages of this development is that it is able to consider various factors that affect the dependent variable and it is closer to the complexity of human brains, allowing a better predictability of consumers decisions-making process (Abhang Mehendale, Nadheera Sherin H R, 2018).

Artificial Intelligence and the power of heuristics

Considering that AI came to improve the ability to predict the consumer decision-making, brands can transmit more personalized messages, based on the heuristics used by each target. Besides personalization, AI is able to provide support for decision making, which enables to influence the consumer. Also, by using tools in which the human and machine cooperates, the decision-making process can be faster (Amitava Dutta, 1995). There are even companies such

as Recorded Future and Palantir that try to predict future individual behavior based on the data available about individuals, with a 90% rate of success.

This evolution can eventually make the future of society predictable and controllable, allowing companies to predict customers desires, needs, future behavior and, thus, the decision-making process. Such techniques address people's subconsciousness, such that they would not necessarily be aware of the reasons causing their actions (2015, Dirk Helbing), allowing companies to access to very detailed information about consumer's behavior.

Algorithms' credibility for the consumer

The credibility of a message is defined as the "individual's judgement of the veracity of the content of communication" (Appleman & Sundar, 2015, p. 5).

More recent explanations of credibility define it as the believability of a source, and it rests largely on perceptions of the trustworthiness and expertise of the information source as interpreted by the information receiver (Franklin Waddell, 2019, Hovland et al., 1953).

Although a variety of aspects can influence perceptions of message credibility, information processing theories such as the heuristic systematic model (Franklin Waddell, 2019, Chen & Chaiken, 1999) predict that credibility judgments are made through a combination of systematic, message-based processing that involve effortful evaluation of a message and heuristic, cue-based processing that renders judgments based on mental rules of thumb that aid processing of information with relatively little effort (Franklin Waddell, 2019, Todorov, Chaiken, & Henderson, 2002). The human cognition tends to be miser (Franklin Waddell, 2019, Moskowitz, Skurnik, & Galinsky, 1999), which makes them rely on heuristic-based processing to make judgments, especially when the ability or motivation to process information is moderately low (Franklin Waddell, 2019, Chaiken, Liberman, & Eagly, 1989). One mental shortcut identified by the MAIN model is the machine heuristic. Specifically, this model predicts that news attributed to automation can activate the heuristic that if a machine selected this information, then it must be free of bias. This prediction was originally resultant from the work of Sundar and Nass (2001), who observed that news purportedly selected by a computer were evaluated more favorably than news purportedly selected by a journalist (Franklin Waddell, 2019).

Although some theory suggests that audiences should respond favorably to machine automated content, a review of relevant past work shows that evidence for the persuasive appeal

of news automation has been mixed. For example, several studies have found that news purportedly selected by a Twitter bot (Edwards et al., 2014) or produced via software (Clerwall, 2014) is perceived as relatively similar to news attributed to humans. If machine sources are less biased than humans but also less anthropomorphic, the presence of two coefficients with opposite signs would produce a null effect (Clerwall, 2014; Edwards et al., 2014; Graefe et al., 2016; Sundar & Nass, 2001). This interpretation is supported by the findings of a study done by Franklin Waddell, 2019, that analyzed the credibility of automated news versus news produced by humans. The study found two indirect pathways with opposite signs regarding the perception of automated news. However, the study shows evidence that when humans acknowledge that a news article is automated by reading a label in the byline, the message credibility is positively influenced (Franklin Waddell, 2019).

A study about "Trust in Public Policy Algorithms" enhances this finding since it shows evidence that people are quite trusting in algorithms relative to other sources of advice, even with minimal information about the algorithm or when they are clearly told that humans are equally good at the task (Ryan Kennedy, Philip D. Waggoner, Matthew Ward, 2018). It's generally accepted that there are risks associated with too much trust in algorithms. Nevertheless, this study found that people tend to have difficulty in understanding the importance of transparency and human involvement in the construction of algorithms in order to guarantee that they result in unbiased outcomes, which results in a general trust in automation for different situations (Ryan Kennedy, Philip D. Waggoner, Matthew Ward, 2018).

Even though individuals trust in algorithms, research has proved that source and message information can become confused in user's minds when searching online since the commercial information is often blurred with information produced for other purposes (Miriam J. Metzger, Andrew J. Flanagin, 2013), which can make it difficult for them to understand the source of the information.

Methodology

The first stage of this study consists in a qualitative research in order to gain in-depth insight about the cosmetic industry and the customers relationship with AR and AI. The qualitative information was gathered through in-depth interviews to professionals that work in the cosmetic industry, namely, beauty advisors with relevant experience. The insight from these professionals is extremely valuable since they have a direct contact with the final customers and they observe their behavior in store on a daily basis. Furthermore, stores already have experimental versions of automatic advice using AR and AI and, usually, beauty advisors assist the client when they are experimenting these technologies. The interview script was structured between past, present and future and its underlays in understanding the influence of the beauty advisor on the customer's decision-making process, the relationship between both and the consequences of new technologies.

The cross-sectional, descriptive, correlational research design was the second stage of this study, which obtained quantitative data regarding consumers' perceptions regarding the use of technology in cosmetics through two surveys. The aim of the first survey was to understand the consumer relationship with cosmetics and the general perception of the utility and ease of use of the technological innovations that have been arising in this industry. Firstly, respondents had to answer wide-ranging questions that analyze their level of interest and involvement with cosmetic products and what drives their purchase. The aim of this part was to understand the buying behavior of the respondents and their perceptions towards the cosmetic products in general and the role of Artificial Intelligence in their life. In the second part of the survey, the product "HiMirror", an Amazon Alexa voice-controlled smart mirror that provides beauty advice for users, was presented as an example of a technology that uses Artificial Intelligence to help and influence the decision-making process of the cosmetics' consumers. Besides that, this product integrates AI to offer a daily skin analysis and personalized recommendations as well as augmented reality to allow users to virtually try on makeup. A brief explanation of how the products works and its benefits for the consumer was offered together with a short video that exemplifies the using process of this product. Even though it was originally designed to be used at home, it could also be used in store to give support to the salespeople. By understanding the receptiveness and desirability of the respondents to this product, it's possible to have a reasonable understanding of the receptiveness and desirability to the integration of technology in cosmetics' points of sales.

The framework used to determine a person's intention to adopt a new technology (Davis 1989) was the TAM (Technology Acceptance Model), which is divided in two other variables: the perception of utility and the perception of ease of use. Several studies have proposed frameworks that define the determinants of technology acceptance/adoption (e.g., Ajzen 1991; Davis, Bagozzi, and Warshaw), but this model is one of the most used because it has gained considerable theoretical and empirical support in predicting technology acceptance among potential users and decision makers (Abdul R. Ashraf, Narongsak (Tek) Thongpapanl, and Seigyoung Auh, 2014). A Study about online shopping adoption under different cultural contexts and a study about driverless cars uses this framework to evaluate purchase intention. According to Davis and Bagozzi (1989), the creators of this model, the users' acceptance of a new technology depends primarily on its function (PU) and secondarily on the ease or difficulty with which its function can be performed (PEOU). The predictive power and parsimony of the TAM enables researchers to apply it to various settings and to analyze and understand different purchase behaviors (Singh et al. 2006; Wu and Lu 2013).

In addition to PU (Perception of Utility) and PEOU (Perception of Ease of use), an important factor involved in technology adoption is trust. One of the key reasons' customers use the Internet but do not actually purchase online is lack of trust in e-retailers, because customers perceive online transactions to be risky (Abdul R. Ashraf, Narongsak (Tek) Thongpapanl, and Seigyoung Auh, 2014). So, trust in the advice delivered by this product will also be analyzed and compared with trust in salespeople. Also, it will be considered if respondents prefer being recommended by a machine or by a specialized salesperson and it will be directly asked if they agree with the following affirmation: "I trust more in machines than in human-beings". Understanding their level of trust in comparison with human beings is crucial to understand how to improve the actual sales strategy of cosmetic companies. In order to increase answer's accuracy, respondents were also asked if they prefer to receive recommendations by "HiMirror" or through a specialized salesperson. The average between the two variables will lead us to the level of preference between robots and humans. The same technique of asking similar questions in different ways was used in order to increase the accurateness of the information. Respondents will be also asked about their intention to use this technology in store, using two different questions with the same meaning.

Research has proved that fashion-sense, creativity and rationality are linked with the propensity to adopt new technologies, thus, these characteristics will be measured at the end of the survey. With this information, it will be possible to find clusters in order to understand some personality characteristics of the potential adopters of these technologies. Demographic

characteristics will also be inquired, and it will contribute to define a potential consumer for these technologies in the Portuguese market. This study will be mainly exploratory, since analyzing receptiveness is very broad and it depends on many different variables. So, many statistical analyses will be conducted in order to respond to the research questions. Firstly, it's necessary to find out which are the characteristics in common between the individuals who are more willing to use the technology used as an example. Clusters will be defined. Secondly, regressions would be conducted to find the coefficients that relate the involvement with the product, the perception of credibility, the perception of utility and the perception of ease of use with the willingness to use this product at home and in store. Lastly, the perception of easiness to understand makeup and skincare will be put in relation with the willingness to use this product.

The aim of the second survey was to gather more specific information about the preferences between automatic advice and human advice, comparing both for each context. The respondents had to answer to the same questions with one single difference, automatic or human advice, in order to understand how this variable affects everything else. The demographic and psychographic questions were equivalent to the first survey in order to make valid comparisons of the results. The principal statistical analysis to run will be the paired sample t-test in order to analyze the differences between automatic and human advice for each context. Furthermore, cluster analysis will be used to split the groups between personalities traits and perceptions regarding automatic and human advice.

Participants

Interviews were conducted to two beauty advisors with experience in cosmetic stores and to four clients who are interested in cosmetics. The population of the first survey are Portuguese citizens who buy cosmetics and who have, at least, a slightly interest for this category of products. To guarantee that only participants with these characteristics answer the survey, two questions are made at the beginning in order to understand if they buy cosmetics and if their interest in cosmetics is equal or higher than 2 in a scale of 1 to 5. Also, answers from participants that don't reside in Portugal will be excluded. In the second survey, the same criteria were considered, with the exception to the fact that consumers who do not buy cosmetics specifically were included because this survey is more focused in the decision-making process and the mechanisms that can influence the customer. Thus, if the respondent

doesn't buy cosmetics, but he is interested about it, the existence of these mechanisms could influence him to start buying it.

Data collection

The data was collected through personal interviews and two online surveys created on Qualtrics. For background information in both surveys, respondents had access to the definition of skincare and makeup products in order to guarantee that they understand correctly which products are included in these two categories. In the first survey, a brief video presenting the "Hi Mirror" technology was provided together with a small and objective description of the product. This survey remained open for 7 days and 190 responses were collected, but 39 were deleted, since it corresponds to the respondents who don't buy cosmetics plus 18 that weren't included because it belonged to the participants who don't value cosmetics. In total, 133 responses were considered for the analysis. In the second survey, it was presented a brief explanation of the "Hi Mirror" technology and the "YouCam", as examples of automatic advice, and it was explained the role of beauty experts, as an example of human advice. The survey stayed open for 2 weeks and 248 responses were collected, but only 133 were considered since the remaining ones correspond to the individuals that are not interested in cosmetics.

Overview of the results

At this chapter, the results from the qualitative and statistically analyses will be described in order to serve as a basis to discuss the variables in study and to reach credible and statistically significant conclusions.

Qualitative Research Analysis

Regarding the interviews conducted to two beauty advisors, the eight words that were most mentioned were "clients", "product", "try", "people", "want", "lot", "online" and "store" (see in Appendix the weighted percentages and the remaining words). According to beauty experts, the key roles of their job is to demonstrate knowledge about the products and to pass it to the consumers and to offer them the possibility to experiment the products in their skin, while explaining how to use it. Beauty advisors know that consumers mostly go to the store to try products on their skin, but they often finalize the purchase after. Nowadays, purchases in store are more impulsive ones, rather than online. Younger consumers like to compare all the prices available and they like to feel that they are doing the right choice and, thus, beauty advisors need to be impartial and to give them space to show their own knowledge. Older consumers rely more on the beauty advisor opinion. However, in general, they feel that clients trust them, even though there is an age difference. They focused on the importance of creating empathy with the client and being pleasant in order to create relationships of trust. Even though they understand the relevance and importance of new technologies, they believe their job will not be replaced due to the significance of human-contact. They try to take advantage of technological advance in order to demonstrate new options to the client, but they know the value of their expertise in beauty products, as counselors and as make-up artists. They believe that the future is about working together with technology and maintain congruency between digital and physical platforms.

Regarding the interviews conducted to four clients, the eight words that were most mentioned were "products", "store", "influencing", "online", "think", "skin", "try" and "know" (see in Appendix the weighted percentages and the remaining words). The three themes that were more cited by them was "Experiment", "Knowledge" and "Trust". All the interviewees mentioned, at least once, the importance of trying the products on their skin. Also, the knowledge and technique of the beauty experts was intensively referred. For these consumers,

beauty experts have an extremely important role in explaining the characteristics of the product and in identifying their needs, thus, they value a lot the knowledge they have about cosmetics. Moreover, all the interviewees demonstrated a high level of trust in the beauty experts. However, the youngest interviewee expressed that sometimes she has some doubts regarding beauty experts' opinions and both the 23 years-old interviewees admitted to trust in them but to know that they have sales goals and it happens to give biased opinions. The interviewee with 48 years-old enhanced with more intensity the high level of trust in beauty experts. All of them mentioned the importance of a "friendly-welcome" and of sympathy, but it was not the crucial factor to decide between a machine or a human-being. The possibility of trying at home the products through Augmented Reality is seen as more useful and convenient than in store because they cannot try the real products at home. When there is the possibility to try the products in their skin, all of them agreed that it was better than do it through a machine. It's very important for them to buy products that are suitable for their skin type and they trust in the expertise of the beauty advisor to help them with that. They all have afraid that the machine offers a standardized service, at least nowadays, that is not as personalized as the beauty advisor. Thus, they believe that the experience of trying products through AR will never be the same as trying the real products in store. Lastly, they admitted that the beauty advisor can influence them a lot in terms of the brand they buy, since they trust in their expertise and knowledge about the different products available. The youngest interviewees assumed that, even though they allow themselves to be influenced in terms of the brand they buy, they know that there might be some bias. This analysis results in a few hypotheses that will be tested through the concretization of two surveys.

Hypotheses

1. Consumers prefer to use counseling technologies for cosmetics at home rather than in store
2. Consumers consider counseling technologies for cosmetics as useful
3. Consumers believe that automatic advice technologies can improve their shopping experience at home

Quantitative Research Analysis

Considering the results of the first survey, 82 out of the 133 respondents affirmed to buy cosmetics in multi-brand stores (61,2%). In second place, 48 out of 133 respondents affirmed to buy cosmetics at pharmacies, which represents 36,1%. Following this, 43 out of 133 respondents stated to buy cosmetics at pharmacies, which means 32,3% of the sample. Then, 25 out of 133, meaning 18,7%, affirmed to buy it at department stores and 24 out of 133, specifically 18,04%, at online stores. See the tables 17 to 20 in appendices. It was asked to the respondents to classify their level of agreement with the following affirmations: "Understanding the composition, characteristics and functions of skincare products is easy" and "Understanding the composition, characteristics and functions of makeup products is easy". Considering the answers to these both questions, a new variable was created, "undersantingofcosmetics". The mean of this variable was 2.95 in a scale of 1 to 5, meaning that respondents have difficulties in understanding the composition, characteristics and functions of cosmetic products, since this value is marginally below 3.

Concerning what sources of information respondents find more credible regarding cosmetics, it was observed that they trust the most in celebrities. In second place, they trust in magazines, in third place, in influencer, in fourth place, in youtubers, in sixth in close persons and, in seventh place in specialized salespeople. The least trustable source for this sample is dermatologists. Following this question, respondents were asked to define their level of trust in the source they indicate as the most trustable for them and the mean of the answers, in a scale from 1 to 5, was 4.3609, meaning that they have a high level of trust in that source. See tables in appendices. In terms of perception of utility of AI, the mean of the responses to the level of agreement with the affirmation "Artificial Intelligence can make my life easier" was 3.4962, with a standard deviation of 0.88441, meaning that respondents consider that AI can slightly become their life easier.

After the technology "HiMirror" was presented, respondents were asked about their perception of utility and ease of use. The mean of the first one, respectively, was 3.7218 in a scale from 1 to 5, with 1 meaning that they totally disagree with the affirmation that this technology is useful and 5 that they totally agree with the same affirmation. Regarding the ease of use and considering the same scale, the mean of the results was 3.5489. These results indicate that respondents consider this technology slightly useful and easy to use. The mean of the intention to use this technology in store was 3.5489 (1 to 5 scale), with a standard deviation of 0.97675. See the results regarding makeup and skincare, "understandingofcosmetics",

perception of utility of AI and perception of utility of "HiMirror", perception of ease of use and intention to use it in store in appendices with more specific values. Furthermore, respondents were asked about the credibility of the product "HiMirror" and the mean of the responses was 3.2481 (1 to 5 scale), a difference of 1.0609 less in comparison to the source they considered more trustable previously, which represents 21,218% less. See tables in appendices.

The effect of the perception of utility and perception of ease of use in the intention to use this technology in store was measured through a linear regression. Considering the Model Summary, a R square of 0.124 is observed, which means that this model explains 12,4% of the effects in the dependent variable.

Table 1 - The perception of utility and the intention to use "HiMirror"

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.352	0.124	0.117	0.91770	2.014

a. Predictors: (Constant), Classify your level of agreement with the following affirmation: "I consider this technology useful." – Utility

b. Dependent Variable: intentionuse_store

The homoscedasticity assumption is confirmed, since there are points equally distributed above and below zero on the X axis, and to the left and right of zero on the Y axis. However, in order to guarantee the accuracy of this result, this assumption was statistically tested, and it was verified that the null hypothesis of homoscedasticity is not rejected because the significance level of Chi-square is above 0,05. (See the statistical test in appendice)
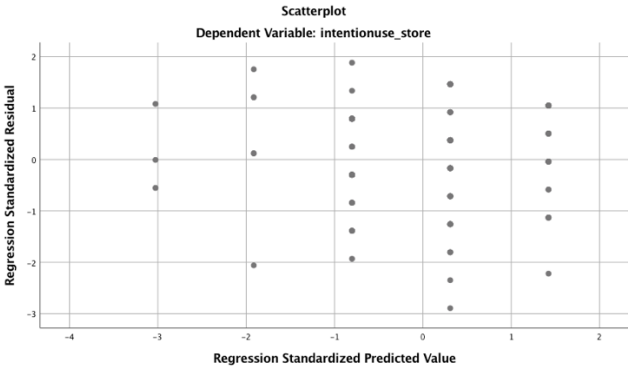

Figure 2 - Scatterplot, dependent variable: intention to use in store

The assumption of normality is confirmed in this model, since there aren't drastic deviations in the linear form.
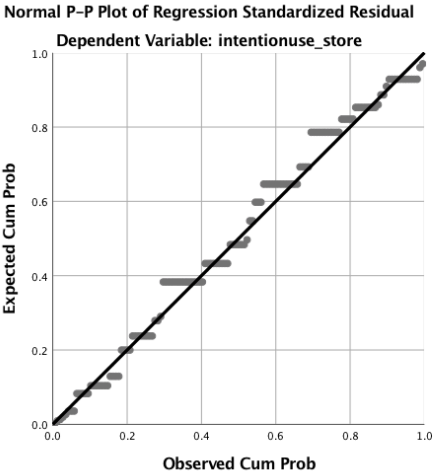

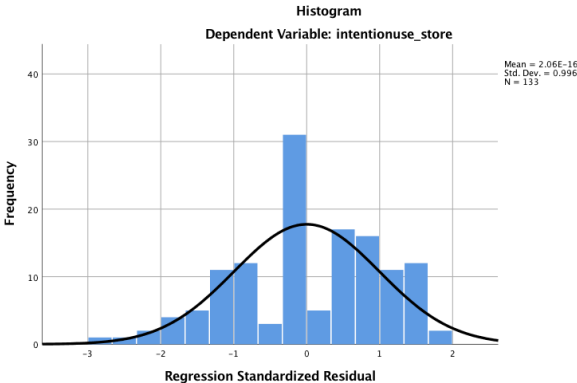*Figure 3 - Normal P-Plot of Regression Standardized Residual*

Figure 4 - Histogram, dependent variable: intention to use in store

Table 2 - ANOVA: utility vs intention to use in store

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	15.606	1	15.606	18.531	0.000
Residual	110.326	131	0.842		
Total	125.932	132			

    a.   Dependent Variable: intentionuse_store

    b.   Predictors: (Constant), Classify your level of agreement with the following affirmation: "I consider this technology useful." – Utility

Multicollinearity is one of the assumptions to guarantee the validity of a linear regression model. It refers to when your predictor variables are highly correlated with each other. This is an issue, as your regression model will not be able to accurately associate variance in your outcome variable with the correct predictor variable, leading to muddled results and incorrect inferences. The VIF (Variation inflation factor) proves that the assumption of multicollinearity is met because all the values are below 10. Also, the value of the Durbin-Watson test is 2,014, meaning that there is no autocorrelation, which also confirms this assumption.

In this linear regression it was used the intention to use in store as the dependent variable and the perception of utility (PU) and perception of easiness of use (PEOU) as the independent variables.

Since the p-value of the variable PEOU is above 0.05, this variable doesn't have a significant effect in the dependent variable and, thus, it was automatically excluded from the model through the stepwise method. The PU, on the other hand, has a high level of significance, since the p-value is 0.000, and it has a positive relation with the dependent variable. The coefficient, B, for this variable is 0.382, meaning that the intention to use the product being study increases 0.382 as the perception of utility increases one unit.

Table 3 - Coefficients: utility vs intention to use in store

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	2.126	0.340		6.250	.000		
Classify your level of agreement with the following affirmation: "I consider this technology useful." – Utility	.382	.089	.352	4.305	.000	1.000	1.000

a. Dependent Variable: intentionuse_store

Table 4 - Excluded Variables: Utility vs Intention to use in store

Excluded Variables

	Beta In	t	Sig.	Partial Correlation	Tolerance	VIF	Minimum Tolerance
Classify your level of agreement with the following affirmation: "I consider this technology useful." – Utility	.382	.089	.352	4.305	.000	1.000	1.000

Intentionuse_store = 2.126 + 0.382*PerceptionUtility

Concerning the preferences between automatic systems and human beings, three questions were made to the respondents. The first variable refers to the level of agreement with the following sentence "I prefer to be advised by automatic systems rather than by human beings", which in a scale from 1 to 5, the mean of the answers is 2.12, meaning that the respondents do not prefer to receive advise from automatic systems in comparison to human beings. The second variable refers to the level of agreement with the sentence "I prefer to receive recommendations through the product "HiMirror" rather than by a specialized salesperson" and the mean of the answers from the respondents is 2.45, which is closer to the median value of the scale. Even though the respondents still prefer specialized salespeople rather than "HiMirror", they are more receptive to "HiMirror" than to robots in general. The third one refers to the level of agreement with the following affirmation "I consider the "HiMirror" system credible" and the mean is 3.248. Thus, the respondents consider this product slightly credible.

Table 5 - AI vs humans, "HiMirror" vs specialized salesperson, Credibility and "HiMirror"

Statistics	**What is your level of agreement with the following affirmation: "I prefer to be advised by automatic systems rather than human beings." – AI vs humans**	**What is your level of agreement with the following affirmation: "I prefer to be advised through the mirror "HiMirror" rather than by a specialized salesperson" – "HiMirror" vs specialized salesperson**	**What is your level of agreement with the following affirmation: "I consider the system "HiMirror" credible". – Credibility and "HiMirror"**
N Valid	133	133	133
N Missing	0	0	0
Mean	2.1203	2.4511	3.2481
Mode	2.00	3.00	3.00
Std. Deviation	.93774	1.13128	.77270
Variance	.879	1.280	.597
Range	4.00	4.00	4.00
Minimum	1.00	1.00	1.00
Maximum	5.00	5.00	5.00

The effect of the preferences between robots and humans on the intention to use "HiMirror" in store was also measured through a linear regression. Considering the Model Summary, a R square of 0.063 is observed, which means that this model explains 6,3% of the effects in the dependent variable. The assumptions of multicollinearity, normality and homoscedasticity were confirmed, and the evidences are in the appendices.

Table 6 – Model Summary: RobotvsHuman and intention to use in store

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.251	.063	.056	.94902	1.864

a. Predictors: (Constant), Robotvshuman

b. Dependent Variable: intentionuse_store

Since the p-value of the variable "robotvshuman" is below 0.05, this variable has a statistically significant effect on the dependent variable, the intention to use "HiMirror" in store. The coefficient B of the variable "robotvshuman" is 0.259, which means that the intention to use the product being study increases 0.259 as the preference for robots instead of humans increases one unit.

Table 7 - Coefficients: RobotvsHuman and intention to use in store

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	2.956	.216		13.694	.000		
robotvshuman	.259	.087	.251	2.972	.004	1.000	1.000

a. Dependent Variable: intentionuse_store

The effect of the ability/easiness to understand makeup on the intention to use in store was also observed. Considering the Model Summary, a R square of 0.029 is observed, which means that this model explains 2,9% of the effects in the dependent variable. The assumptions of multicollinearity, normality and homoscedasticity were confirmed, and the evidences are in the appendices. The coefficient of the variable "understandingofcosmetics" is 0.197 and it has a p-value of 0.05 and, thus, the null hypothesis is rejected because there's no difference between the means and this variable is statistically significant. Theoretically, the intention to use increases 0.197 as the level of understanding of cosmetics increases in one unit. However, since

the R Square is close to zero, the results from these analyses are not accurate. See the linear regression tables in appendices and evidences from the assumptions.

With the objective of increasing the significance of the model as a whole, it was created a linear regression with the intention to use in store as dependent variable and the ability/easiness to understand makeup, robotvshuman, perception of utility, perception of easiness of use and interest in cosmetics in general as independent variables. However, the R Square is the same as in the linear regression used to test the effect of perception of utility on the intention to use in store, which is 0.124. This phenomenon can be explained due to the fact that all the variables were excluded, with the exception to the perception of utility. So, in fact, the only variable that is explaining the changes in the dependent variable and, thus, that contributes to the percentage explained by the whole model, is the perception of utility. The coefficient B of this variable is 0.382, the same value observed previously. See the table of excluded variables in appendices with more specific values and the confirmation of the assumptions.

After observing the intention to use this product in stores, the propensity to pay to use this service at home was perceived to be slightly low. In a scale from 1 to 5, in which 1 is little willingness to pay to use at home and 5 is high willingness, the mean of the responses was 2.4759. The standard deviation was 1.03427, meaning that there might be significant differences between the respondents regarding the willingness to pay to have this product at home.

Table 8 - Statistics: propensity to pay

Statistics

Would you be willing to pay to use this service at home? – Propensity to pay

N Valid	133
N Missing	0
Mean	2.3759
Std. Deviation	1.03427
Sum	316.00

The last part of the survey aimed to collected psychologic and demographic information about the respondents. The means of the intention to use in store between gender were

compared and it was observed that feminine respondents had a mean of 3.5984 of intention to use and Masculine respondents had a mean of 3.0000. The standard deviation of the mean from the female's respondents was .93517 and from the masculine respondents was 1.28452. Regarding the familiar income, it was observed that the respondents with the biggest intention to use "HiMirror" in store have an annual household income between 10,000€ and 19,999€. The second group of respondents with more intention to use have an annual household income between 50,000€ and 74,999€. The group with less intention to use this product in stores is the one with an annual household income below 10,000€.

Table 9 - Income and intention to use in store

Report

Intentionuse_store			
Define your level of annual household income.	**Mean**	**N**	**Std. Deviation**
Less than 10,000€	3.1667	33	.91572
10,000€ to 19,999€	4.4688	32	1.00753
20,000€ to 34,999€	3.7143	21	.87423
35,000€ to 49,999€	3.6429	14	1.02711
50,000€ to 74,999€	3.9063	16	.84101
75,000€ to 99,999€	3.8636	11	1.05097
100,000€ to 149,99€	3.7500	4	1.25831
150,000€ or more	3.7500	2	1.76777
Total	3.5489	133	.97675

After observing some demographic characteristics, it was conducted a k-cluster analyses in SPSS, being k=2, in order to divide the respondents in groups of similar personalities and to perceive their respective intention of use in store. The variables considered to divide them were the level of agreement with affirmations in the first person, related with the variable in question, in scale of 1 to 5.

The first group considers having a level of fashion sense of 3, to follow fashion trends in a level of 3, a level of openness to new experiences of 3, a level of artistic capabilities of 2, a level of creativity of 3 and a level of innovativeness of 3. Also, they consider to be rational

persons, since the mean of the level of agreement with the sentence "I'm a rational person" was 4. Lastly, the mean of the level of agreement with the sentence "I'm an introverted person" was 3. The mean of the intention to use this product in store for this group was 3.12.

The second group considers having a level of fashion sense of 4, to follow fashion trends in a level of 4, a level of openness to new experiences of 4, a level of artistic capabilities of 3, a level of creativity of 4 and a level of innovativeness of 4. Furthermore, they also consider to be rational persons, since the mean of the level of agreement with the sentence "I'm a rational person" was 4. Lastly, the mean of the level of agreement with the sentence "I'm an introverted person" was 3. The mean of the intention to use this product in store for this group was 3.72, the highest mean between these two.

Thus, the individuals that correspond to these characteristics are the ones with the highest intention to use "HiMirror" in stores. Both groups considered to have the same level of rationality and the p-value for this variable is above 0,05, meaning that this variable is not statistically significant. Consequently, the level of rationality of an individual doesn't interfere with their intention to use this product in stores. The variable concerning intention to use in store has a p-value of 0.001, which is below 0.05. So, the null hypothesis of equal means is rejected and, therefore, this variable is statistically significant.

Table 10 - Cluster with personality traits

	1	2
Between 1 and 5, evaluate your level of agreement with the following affirmations: - I believe that I have a good fashion sense.	3	4
Between 1 and 5, evaluate your level of agreement with the following affirmations: - I follow fashion trends.	3	4
Between 1 and 5, evaluate your level of agreement with the following affirmations: I like to experiment new things.	3	4
I consider having artistic capabilities.	2	3
I consider myself a creative person.	3	4
I consider myself an innovative person.	3	4

I'm a rational person.	4	4
I'm an introverted person.	3	3
Intentionuse_store	3.12	3.72

Table 11 - Distances between final cluster centers

Distances between Final Cluster Centers		
Cluster	1	2
1		2.891
2	2.891	

Table 12 - Statistics: Cluster with personality traits

	Cluster		Error			
	Mean Square	df	Mean Square	df	F	Sig.
Between 1 and 5, evaluate your level of agreement with the following affirmations: - I believe that I have a good fashion sense.	24.361	1	.412	131	59.098	.000
Between 1 and 5, evaluate your level of agreement with the following affirmations: - I follow fashion trends.	21.221	1	.610	131	34.777	.000

Between 1 and 5, evaluate your level of agreement with the following affirmations: I like to experiment new things.	13.703	1	.550	131	24.923	.000
I consider having artistic capabilities.	47.747	1	.800	131	59.696	.000
I consider myself a creative person.	60.644	1	.438	131	138.327	.000
I consider myself an innovative person.	27.717	1	.456	131	60.793	.000
I'm a rational person.	.075	1	.489	131	.154	.695
I'm an introverted person.	21.474	1	1.121	131	19.160	.000
Intentionuse_store	9.857	1	.886	131	11.125	.001

The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.

Table 13 - Number of cases in each cluster

Number of Cases in each Cluster

Cluster	1	38.000
	2	95.000
Valid		133.000
Missing		.000

Considering the results of the second survey, in a scale of 1 to 5, the mean of the responses to the question "Classify your level of agreement with the following affirmation: "I prefer a store that offers these systems rather than a store that doesn't offer it." was 3.4887, meaning that having technology advance systems can be a differentiation factor when choosing a store. When it concerns to the sentence "I would be more willing to buy due to these technologies", the mean of the responses was 3.218, meaning that there is a propensity to buy more, but not significant. The standard deviation of the answers to this question was 1.123, thus, there are extremely different perspectives towards this effect. Regarding the question "Classify your level of agreement with the following affirmation: I believe these technologies will have a good performance", the mean of the responses was 3.879, which means that consumers expect a good performance, and the standard deviation was 0.861, significantly lower than in the previous question.

The comparison of means between the answers related to automatic systems and human advice demonstrates, firstly, that consumers trust more on specialized salespeople when they suggest them a pack of products than on machines. Secondly, consumers are more likely to ask for help to a machine when they have a skin problem than to a salesperson. Thirdly, it's clear that when consumers are looking for a perfume to offer someone else they prefer to ask help to a salesperson than to a machine. Also, when they look for a specific product, they clearly prefer to be advised by humans. Moreover, they believe that humans are better to help them finding products that can enhance their facial and body look. Lastly, respondents demonstrated that if they can receive automatic advice at home, they are more willing to buy cosmetics online. The preference between human and machine advice for the situations in which they are not looking for a specific problem was not statistically significant. See table number 46 in appendices.

Discussion

Considering the results, it was clear that celebrities are a major force of influence for cosmetic consumers, followed by magazines, and only after those two, respondents chose influencers and youtubers. These results indicate a strong connection with traditional sources of influence and it diminishes the importance of digital influencers, a category that has been growing in the last years. On the other hand, the opinion of close persons, specialized salespeople and dermatologists were the sources least selected by the respondents, meaning that less people trust in them. This information decreases the power of spokespersons and those that are closer to consumers communities and quotidian. Also, it means that people representing cosmetic brands in store have a little power of influence on consumers' minds or, at least, that they want to deny their power of influence. Concerning Youtube and influencers, they have a significant importance in this industry, but they aren't used by everyone. In general, consumers have a high level of trust in the source they have indicated as the most trustable for them, but there is still space for the introduction of a new platform of advice that might be more credible. Furthermore, since dermatologists were considered the least used source of information, it means that there is a lack of scientific based decisions regarding the choice of cosmetics, which can decrease the efficiency of the treatments. The use of technological systems could solve this gap between cosmetics and science by providing cheaper and more accessible scientific advice. However, respondents admitted that they are not aware of technologies that use AI in cosmetics. Consequently, before developing new services, it's necessary to test the receptiveness of consumers to automatized advice in cosmetics, using current innovations as benchmark.

Regarding the product "HiMirror", an Amazon Alexa voice-controlled smart mirror that provides beauty advice for users, the perception of utility was 3,7218 in a scale from 1 to 5, with a standard deviation of 0.89910, meaning that respondents in general consider it slightly useful, but there are different views towards the product. This result indicates that the product might need some alterations in order to make it more useful, for example, by introducing a more scientific approach when it comes to cosmetics. Also, mentalities need to change, and consumers need to understand and give value to the outcomes of using this technology. It was observed that utility is the only significant factor influencing the intention to use this technology, thus, it's crucial for companies to know well their target and to understand their utility perceptions. After collecting this information, companies can decide if this product adds significant value for their target consumers. Even though the perception of easiness of use is a

parameter of the technology acceptance model, in this case, it doesn't have a statistically significant effect on the intention to use. Nowadays, consumers are surrounded by technology in their quotidian, thus, it's predicted that the easiness of use might be more relevant for more disruptive technologies that require some specific skills. Since the perception of ease of use was not statistically significant, the technology acceptance model should be based only on the perception of utility. Respondents considered this product slightly useful, meaning that their receptiveness is slightly positive. It was also observed that consumers, in general, are not able to pay to have this service at home. Considering this result and the fact that respondents perceive this product as slightly useful, there is a chance that consumers find this product an entertaining and amusement product to use in store, but not sufficiently useful to have at home and use it daily. Furthermore, consumers demonstrated that they prefer to be advised by human beings rather than automatic systems and that they prefer human advice to the product "HiMirror".

Since respondents showed that they consider the "HiMirror" technology as credible and that salespeople are one of the sources of information in which they trust less, the preference to human advice is not due to the lack of trust in automatic advice. The results of the second survey demonstrated that when consumers are looking for a specific product for them or to offer someone else, they value human advice more than automatic advice. These results revealed that consumers rely on the help of salespeople, even though they are aware that the advice might be biased. Considering these observations, there's a possibility that consumers didn't see this product as a substitute but as a complement of human contact, since they considered this product useful, even though they prefer to be received by a human salesperson when in store.

The other factors considered in this study should be ignored by companies when considering the intention to use this product in store and at home, since they don't have a statistically significant effect on it. Thus, the hypothesis that consumers prefer to use these technologies at home cannot be verified. Concerning the variable "robotvshuman", which refers to the level of preference between robots and humans, this variable was considered to have a statistically significant effect on the intention to use the product in store when tested separately from all the other variables. Hence, when tested in a bigger sample, the results could have been different in terms of statistically significance for all the variables together. Regarding the variable "understandingofcosmetics", there's a chance that consumers didn't perceive the product "HiMirror" as capable to clarify the characteristics of cosmetic products because when the product was explained to them that benefit was not mentioned. Also, the product was presented as a mirror that identifies the problems of your skin and suggest treatments, but the possibility of comparing products was not mentioned. There is also a chance that the answers

to the question "In which level do you agree with the following affirmation: "Artificial Intelligence can make my life easier"?" weren't significant to the intention to use "HiMirror" in store because respondents didn't associate this product as a result of Artificial Intelligence. However, in this case, the use of Artificial Intelligence was mentioned in the explanation of the product, so it was easier to associate. It's possible that respondents didn't have a defined opinion about how Artificial Intelligence could make their life easier and answered quickly because it's more difficult to materialize the impact of a concept in their life rather than a final product. Also, for the companies it's more important to understand how they perceive a final product that uses Artificial Intelligence rather than recognize their opinion towards a subjective and technical concept. This perspective is in accordance with Genevieve Bell, VP and Senior Fellow at Intel opinion. Genevieve believes that emerging technologies like AI and 5G are abstract, and harder to grasp, likely leading to anxiety around what they may bring.

Concerning the variable related with the level of interest for cosmetic products, the effect on the intention to use this product in store was also statistically insignificant. This result is considerably unexpected, since this product is specifically useful for cosmetic products consumers. On one hand, there is a probability that in a bigger sample this result could have been different. On the other hand, since the use of this product in store is presumably cost-free for the consumers, the interest in cosmetics might be irrelevant for the intention to try it. However, this variable should be considered by companies since it has a positive, even though insignificant, effect on the intention to use and the product itself is focused in cosmetics, existing an inherent relation. Furthermore, if brands test the effect of this variable on the intention to use it in store, having its consumers as population, the results will probably have significant changes.

Another important result of this research is that the type of product and the context of the purchase has a significant effect on the preferences between receiving automatic or human advice. Individuals prefer to have human contact when they are looking for a product to offer someone else and they believe that salespeople can help them more when they are looking for products that enhance their beauty. Machines are perceived as helpful to find a solution for a skin problem, probably because they accumulate more information, and to make online purchases at home, probably because they are not able to receive human advice at home. So, both the hypothesis that consumers perceive automatic advice technologies as useful and that consumer believe that these technologies can improve their online shopping experience were verified. It's also important to enhance that, in general, consumers demonstrated that having new technologies of advice can be a determinant factor to choose a store and they admitted that

these technologies can influence them to buy more. So, the importance and preference for human advice doesn't eliminate the need to introduce these technologies in store because consumers are attracted by new things and new experiences.

When it concerns to personality traits, it was verified that it has a significant effect on the intention to use "HiMirror" in store, the product used as an example of automatic advice technologies. It was observed that consumers with fashion-sense and who follow fashion trends are more willing to use this product. These results are in harmony Jordaan & Simpson research, which considers that "fashion-conscious females that are appealed to beauty are more innovative in their behavior" and, thus, are more innovative in their purchasing decisions. Naturally, consumers who consider themselves innovative and creative are also more willing to use "HiMirror" in stores. This result is also in accordance with previous studies that provide evidence in the positive relationship between consumer innovativeness and consumer new product adoption behavior.[1] On the other hand, rationality doesn't have a statistically significant effect on the intention to use this product in stores. Both groups considered to have the same level of rationality, meaning that this personality factor should not be considered by companies when analyzing their target. This result might be explained by the fact that individuals tend to consider themselves as rational. Daniel Kahneman, Amos Tversky, and other psychologists have demonstrated that humans are systematically, and deeply irrational in their reasoning and decision making, but in the moment of the decision they think they are being rational. In fact, nothing we think about or do fails to be influenced by a multitude of mental shortcuts that our brain has gathered through experience to allow us to get through the day. Introverted individuals should be analyzed because, even though both groups assumed to have the same level of introvertive, this variable was statistically significant, which means that in a bigger sample there might exist different levels of this variable between groups.

Overall, it is clear that consumers still prefer to receive the help from a person and to experiment the products on their skin, even though they can percept the utility of new technologies and they are receptive to use them. Automatic systems still have a long path to do until satisfying the consumers in general. However, the credibility of the system didn't influence the intention to use it in store. It's possible that respondents considered it a satisfying service to have in stores, but only as a complement, since human advice is perceived as more personalized. These results are in accordance with Andrew McAfee that argues that, in most

---

[1] Midgley & Dowling, 1978; Foxall & Goldsmith, 1988; Im et al., 2003; Bartels & Reinders, 2011

cases, intelligence machines will complement human workers, making them more productive in the process.[2]

---

[2] Andrew McAfee, The Second Machine Age

Conclusions and managerial implications

This research aimed to identify the receptiveness of automatic advice for cosmetic products in the Portuguese market. Based on a quantitative and qualitative analysis of the many factors that influence the purchasing behavior, it can be concluded that the perception of utility is an important factor to consider when companies are passing through a digital transformation stage. The results demonstrate that the perception of utility is the only variable with a statistically significant effect on the intention to use "HiMirror", the technology used as benchmark, in stores. Consequently, companies should dedicate special attention to how their target group perceives the utility of the technologies they pretend to implement. Moreover, it can be concluded that consumers are not willing to pay to have this technology at home. Thus, the context in which technologies will be implemented should be evaluated when testing acceptance, receptiveness and desirability because it varies significantly between paying to own the product for self-use only and using it for free at a store. It's expected that the lack of willingness to pay to have this product at home might result from the fact that the utility of this product is not sufficient to convince consumers to pay for this product.

Furthermore, practitioners should consider that, at the time of this article, consumers were not ready to substitute salespeople by automatic advice, even though they recognized the utility of these technologies. These results indicate that consumers accept and perceive automatic advice technologies as useful, when they are designed to be a complement of human-labor. This conclusion results from the fact that consumers demonstrated intention to use this technology in store, but they clearly established that they prefer to be assisted by a human salesperson rather than a machine. Also, it was observed that consumers are not aware of the existence of AI technologies related with cosmetics. Thus, the digital transformation should be done gradually, guaranteeing that the consumer buying experience is not negatively affected. In opposition to the Technology Acceptance Model, a framework that has been intensively used by researchers in order to evaluate the acceptance of new technologies, the perception of easiness of use didn't demonstrate to have a statistically significant effect on the intention to use "HiMirror" in stores. As it was previously discussed, it might result from the fact that a small sample was used or that consumers are becoming more adapted to new technologies and less concerned with its easiness to use. Therefore, this variable shouldn't be a determinant factor for companies' decisions.

Other variables were considered in order to understand which factors influence the intention to use this technology, such as understanding of makeup, understanding of skincare, understanding of cosmetics, interest in cosmetics, perception of utility of AI, perception of "HiMirror" credibility and preference between robots and humans. However, these variables established to have a statistically insignificant effect on the intention to use "HiMirror" when tested together. The interest in cosmetics exhibited a statistically significant effect on the dependent variable of this study when tested separately from the other variables. Thus, the interest in the product should be considered by companies that pretend to deliver automatized advice technologies to their customers.

Previous literature indicates that fashion-sense and individuals' innovativeness influence the willingness to use new technologies. Thus, considering the intention to use "HiMirror" in store as dependent variable, the effect of these two variables, together with rationality, creativity, artistic capabilities and level of introvertive were tested. Based on a cluster analyses, the individuals with more fashion-sense and innovativeness demonstrated to have greater intention to use "HiMirror", confirming the theory from previous literature. Creativity and artistic capabilities also established to have a positive and statistically significant relation with the intention to use. The level of rationality and of introversion was the same for both clusters. However, rationality had statistically insignificant effect on the intention to use and introversion was significant. Consequently, when analyzing automate advice technologies, the level of rationality of the target consumers should be ignored and all the other variables should be considered. The level of innovativeness and fashion-sense should be contemplated when evaluating other industries as well, since it's expected that individuals with these characteristics are more receptive to new products in general, and these results are in accordance with previous studies regarding other products.

Concerning these technologies in general, companies should consider that introducing these technologies in store can add competitive advantage to their business, since consumers perceived them as useful and they are attracted by new things and new experiences. Also, respondents agreed that the use of advice technologies at home is extremely helpful, even though it's not equally satisfying to human advice, and it can be a determinant factor to the increase of online purchasing. The fact that they feel a big difference between automatic and human advice means that companies should try to create solutions that offer a more similar experience between buying in store and online. Moreover, companies should start to invest in the areas, products and contexts where consumers prefer to be advised by a machine, such as when they are looking for a product that solves a specific skin problem, when they are not

looking for a specific product and when they are doing online shopping. Lastly, for the situations where consumers prefer human rather than automatic advice, software and technology improvements should be done in order to improve the quality of the experience.

Generally, consumers are receptive to these technologies and they can visualize its added value. However, they see it as a complement to human advice rather than a substitute.

Limitations

The most relevant limitation of this study is that a small sample was considered to analyze the results of the survey. A bigger sample could have changed the statistically significance of some variables and it could allow to find more clusters. Besides the sample size, there are other relevant limitations.

Firstly, the explanation and the visualization of the video didn't deliver a profound explanation of the product. Also, the respondents didn't have access to the physical product neither the possibility to try it in real life, which could have completely modified their perceptions. Secondly, respondents were not aware of the price they would have to pay to have the product "HiMirror" at home, which obliged them to make assumptions. Thus, the responses are dependent of that assumptions and they could change if a number was given. This decision was a result of the intention to study only the receptiveness, rather than the business opportunity to sell this for private consumers. The study was more focused in the introduction of this technology in stores. Thirdly, only one product was tested and the conclusions regarding the receptiveness to automated advice would be more accurate if other product categories would have been considered. This decision was intended to simplify the survey and decrease the time required to answer it. Fourthly, it's predicted that respondents didn't understand the difference between multi-brand and department stores because department stores are also multi-brand, which can explain the high difference between both. Also, the "department stores" concept is not a common denomination used in Portugal, even though this type of stores are common here.

It's also predicted that respondents didn't understand the difference between influencers and youtubers or that they perceive both as one thing only. Lastly, the second most relevant limitation in this study is the fact that respondents probably had difficulties in making an accurate evaluation of themselves regarding psychological characteristics. The levels of self-awareness vary depending on the person and there is also a natural tendency to deny some self-characteristics.

Further Research

To better understand the implications of these results, future studies could address the increase in revenue resulted from the implementation of these technologies in store, since this would quantify the impact on cosmetic companies that implement this technology. Besides the impact on revenue, this study would provide information about the effect of using these technologies in the willingness to buy cosmetics. Moreover, it's suggested a future analysis regarding the receptiveness of different technological products from this category and compare them using the same methodology applied in this study. A study that would considered more products with the aim to provide automatized advice would be more accurate and appreciated by companies.

It would be also valuable for companies to have access to research that gives insights about how to increase the product perception of utility. This study could be done by testing possible features to add and/or change in "HiMirror". Another suggestion for future researchers would be to test the willingness to pay in absolute value and in percentage of the price paid for the products bought using this advice service by consumers. It's also recommended a study with the aim to quantify and explain the difference between the willingness to buy these products at home and to use it in stores.

List of figures

List of tables

Reference List

Maris, S., Slavici, T., Nenu, P., Baciu, L. (2017). Artificial Intelligence as a Decision-making Tool in Planning the Research. *BRAIN: Broad Research in Artificial Intelligence and Neuroscience,* 8(3)

Melnik, M. and Alm, J. (2003). Does a Seller's eCommerce Reputation Matter? Evidence from eBay Auctions. *The Journal of Industrial Economics*, 50(3), pp.337-349.

Oh, J. (2017). A conceptual framework for successful salesperson role change management. *Journal of Business & Industrial Marketing*, 32(8), pp.1136-1143.

Kietzmann, J., Paschen, J. and Treen, E. (2018). Artificial Intelligence in Advertising. *Journal of Advertising Research*, 58(3), pp.263-267.

Pomerol, J. (1997). Artificial intelligence and human decision making. *European Journal of Operational Research*, 99(1), pp.3-25.

Mehendale, A., Sherin HR, Nadheera, 2018. APPLICATION OF ARTIFICIAL INTELLIGENCE (AI) FOR EFFECTIVE AND ADAPTIVE SALES FORECASTING. The Journal - Contemporary Management Research, [Online]. 12, 17-35.

Bingqing, Y. and Susie, P. (2012). BEAUTY IN THE AGE OF MARKETING. *REVIEW OF BUSINESS & FINANCE CASE STUDIES*, 3(1).

Waddell, T. (2019). Can an Algorithm Reduce the Perceived Bias of News? Testing the Effect of Machine Attribution on News Readers' Evaluations of Bias, Anthropomorphism, and Credibility. *Journalism & Mass Communication Quarterly*, 96(1), pp.82-100.

Theotokis, A., Pramatari, K. and Doukidis, G. (2009). Consumer Acceptance of Technology Contact. *SSRN Electronic Journal*.

Metzger, M. and Flanagin, A. (2013). Credibility and trust of information in online environments: The use of cognitive heuristics. *Journal of Pragmatics*, 59, pp.210-220.

Wirth, N. (2018). Hello marketing, what can artificial intelligence help you with?. *International Journal of Market Research*, 60(5), pp.435-438.

Wu, P. and Lee, C. (2015). Impulse buying behaviour in cosmetics marketing activities. *Total Quality Management & Business Excellence*, 27(9-10), pp.1091-1111.

Malhotra, N. (1982). Information Load and Consumer Decision Making. *Journal of Consumer Research*, 8(4), p.419.

FĂDOR, A. (2014). Innovation and technology acceptance model (TAM): A theoretical approach.

Dawson, J. and Sparks, L. (1986). New technology in UK retailing: Issues and responses. *Journal of Marketing Management*, 2(1), pp.7-29.

Kamran Siddiqui (2012). Personality influences on customer satisfaction. *African Journal of Business Management*, 6(11).

Montgomery, A. and Smith, M. (2008). Prospects for Personalization on the Internet. *SSRN Electronic Journal*.

Gerlach, G., Rödiger, K., Stock, R. and Zacharias, N. (2016). Salespersons' empathy as a missing link in the customer orientation–loyalty chain: an investigation of drivers and age differences as a contingency. *Journal of Personal Selling & Sales Management*, 36(3), pp.221-239.

Helbing, D. (2015). Societal, Economic, Ethical and Legal Challenges of the Digital Revolution: From Big Data to Deep Learning, Artificial Intelligence, and Manipulative Technologies. *SSRN Electronic Journal*.

Koul, S. and Eydgahi, A. (2018). Utilizing Technology Acceptance Model (TAM) for driverless car technology Adoption. *Journal of technology management & innovation*, 13(4), pp.37-46.

Ashraf, A., Thongpapanl, N. and Auh, S. (2014). The Application of the Technology Acceptance Model under Different Cultural Contexts: The Case of Online Shopping Adoption. *Journal of International Marketing*, 22(3), pp.68-93.

Bo Kyung, S. (2012). THE IMPACT OF CONSUMER INNOVATIVENESS, ATTITUDE, AND SUBJECTIVE NORM ON COSMETIC BUYING BEHAVIOR: EVIDENCE FROM APU FEMALE STUDENTS.

Reinartz, W., Wiegand, N. and Imschloss, M. (2018). The Impact of Digital Transformation on the Retailing Value Chain. *SSRN Electronic Journal*.

Secară, O. and Sasu, D. (2013). THE IMPACT OF GLOBALIZATION IN THE INDUSTRY OF COSMETICS.

Arndt, A., Evans, K., Landry, T., Mady, S. and Pongpatipat, C. (2014). The impact of salesperson credibility-building statements on later stages of the sales encounter. *Journal of Personal Selling & Sales Management*, 34(1), pp.19-32.

Salim Khraim, H. (2011). The Influence of Brand Loyalty on Cosmetics Buying Behavior of UAE Female Consumers. *International Journal of Marketing Studies*, 3(2).

Sharma, A. (1990). The persuasive effect of salesperson credibility: conceptual and empirical examination. *Journal of Personal Selling & Sales Management*, X.

Liu, H. (2018). The power structure of artificial intelligence. Law Innovation and Technology, 10(2), pp.197-229.

Belonax, J., Newell, S. and Plank, R. (2007). The Role of Purchase Importance on Buyer Perceptions of the Trust and Expertise Components of Supplier and Salesperson Credibility in Business-To-Business Relationships. *Journal of Personal Selling & Sales Management*, 27(3), pp.247-258.

Kennedy, R., Waggoner, P. and Ward, M. (2018). Trust in Public Policy Algorithms. *SSRN Electronic Journal*.

Wong, H. (2007). Using Robustness Analysis to structure online marketing and communication problems. *Journal of the Operational Research Society*, 58(5), pp.633-644.

Kolodner, J. (1991). Improving Human Decision Making through Case-Based Decision Aiding1. *AI Magazine Volume*, 12(2).

Prasad, A., R, K. and Gudimetla, S. (2019). A Study of Digital Shopping Behaviour of Women with Respect to Beauty and Personal Care Products. *SSRN Electronic Journal*.

Asad Shahjehan (2012). The effect of personality on impulsive and compulsive buying behaviors. *AFRICAN JOURNAL OF BUSINESS MANAGEMENT*, 6(6).

Arndt, A., Evans, K., Landry, T., Mady, S. and Pongpatipat, C. (2014). The impact of salesperson credibility-building statements on later stages of the sales encounter. *Journal of Personal Selling & Sales Management*, 34(1), pp.19-32.

Waddell, T. (2019). Can an Algorithm Reduce the Perceived Bias of News? Testing the Effect of Machine Attribution on News Readers' Evaluations of Bias, Anthropomorphism, and Credibility. *Journalism & Mass Communication Quarterly*, 96(1), pp.82-100.

Metzger, M. and Flanagin, A. (2013). Credibility and trust of information in online environments: The use of cognitive heuristics. *Journal of Pragmatics*, 59, pp.210-220.

Nikdavoodi, J. (2013). THE IMPACT OF ATTITUDE, SUBJECTIVE NORM, AND CONSUMER INNOVATIVENESS, ON COSMETIC BUYING BEHAVIOR – Evidence from Women in Sweden.

Mehendale, A. and Sherin, N. (2018). APPLICATION OF ARTIFICIAL INTELLIGENCE (AI) FOR EFFECTIVE AND ADAPTIVE SALES FORECASTING. *The Journal - Contemporary Management Research*, 12(2), pp.17-35.

R. Bettman, J., J. Johnson, E. and W. Payne, J. (1991). Consumer Decision Making.

MarketLine (2019) *Make-Up in Europe*. Available from: https://store.marketline.com/report/ohme6989-ml--make-up-in-europe/#save-report

MarketLine (2018) *Skincare in Europe*. Available from: https://store.marketline.com/report/ohmf1572--skincare-in-europe/

Appendices

Interview to beauty professionals' script

Past

1. In your perspective, how does a beauty advisor influence the purchase?

2. What is the level of knowledge about cosmetics demonstrated by the clients?

3. What do customers value the most from beauty experts?

4. What is the level of trust in the beauty expert by the clients?

Present

5. What references do customers mention?

6. Do you feel that youtubers and online information have come to harm or benefit your role in the purchasing decision process?

7. In your perspective, what drives consumers to shop in-store rather than online?

8. What is the client profile that values human counseling? Can you describe?

Future

9. What are the main challenges of the cosmetics industry in the next 5 years?

10. Which are the advantages and disadvantages of automatic systems?

11. How do you think that automatic systems can help you performing your job as a beauty advisor?

12. Do you think new technologies can offer the same experience at home as in-store?

Interview to cosmetic clients' script

1. How do you think a beauty advisor influences your purchase?

2. What do you value the most about cosmetic salespeople?

3. How much do you trust on cosmetic salespeople?

4. What are your references / sources of information regarding cosmetics?

5. Given youtubers / influencer and specialist salespeople, which one do you think most influences your decision?

6. What drives you to buy in a physical store instead of buying online?

8. Advantages and disadvantages of being advised by automatic systems?

9. How do you think automatic systems can affect the specialized salespeople role?

10. Do you think new technologies can provide the same experience at home as in-store buying?

11. Do you know the YouCam Makeup app?

17. Do you know HiMirror technology?

Brief presentation about these technologies.

20. Would you be more willing to use this technology in store or at home?

Table 14 - Most used words by beauty advisors during interviews

Word	Length	Count	Weighted Percentage	Similar Words
clients	7	25	3,56%	client, clients
product	7	25	3,56%	product, products
try	3	20	2,84%	try, trying
people	6	13	1,85%	people
want	4	13	1,85%	want, wants
lot	3	11	1,56%	lot
online	6	11	1,56%	online
store	5	11	1,56%	store
buy	3	11	1,56%	buy, buying
also	4	10	1,42%	also
influence	9	10	1,42%	influence, influenced, influencer, influencers, influences
good	4	9	1,28%	good
know	4	9	1,28%	know
like	4	8	1,14%	like
always	6	7	1,00%	always
happens	7	7	1,00%	happen, happens
look	4	7	1,00%	look, looking
things	6	7	1,00%	thing, things
cosmetics	9	6	0,85%	cosmetic, cosmetics
digital	7	6	0,85%	digital

Table 15 - Most used words by clients during interviews

Word	Length	Count	Weighted Percentage	Similar Words
products	8	33	4,12%	product, products
store	5	28	3,50%	store, stores
influencing	11	17	2,12%	influence, influenced, influencer, influencers, influences, influencing
online	6	14	1,75%	online
think	5	14	1,75%	think

skin	4	13	1,62%	skin
try	3	12	1,50%	try, trying
know	4	12	1,50%	know, knowing
sellers	7	11	1,37%	seller, sellers
always	6	10	1,25%	always
person	6	9	1,12%	person, personal, personalized
see	3	9	1,12%	see
information	11	9	1,12%	information, informative, informed
experience	10	9	1,12%	experience, experiences, experiment
opinion	7	8	1,00%	opinion, opinions
machine	7	8	1,00%	machine, machines
also	4	8	1,00%	also
lot	3	8	1,00%	lot
trust	5	7	0,87%	trust
buy	3	7	0,87%	buy, buying

Survey number one – AI in cosmetics

Default Question Block

Hello everyone!

My name is Teresa Poças and I am currently doing my master's degree in Management with specialization in Strategic Marketing at Católica Lisbon School of Business and Economics.

Your collaboration is extremely precious and indispensable for the

completion of this study.

For that, thank you for coming here!

Let's get started!

The skin care market consists of selling facial care products,

body care, hand care, depilatories and hair removal products.

The makeup market is made up of eye make-up,

face make-up, lip make-up and nail make-up.

1. Are you a consumer of AT LEAST one of these products? From 1 to 5, how do you rate your interest in cosmetic products, being 1 = Little Interest and 5 = Much Interest?

1   2   3   4   5

2. Where do you usually buy cosmetic products?

Youtube

Instagram

Facebook

Websites

Magazines

Dermatologist

Cosmetic stores

Others

3. How often do you buy cosmetic products?

At least once a week

At least once a month

At least every three months

At least once a year

Less than once a year

4. What is your level of agreement with the following statement: "Understand the composition, characteristics and function of make-up products is simple."?

1- Totally disagree

2- Disagree

3- Neither agree or disagree

4- Agree

5- Totally agree

5. What is your level of agreement with the following statement: "Understanding the composition, characteristics and function of skin care products is simple."?

1- Totally disagree

2- Disagree

3- Neither agree or disagree

4- Agree

5- Totally agree

6. Where do you look for information about cosmetics?

Youtube

Instagram

Facebook

Websites

Magazines

Dermatologist

Cosmetic stores

Others

7. Which sources do you find most credible regarding cosmetics?

Youtubers

Influencers

Magazines

Dermatologist

Cosmetics Specialists

Celebrities

Family / Friends / acquaintances

8. From 1-5, indicate your level of confidence in the source you found most credible in the previous question, where 1 = Little Credible and 5 = Very Credible.

1   2   3   4   5

9. Do you know any cosmetic products/services that use Artificial Intelligence?
   Yes
   No

10. At what level do you agree with the statement "Artificial Intelligence can make my life simpler"?

1- Totally disagree

2- Disagree

3- Neither agree or disagree

4- Agree

5- Totally agree

"HiMirror", originally released in 2016 by the New Kinpo Group, offers a voice-controlled Amazon Alexa smart mirror, which provides Beauty advices for its users. HiMirror integrates Artificial Intelligence to provide a daily analysis of the skin and personalized recommendations, as well as augmented reality to allow users to virtually try on makeup.

11. Indicate your level of agreement with the following statement: "I consider this technology useful. "

1- Totally disagree
2- Disagree
3- Neither agree or disagree
4- Agree
5- Totally agree

12. Indicate your level of agreement with the following statement: "I consider this technology easy-to-use. "

1- Totally disagree
2- Disagree
3- Neither agree or disagree
4- Agree
5- Totally agree

13. Would you use this technology in store?

1- Totally disagree
2- Disagree
3- Neither agree or disagree
4- Agree
5- Totally agree

14. Would you be willing to pay to use this service at home?
1. Sure not
2. Unlikely
3. Probably
4. Very likely
5. Sure

15. If brands offered this service in-store, would you use it?

6. Sure not
7. Unlikely
8. Probably
9. Very likely
10. Sure

16. Indicate your level of agreement with the following statement: "I prefer to be advised by automatic systems than by a human being. "

1- Totally disagree
2- Disagree
3- Neither agree or disagree
4- Agree
5- Totally agree

17. Indicate your level of agreement with the following statement: "I prefer to receive product recommendations through "Hi Mirror" than through a specialized salesperson. "

1- Totally disagree
2- Disagree
3- Neither agree or disagree
4- Agree
5- Totally agree

18. Indicate your level of agreement with the following statement: "I consider the Hi Mirror system credible."

1- Totally disagree
2- Disagree
3- Neither agree or disagree
4- Agree
5- Totally agree

19. From 1 to 5, rate how much you agree with the following statements:

I believe I have a good sense of fashion.

I follow fashion trends.

I like to try new things.

I consider having artistic abilities.

I consider myself a creative person.

I consider myself an innovative person.

I am a rational person.

I am an introvert.

20. Indicate your gender.

Female

Male

21. Indicate your country of residence.
22. Indicate your age.

    Less than 18

    18 - 24

    25 - 34

    35 - 44

    45 - 54

    55 - 64

    65 - 74

    75 - 84

    85 or more

23. Indicate your marital status.

Married

Single

Divorced

Widowed

Separated

24. Indicate your maximum level of education.

PhD

Master's degree

Postgraduate studies

Graduation

High school

Basic education

25. Indicate the annual income level of your household.

Less than 10,000 €

€ 10,000 to € 19,999

€ 20,000 to € 34,999

€ 35,000 to € 49,999

€ 50,000 to € 74,999

€ 75,000 to € 99,999

$ 100,000 or $ 149.99

€ 150,000 or more

Survey number 2 – automatic vs human advice

Hello everyone!

My name is Teresa Poças and I am currently doing my master's degree in Management with specialization in Strategic Marketing at Católica Lisbon School of Business and Economics.

Your collaboration is extremely precious and indispensable for the

completion of this study.

For that, thank you for coming here!

Let's get started!

The skin care market consists of selling facial care products,

body care, hand care, depilatories and hair removal products

make up.

The makeup market is made up of eye makeup, face make-up, lip make-up and nail make-up.

1. Are you familiar with systems that use Artificial Intelligence to provide automatic counseling?
   Yes
   No

2. Are you a user of any of these systems?

Yes

No

3. How often do you use automated counseling systems?

   At least once a week

   At least once a month

   At least once every three months

   At least once a year

   Less than once a year

4. Read the following information carefully:

   cosmetic

   (french cosmetic)

   adjective

It considers the ingredients with which it seeks to beautify, conserve or restore the beauty of the skin.

Over the last few years, the cosmetics industry has been developing technologies that allow us to offer a personalized counseling service without the help of an experienced professional through the use of Augmented Reality and Artificial Intelligence.

"HiMirror" technology and the YouCam app are two results of this development.

HiMirror integrates Artificial Intelligence to provide daily skin analysis and personalized recommendations, as well as augmented reality to allow users to virtually experiment with make-up.

"YouCam Makeup" is an application that lets users virtually test different real beauty products like make-up, hair coloring and fashion accessories.

5. From 1 to 5, how do you rate your interest in cosmetic products, 1 = Little Interest and 5 = Very Interesting?

   1   2   3   4   5

6. Classify your level of agreement with the following statement: "I prefer a store that offers these systems, over a store that does not offer them."

1- Totally disagree

2- Disagree

3- Neither agree or disagree

4- Agree

5- Totally agree

7. Classify your level of agreement with the following statement: "I would be more likely to buy if I could use these technologies"

1- Totally disagree

2- Disagree

3- Neither agree or disagree

4- Agree

5- Totally agree

8. Classify your level of agreement with the following statement: "I believe these technologies will have a good performance".

1- Totally disagree

2- Disagree

3- Neither agree or disagree

4- Agree

5- Totally agree

9. Share the reasons that influenced your answer to the previous question.

10. If these technologies suggest a set of products and explain the benefits of such treatment, what is your propensity to buy?

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

11. If you have a skin problem, how likely are you to ask for help from an automated counseling system?

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

12. If you are looking for a perfume to offer someone, how likely are you to seek help from an automated counseling system?

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

13. If you are looking for a specific product, how likely are you to ask for help from an automated counseling system?

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

14. If you are NOT looking for a specific product, how likely are you to ask for help from an automated counseling system?

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

15. Do you think new technologies can help you find products that enhance your body and face?

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

16. Classify your level of agreement with the following statement: "If I have the possibility to get automated counseling at home, I will be more willing to buy cosmetic products online."

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

Beauty experts are cosmetics salespeople who offer personalized customer advice in a physical store environment.

17. If a specialist salesperson suggests a set of products and explains the benefits of this treatment, what is your propensity to buy?

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

18. If you have a skin problem, how likely are you to ask a cosmetics salesperson for help?

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

19. If you are looking for a perfume to offer someone, how likely are you to ask a cosmetics salesperson for help?

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

20. If you are looking for a specific product, how likely are you to ask a cosmetics salesperson for help?

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

21. If you are NOT looking for a specific product, how likely are you to ask a cosmetics salesperson for help?

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

22. Do you think specialist retailers can help you find products that enhance your body and face?
1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

23. Classify your level of agreement with the following statement: "If I would have the possibility to get human advice at home via chat or video call, I would be more willing to buy cosmetic products online."

1- Very unlikely

2- Unlikely

3- Indifferent

4- Likely

5- Very likely

24. Do you know the app YouCam Makeup?

Yes

No

25. Have you ever tried it?

Yes

No

26. Would you like to try the app on store screens?

1- Totally disagree

2- Disagree

3- Neither agree or disagree

4- Agree

5- Totally agree

27. Classify your level of agreement with the statement: "I would be more willing to use this technology in-store than through my mobile phone."

1- Totally disagree

2- Disagree

3- Neither agree or disagree

4- Agree

5- Totally agree

28. Classify your level of agreement with the following statement: "This technology can influence me to buy more cosmetic products".

1- Totally disagree

2- Disagree

3- Neither agree or disagree

4- Agree

5- Totally agree

29. Classify your level of agreement with the following statement: "This technology has a good performance".

1- Totally disagree

2- Disagree

3- Neither agree or disagree

4- Agree

5- Totally agree

30. From 1 to 5, rate how much do you agree with the following statements:

I believe I have a good sense of fashion.

I follow the fashion trends.

I like to try new things.

I consider having artistic abilities.

I consider myself a creative person.

I consider myself an innovative person.

I am a rational person.

I am an introvert.

31. Indicate your gender.

Female

Male

32. Indicate your country of residence.

33. Indicate your age.

Less than 18

18 - 24

25 - 34

35 - 44

45 - 54

55 - 64

65 - 74

75 - 84

85 or more

34. Indicate your marital status.

Married

Single

Divorced

Widowed

Separated

35. Indicate your maximum level of education.

PhD

Master's degree

Postgraduate studies

Graduation

High school

Basic education

SPSS output

Table 16 - Where do you usually buy cosmetics?

	Where do you usually buy cosmetics? Selected choice Department stores	Where do you usually buy cosmetics? Selected choice Multibrand Stores	Where do you usually buy cosmetics? Selected choice Pharmacies	Where do you usually buy cosmetics? Selected choice Own Brand stores	Where do you usually buy cosmetics? Selected choice Online Stores	Where do you usually buy cosmetics? Selected choice Others
Valid	**25**	**82**	**48**	**43**	**24**	**7**
Missing	108	51	85	90	109	126
Mean	1.00	1.00	1.00	1.00	1.00	1.00

Table 17 - Understanding of makeup

Statistics

What is your level of agreement with the following affirmation: "Understanding the composition, characteristics and functions of makeup products is simple."?

N Valid	133
N Missing	0
Mean	3.0075
Std. Deviation	0.96528

Minimum	1.00
Maximum	5.00

Table 18 - Understanding of skincare

Statistics

What is your level of agreement with the following affirmation: "Understanding the composition, characteristics and functions of skincare products is simple."?

N Valid	133
N Missing	0
Mean	2.8947
Std. Deviation	0.93956
Minimum	1.00
Maximum	5.00

Table 19 - Understanding of cosmetics

Statistics

"understandingofcosmetics"

N Valid	133
N Missing	0
Mean	2.9511
Std. Deviation	.84581
Sum	392.50

Table 20 - Most credible sources of information regarding cosmetics

Descriptive Statistics

	N	Minimum	Maximum	Sum	Std. Deviation
What sources do you consider more credible regarding cosmetics? - Dermatologists	133	1	7	232	1.449
What sources do you consider more credible	133	1	7	370	1.489

regarding cosmetics? – Salespeople specialized in cosmetics					
What sources do you consider more credible regarding cosmetics? – Family, friends, known people	133	1	7	525	1.798
What sources do you consider more credible regarding cosmetics? - Youtubers	133	1	7	559	1.783
What sources do you consider more credible regarding cosmetics? - Influencers	133	1	7	615	1.495
What sources do you consider more credible regarding cosmetics? - Magazines	133	2	7	622	1.593
What sources do you consider more credible regarding cosmetics? - Celebrities	133	3	7	801	1.033
Valid N (listwise)	133				

Table 21 - Level of trust in the most credible source

Statistics

From 1 to 5, define your level of trust in the source you have considered more credible in the previous question, being 1 = little credible and 5 = very credible. - Trust

N Valid	133
N Missing	0
Mean	4.3609
Std. Deviation	.78178
Sum	580.00

Table 22 - Perception of utility of AI

Statistics

What is your level of agreement with the following affirmation: "Artificial Intelligence can make my life easier."?

N Valid	133
N Missing	0
Mean	3.4962
Std. Deviation	.88441

Table 23 - Perception of utility of "HiMirror"

Statistics

What is your level of agreement with the following affirmation: "I consider this technology useful."?

N Valid	133
N Missing	0
Mean	3.7218
Std. Deviation	0.89910
Minimum	1.00
Maximum	5.00

Table 24 - Perception of ease of use

Statistics

What is your level of agreement with the following affirmation: "I consider this technology easy to use."?

N Valid	133
N Missing	0
Mean	3.5639
Std. Deviation	0.75230
Minimum	2.00
Maximum	5.00

Table 25 - Perception of "HiMirror" credibility

Statistics

Classify your level of agreement with the following affirmation: "I consider the system "HiMirror" credible". – "HiMirror" credibility

N Valid	133
N Missing	0
Mean	3.2481
Std. Deviation	.77270
Sum	432.00

Table 26 - Intention to use in store - mean

Statistics

Variable: intentionuse_store

N Valid	133
N Missing	0
Mean	3.5489
Std. Deviation	.97675

Independent Variables: Perception of utility and perception of ease of use

Dependent Variable: intention to use in store

Assumptions Confirmation

Table 27 - Histogram; perception of utility and perception of ease of use
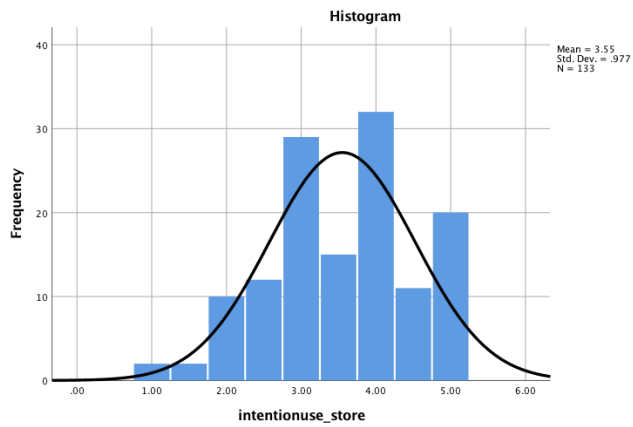
ASSUMPTIONS: Dependent: Intention to use in store

Independent: ability/easiness to understand makeup, robotvshuman, perception of utility, perception of easeness of use, interest in cosmetics in general

Table 28 - Histogram; assumption confirmation
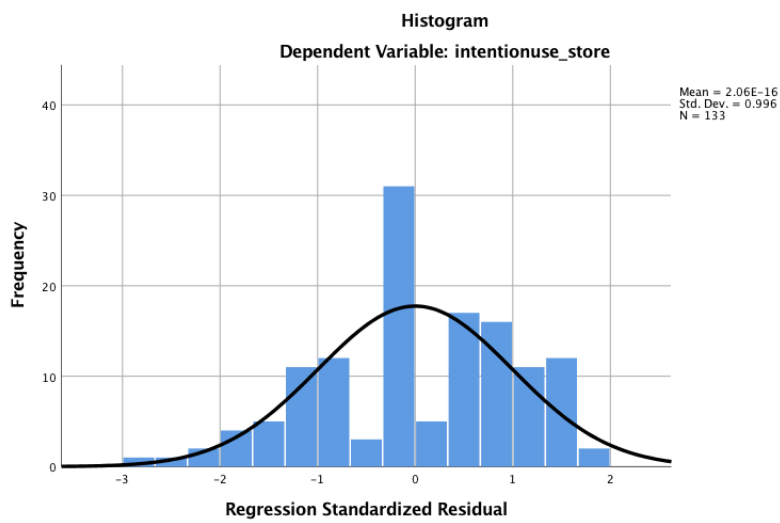
Table 29 - Number P-Plot assumption confirmation

Normal P–P Plot of Regression Standardized Residual

Dependent Variable: intentionuse_store
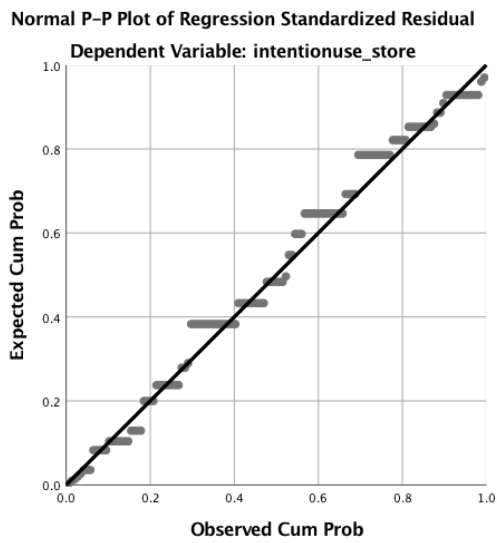
Table 30 - Scatterplot; assumption confirmation

Scatterplot

Dependent Variable: intentionuse_store

Table 31 - Linear regression; dependent variable: intention to use in store; independent: robotvshuman, understandingofcosmetics and perception of easiness of use

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of Estimates	Durbin-Watson
1	.352	.124	.117	.91770	2.014

a. Predictors: (Constant), Classify your level of agreement with the following affirmation: "I consider this technology useful." – Utility

b. Dependent Variable: intentionuse_store

Table 32 - ANOVA; dependent variable: intention to use in store; independent: robotvshuman, understandingofcosmetics and perception of easiness of use

ANOVA

Model Squares		Sum of	df	Mean Square	F	Sig
1	Regression	15.606	1	15.606	18.531	.000
	Residual	110.326	131	.842		
	Total	125.932	132			

    a.   Dependent Variable: intentionuse_store

    b.   Predictors: (Constant), Classify your level of agreement with the following affirmation: "I consider this technology useful." – Utility
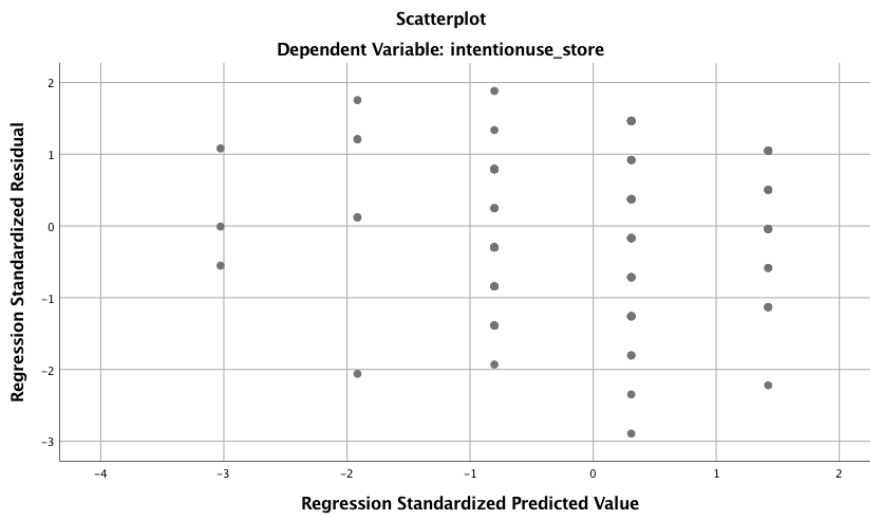
Table 33 - Coefficients; dependent variable: intention to use in store; independent: robotvshuman, understandingofcosmetics and perception of easiness of use

Coefficients

		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig	Tolerance	VIF
1	(Constant)	2.126	.340		6.250	.000		
	a. Classify your level of agreement with the following affirmation: "I consider this technology useful." – Utility	.382	.089	.352	4.305	.000	1.000	1.000

    a.   Dependent Variable: intentionuse_store

Table 34 - Excluded Variables; dependent variable: intention to use in store; independent: robotvshuman, understandingofcosmetics and perception of easiness of use

Excluded Variables

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
1	robotvshuman	$.150^b$	1.745	.083	.151	.888	1.126	.888
	Understandingofcosmetics	$.112^b$	1.349	.180	.117	.969	1.032	.969
	Classify your level of agrément with the following affirmation: "I consider this technology easy to use." – easiness to use	$-.003^b$	-.030	.976	-.003	.736	1.358	.736
	In which level do you agree with the following affirmation: "Artificial Intelligence can make my life easier"?	$.108^b$	1.202	.231	.105	.829	1.206	.829
	From 1 to 5, how do you classify your interest for cosmetic products, being 1=Little Interest and 5=A lof of interest"? - Interest	$.156^b$	1.888	.061	.163	.966	1.035	.966

a. Dependent Variable: intentionuse_store

b. Predictors: (Constant), Classify your level of agreement with the following affirmation: "I consider this technology useful." – Utility

Table 35 - Intention to use in store vs understanding of cosmetics – linear regression model

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of Estimates	Durbin-Watson
1	.170	.029	.022	.96615	1.988

a. Predictors: (Constant), understandingofcosmetics

b. Dependent Variable: intentionuse_store

Table 36 - ANOVA: Intention to use in store vs understanding of cosmetics

ANOVA

Model Squares		Sum of	df	Mean Square	F	Sig
1	Regression	3.651	1	3.651	3.911	0.50
	Residual	122.281	131	.933		
	Total	125.932	132			

a. Dependent Variable: intentionuse_store

b. Predictors: (Constant), understandingofcosmetics

Table 37 - Coefficients; Intention to use in store vs understanding of cosmetics

Coefficients

		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig	Tolerance	VIF
1	(Constant)	2.969	.305		9.729	.000		
	Understandingofcosmetics	.197	.099	.170	1.978	.050	1.000	1.000

a. Dependent Variable: intentionuse_store

Table 38 - Preference for stores with technologic systems

Statistics

Classify your level of agreement with the following affirmation: "I prefer a store that offers these systems rather than a store that doesn't offer it." - Preference

N Valid	133
N Missing	30
Mean	3.4887
Std. Error of Mean	.08446
Std. Deviation	.97403
Sum	464.00

Table 39 - Propensity to buy due to new technologies

Statistics

Classify your level of agreement with the following affirmation: "I would be more willing to buy due to these technologies" - Propensity

N Valid	133
N Missing	30
Mean	3.2180
Std. Error of Mean	.09744
Std. Deviation	1.12370
Sum	428.00

Table 40 - Expectations regarding performance

Statistics

Classify your level of agreement with the following affirmation: "I believe these technologies will have a good performance." – Performance

N Valid	133
N Missing	30
Mean	3.8797
Std. Error of Mean	.07474
Std. Deviation	.86197
Sum	516.00

Table 41 - Comparation of means regarding intention to use in store between genders

Report

intentionuse_store

Define your gender.	Mean	N	Std. Deviation
Feminine	3.5984	122	.93517
Masculine	3.0000	11	1.28452
Total	3.5489	133	.97675

Table 42 - "HiMirror" credibility

Statistics

Classify your level of agreement with the following affirmation: "I consider the system "HiMirror" credible". – "HiMirror" credibility

N Valid	133
N Missing	0
Mean	3.2481
Std. Deviation	.77270
Sum	432.00

Table 45 - Paired Sample T-Test: Human vs automatic advice

Paired Sample Test

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	If these technologies suggest you a set of products and explain you the benefits of that treatment, what would be your propensity to buy it? - Propensity - If a specialized salesperson suggests you a set of products and explains you the benefits of that treatment, what would be your propensity to buy it? - Preference	-.25954	.82823	.07236	-.40270	-.11638	-3.587	130	.000
Pair 2	If you have a skin problem, how likely are you to ask for help to an automatic counseling system? - Skin - Case If you have a skin problem, how likely are you to ask for help to a cosmetics salesperson? - skin	-1.08397	1.49891	.13096	-1.34306	-.82488	-8.277	130	.000
Pair 3	If you are looking for a perfume to offer someone else, how likely are you to ask for help to an automatic system? -	-.45802	1.53051	.13372	-.72257	-.19346	-3.425	130	.001

	Perfume - If you are looking for a perfume to offer someone else, how likely are you to ask for help to a cosmetics salesperson? - Perfume								
Pair 4	If you are looking for a specific product, how likely are you to ask for help to an automatic system? - Specific Product – If you are looking for a specific product, how likely are you to ask for help to cosmetics salesperson? - Specific Product	-.75573	1.31320	.11473	-.98271	-.52874	-6.587	130	.000
Pair 5	If you are NOT looking for a specific product, how likely are you to ask for help to an automatic system? - NO specific product - If you are NOT looking for a specific product, how likely are you to ask for help to a cosmetics salesperson? - Nonspecific	.20769	1.45045	.12721	-.04400	.45939	1.633	129	.105
Pair 6	Do you believe that new technologies can help you to find products that enhance your body and face? - Help – Do you believe	-.23846	1.07692	.09445	-.42534	-.05159	-2.525	129	.013

	that specialized salespeople can help you to find products that enhance your body and face? - Highlight								86
Pair 7	Rate your level of agreement with the following statement: "If I have the possibility to get automatic counseling at home, I will be more willing to buy cosmetic products online." - House - Rate your level of agreement with the following statement: "If I have the possibility of getting human advice at home via chat or video call, I will be more willing to buy cosmetic products online. - House	.36154	1.47855	.12968	.10497	.61811	2.788	129	.006