



*The effect of Augmented Reality on  
Consumers' Intention to Purchase Make-up  
Products in Online Retail Environments*

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## **Abstract**

The disruptive effect of technology on business models and consumers' behaviors has paved the way for revamping the retail industry. Conscious that brick-and-mortar channels are no longer sufficient to thrive in a hyper-connect and competitive marketplace, retailers are increasingly digitalizing their businesses by developing omnichannel strategies designed to target consumers throughout multiple decision-making journey touchpoints. For high-involvement product categories where meaningful sensorial product experiences are highly valued, the successful expansion to e-commerce platforms presents a challenge due to the channels' inability to provide sensorial experiences. The present dissertation aims to assess the effects of Augmented Reality (AR) technology as a strategy to simulate sensorial experiences in online retail environments contributing to deliver an enhanced service experience and to generate purchase intentions within the make-up industry. The research study conducted to assess the impact of AR on the industry's digitalization and its competitive advantage compared to the 2D product display strategy currently implemented by most retailers, illustrated a significant effect of AR on consumers' intentions to purchase make-up products in online retail channels. Thus, indicating the technology implementation's adequacy to surpass the online channels' sensorial (visual and touch) limitations. The significant effect of AR on service experience dimensions (hedonic and utilitarian value) and consumer psychological responses (decision comfort) demonstrates to be greater when compared to the one disrupted by the 2D strategy, leading the findings of this dissertation to be crucial to aid retailers in developing a competitive service experience approach.

**Title:** The effect of Augmented Reality on Consumers' Intention to Purchase Make-up Products in Online Retail Environments

**Author:** Mariana Malhó da Cruz

**Keywords:** AR, online retail environment, purchase intentions, mental intangibility, sense of control, decision comfort, hedonic and utilitarian value perceptions, sensory experience

## **Resumo**

O efeito disruptivo da tecnologia nos modelos de negócio e comportamento dos consumidores desencadeou a modernização da indústria retalhista. Cientes que a presença em canais tradicionais não é já suficiente para suceder num mercado altamente competitivo e conectado, as empresas retalhistas têm vindo a digitalizar a sua atividade desenvolvendo estratégias de *omnichannel* delineadas para impactar os consumidores durante todo o processo de decisão de compra. Para categorias de produtos de alto envolvimento, onde as experiências sensoriais são altamente valorizadas, a expansão para canais de venda *online* é comprometida pela incapacidade deste canal de as providenciar. A presente dissertação pretende assim analisar o efeito da Realidade Aumentada (RA) como estratégia para simular experiências sensoriais em canais digitais, contribuindo para melhorar a experiência e aumentar a intenção de compra de produtos de maquilhagem. O estudo conduzido para avaliar o impacto da RA nesta indústria e determinar a sua vantagem competitiva sobre as estratégias 2D atualmente implementadas pela maioria dos retalhistas, ilustrou o efeito significativo da RA sobre a intenção dos consumidores de comprar produtos de maquilhagem em canais de venda *online*. Tal, demonstra assim a adequação da RA para superar as limitações sensoriais (visuais e de tato) presentes nestes canais de venda. O efeito significativo da RA sobre as dimensões de experiência de compra (valor hedónico e utilitário) e respostas psicológicas dos consumidores (sensação de conforto) demonstra ser maior do que o gerado pela estratégia 2D, reforçando a relevância dos resultados obtidos para desenvolvimento de estratégias competitivas de experiência de compra.

**Título:** O efeito da Realidade Aumentada na Intenção dos Consumidores de Comprar Produtos de Maquilhagem em Canais de Venda Online

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**Palavras-Chave:** RA, canais de venda *online*, intenção de compra, intangibilidade mental, sensação de controlo, conforto na decisão, perceções de valor hedónico e utilitário, experiências sensoriais

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## **LIST OF ABBREVIATIONS**

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AR – Augmented Reality

CG – Control Group

DC – Decision Comfort

EG – Experimental Group

ENG – English

GARC – Compound Annual Growth Rate

HV – Hedonic Value

M – Mean

MI – Mental Intangibility

OS – Online Stores

PI – Purchase Intentions

PT – Portuguese

SC – Sense of Control

SP – Specialized Retailers

SPSS – Statistical Package for Social Sciences

UV – Utilitarian Value

WOM – Word-of-mouth

WTP – Willingness-to-pay

# CHAPTER 1: INTRODUCTION

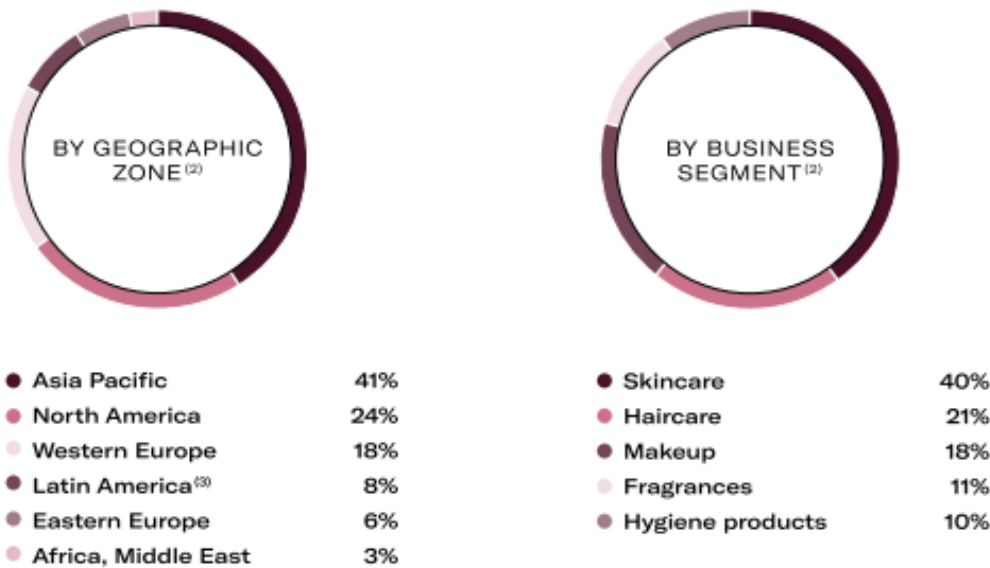
## 1.1 COSMETIC INDUSTRY CONTEXTUALIZATION

The global cosmetic industry is an evolving market sustained by a strong consumption growth potential, strengthened by recent years’ market trends such as globalization, the rise of middle- and upper-income classes, and the emergence of new target segments (e.g., seniors and men). The digital revolution and the implementation of omnichannel retail strategies have also contributed to sustaining the increase of the industry's market value (L’Oréal Paris, 2019).

Composed by six main product categories: skincare, haircare, make-up, perfumes, and hygiene products, the cosmetic industry registered in 2019 an annual growth rate of 5.25% with estimated market sales of €220 Bn (Statista, 2020). Skincare is the industry’s leading product category, having accounted for 40% of the market in 2019, immediately followed by the hair care and make-up categories, that represented 21% and 18% of the cosmetics market, respectively. As for the leading market, in 2019, Asia Pacific assumed this position accounting for 41% of the market (*Figure 1*) (L’Oréal Paris, 2019).

The commercialization of cosmetic and beauty products is commanded by several multinational companies like L’Oréal - the industry market leader with revenues of 31.8 billion US dollars in 2019 - Unilever, Estée Lauder, Procter & Gamble, Shiseido, and Coty (*Figure 2*) (Collins et al., 2020; L’Oréal Paris, 2019).

**Figure 1 - Breakdown of the global Cosmetic Market, by Geographic Zone and Product Category**  
**BREAKDOWN OF THE MARKET**



Source: L’Oréal Paris, 2019

**Figure 2 - Main global Cosmetic Market players in sales (in billions of US dollars) | 2019**

**MAIN WORLDWIDE PLAYERS IN SALES<sup>(1)</sup>**  
(in billions of USD)



Source: L'Oréal Paris, 2019

### **1.1.1 MAKE-UP PRODUCT CATEGORY**

The terminology of make-up encompasses cosmetic products whose usage is motivated by the desire to enhance one's facial and physical features, being so incorporated into this product category nail products, facial products, lip products and eye products (Grand View Research, 2019; Statista, 2020). The facial products sub-segment is the product category's leader, having registered a market share of more than 28% in 2018, a position supported by the increased demand generated from working-class women that look for this typology of products as a way to attenuate aging and stress effects. Additionally, market forecasts indicate that the lip product sub-segment is expected to register exponential growth over the next years, predicting a CAGR of 7% from 2019 to 2025 (Grand View Research, 2019).

Furthermore, it is estimated that in 2024 the make-up segment will be worth about 85 billion US dollars (Statista, 2020).

### **1.1.2 COSMETIC INDUSTRY AND E-COMMERCE**

For the past few decades, technology and digital innovation have disrupted the way businesses are conducted within the retailing industry. The market's globalization has led consumers' behavior to suffer a drastic change due to the access to prompt information "anytime, anywhere," contributing to an increased education and knowledge about different market offerings. Furthermore, the rise of technological innovations has reflected an intensification of market competition as new business ideas came to fruition.

These phenomena made it crucial for retailers to digitalize their businesses, betting on the development of omnichannel strategies to target consumers throughout all of the different touchpoints that integrate their decision-making process. Although the implementation of omnichannel strategies might be able to generate an immediate improvement in consumers'

shopping service experiences and revenue growth in some industries; for others, it presents a new challenge that needs to be carefully managed. As is the case of the cosmetics industry.

Conceptualized as a high involvement market (Huang et al., 2019), this “try before buy” industry demonstrates to struggle with its presence in the e-commerce channels, registering an e-commerce share on total industry sales of 30% in 2018 (The Nielsen Company, 2018). The retail channel primarily emphasis visual features (Heller et al., 2019b; Petit et al., 2019), showcasing an inability to provide meaningful sensory product experiences, a characteristic of brick-and-mortar stores (Heller et al., 2019b) that is highly valued by consumers (Heller et al., 2019b; Krishna, 2011).

In the contemporary online retail environment, companies strive to surpass the existing constraints imposed on sensory responses by adopting emerging technologies as a way to simulate multisensory experiences to enhance consumers' satisfaction (Heller et al., 2019b; Petit et al., 2019). Therefore, AR has been implemented as a strategic solution to overcome this problem since its characteristics allow for a simulation of said experiences in online retail environments (Heller et al., 2019b).

## **12 PROBLEM STATEMENT**

Drawing on the previously presented information and combining it with an assessment of the current constraints imposed to the physical in-store service experience within the cosmetic industry, as well, with a deliberation of possible pain points and behavior change that these restrictions might create amongst consumers, it is proposed that the research problem that will guide the development of the present dissertation is set to focus on **understanding how the cosmetic industry can leverage on Augmented Reality (AR) to generate purchase intentions in online retail environments**. The study conducted to assess the problem statement will focus on the make-up segment within the cosmetic industry.

Supporting this choice, is the fact that the make-up industry is a high involvement category being directly correlated to consumers' appearance and self-esteem, thus creating the need for product trial while evaluating different product offerings. An action that is yet not possible in online environments. The current strategies implemented by the industry's retailers to display the distinctive product offerings available in e-commerce platforms (e.g., 2D product catalogs) are insufficient to fulfill consumers desire for representability, as well as to enable consumers to visualize how the product might when in usage.

Strengthening the decision to focus on this segment is the fact that major beauty market players like L'Oréal, Charlotte Tilbury, Sephora, Lancôme, and MAC Cosmetics are already implementing AR as a way to enhance consumers' online service experience.

### **1.3 RESEARCH QUESTIONS**

To ensure that the problem statement proposed is answered, a set of research questions and respective objectives were developed:

**RQ1:** What is AR's impact on the generation of purchase intentions in an online retail environment?

**RQ1 Objective:** (i) Determine if AR is capable of influencing consumers' intention to purchase make-up products in an online retail online environment.

**RQ2:** To what extent does consumers' level of mental intangibility influence AR's ability to generate purchase intentions in an online retail environment?

**RQ2 Objective:** (i) Understand if AR's effect on consumers' intention to purchase make-up products in an online retail environment differs based on consumers' level of mental intangibility (high level versus low level).

**RQ3:** To what extent does consumers' perceived value of the service experience influence AR's ability to generate purchase intentions in an online retail environment?

**RQ3 Objective:** (i) Determine if AR enhances consumers' hedonic and utilitarian value perceptions of the service experience. (ii) Understand if consumers' utilitarian and hedonic value perceptions of the AR-enabled service experience enhances the intention to purchase make-up products in an online retail environment. (iii) Establish if consumers' hedonic and utilitarian value perceptions of the AR-enabled service experience enhance the sense of decision comfort regarding the purchase of make-up products in e-commerce platforms.

**RQ4:** To what extent does consumers' sense of control over a virtual product offering impact AR's capability to generate purchase intentions in an online retail environment?

**RQ4 Objective:** (i) Establish if consumers' sense of control over a virtual product offering increases with the presence of AR. (ii) Determine if the sense of control over a virtual product offering enabled by AR augments the intention to purchase make-up products in an online retail environment. (iii) Understand if consumers' sense of control over a virtual product

enabled by AR contributes to an increase in the sense of decision comfort regarding the purchase of make-up products in online retail environments.

**RQ5:** How does consumers' sense of decision comfort influence AR's ability to generate purchase intentions in an online retail environment?

**RQ5 Objectives:** (i) Determine if the sense of decision comfort driven from an AR-enabled service experience impacts the intention to purchase make-up products in an online retail environment. (ii) Establish if AR's effect on the intention to purchase make-up products in an online retail environment is augmented by the effect of (a) sense of control and (b) hedonic and (c) utilitarian value perceptions on consumers' sense of decision comfort.

## **14 ACADEMIC AND MANAGERIAL RELEVANCE**

The proposed research demonstrates to have academic and managerial relevancy in several distinctive points. First and foremost, due to the Covid-19 global pandemic, in-store sensory experiences are conditioned being so imperative that retailers turn to interactive technologies like AR as a strategic solution to maintain the industry's service delivery standards without compromising consumers safety, that now more than ever express concerns about in-store product trials and personal consultations (Gerstell et al., 2020). Secondly, in general, the already existing research surrounding AR is drawn on technology acceptance models (e.g., TAM) (Huang et al., 2019), overlooking the effect of consumers psychological responses and traits (e.g., ability to mentally visualize the trial of a product offering) (Hilken et al., 2017) on AR's ability to generate behavioral intentions.

Therefore, applying AR in the make-up industry to generate purchase intentions and, consequently, attain a competitive and differentiating advantage demonstrates an enormous strategic potential and managerial implications, needing further investigation.

## **15 DISSERTATION OUTLINE**

The present dissertation is integrated by six distinctive chapters, being the first one related to the introduction and contextualization of the research topic under-analysis and where this subtopic is inserted. The second chapter addresses the literature review of the relevant concepts and knowledge necessary to conceptualize this dissertation. The third presents the conceptual framework and hypotheses while the fourth describes the methodology implemented to conduct the research study.

The following chapter is the discussion chapter, thus presenting an analysis of the research results to answer the proposed research questions. Finally, the sixth chapter will assess the research conclusions, managerial and theoretical implications, and identify research limitations that should be further investigated in future research.

## **CHAPTER 2: LITERATURE REVIEW**

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### **2.1 AUGMENTED REALITY**

#### **2.1.1 DEFINITION**

Augmented Reality (AR) technology consists of an “interface that creates an altered reality that enables consumers to perceive the virtual consumption to be authentic” (Huang et al., 2019). By merging “the perception of a consumer’s physical environment with digitally enhanced interactive visual, auditory and tactile sensory information” (Heller et al., 2019b), AR can construct in the online environment “an actual experience that is tacit in the mind of the consumer” (Huang et al., 2019).

Moreover, AR can also be defined as a distinctive type of Virtual Reality (VR) technology that, through the usage of digitally enabled devices embeds sensory information, from sound to objects, on physical reality (Wedel et al., 2020). Through this, AR can provide consumers with relevant information augmenting its appearance and usability while evoking a sense of enjoyment that contributes to the development of a heightened interactive service experience.

The implementation of AR can not only be leveraged as a strategic tactic to attain a competitive and differentiating advantage in the area of service delivery (Huang et al., 2019) but also as a mechanism to tackle a set of limitations that are currently present in online retail environments since its characteristics permit to overcome potential product intangibility barriers (Heller et al., 2019b).

#### **2.1.2 CHARACTERISTICS**

AR is composed of characteristics that enable it to substantially impact consumer experience, outperforming the influence of traditional and digital media marketing strategies. Due to its affordance to generate and transform 3D visual experiences, AR creates an enhanced interactive service experience that surpasses the effectiveness of traditional product display solutions (Heller et al., 2019a).

AR’s highly interactive nature enables an embodied online service experience by providing consumers the ability to control a product (e.g., rotate, move) in a virtual environment through the usage of the equal physical movements that they would conduct to evaluate the product in a brick-and-mortar retail channel (Rosa & Malter, 2003; Hilken et al., 2017). Identified as simulated physical control, this AR characteristic transposes consumers’ sense of control and

physical interaction to the online environment, contributing to an improvement of consumer's capability to assess the product offering while arousing an affective physiological response in the form of pleasure (Hilken et al., 2017) and potentializing a sense of empowerment (Huang et al., 2019).

Moreover, by spatializing and contextualizing consumers' virtual product experiences, AR eases situated information processing since its interface facilitates the embedment of a virtual product in a personally relevant context (e.g., virtually fitting an eyeshadow on the customer's face). The environmental embedding AR characteristic can be conceptualized as the visual overlaying of virtual content into an individual's physical and real environment (Hilken et al., 2017). Leveraging this feature is of extreme importance since when evaluating different product offerings, consumers tend to envision the product on themselves (Escalas, 2004; Hilken et al., 2017) using the physical environment that surrounds them to aid in said mental visualization.

Combining simulated physical control with environmental embedding, AR allows consumers to interact and participate in a situated online service experience. The perceived level of authenticity of the experience – that is, the capability of AR to simulate a realistic physical try-on product experience in the online environment – generates in consumers' a sensation of spatial presence (Hilken et al., 2017; T. Schubert et al., 2001; Schultze, 2010).

Spatial presence defines a physiological state in which the individual feels wholly emerged in a different environment that does not correspond to its actual physical location, consequently recognizing the possibility of interacting with elements present in the said environment (Hilken et al., 2017; Wirth et al., 2007). The combination of its features provides realistically simulated multisensory experiences, leading individuals to neglect the presence of technology as an intermediary of the experience (Hilken et al., 2017; Lombard & Snyder-duch, 2010).

Present in AR-enabled settings, the characteristic of spatial presence demands for a reformulation of the understanding of its concept (Hilken et al., 2017; T. W. Schubert, 2009) since in an AR context, the aim is to embed virtual products in consumers physical environment rather than having the latter being emerged in an artificial location (e.g., virtual shopping mall). The application of spatial presence in AR thus demands the substitution of an individual's sense of "self-location" with a feeling of virtual "object-location" in a physical environment (Hilken et al., 2017).

## **2.1.3 FIELDS OF APPLICATION**

### **2.1.3.1 AR Applications in Marketing**

The continuous technological evolution that atmospheres contemporary societies disrupted a change in consumers' expectations. If not long ago, interactive technologies like AR were perceived to be a unique feature that conferred high levels of attraction and differentiation; nowadays, its implementation has become almost imperative to thrive in extremely competitive markets (Wedel et al., 2020).

Presented as a key strategic solution, AR is already incorporated in different marketing areas. In the advertising field, AR has shown to have great relevance and effectiveness since it potentializes higher levels of engagement, with AR-driven ads registering greater click-through-rates than traditional online ads; and stimulates positive brand attitudes and purchase intentions (Grudzewski et al., 2018; Van Kerrebroeck et al., 2017; Wedel et al., 2020).

Furthermore, AR (i) provides new and innovative ways for companies to interact with consumers through the application of mobile AR ads that can be distributed across different media platforms, (ii) enables an interactive exploration of product information and contextualization, eliminating the boundaries between advertising and retail; and (iii) facilitates the implementation of interactive ads in traditional printed media platforms (e.g., outdoors). The latter is typically enabled by a mobile application (e.g., QR code) that individuals can scan to virtually engage with the advertising content, creating a mechanism to track consumers' interactions with a traditional media ad (Wedel et al, 2020).

AR can also be leveraged through the application of haptic ads, implemented through the utilization of vibration sensors of mobile devices that recreate a sensory experience for consumers when interacting with a virtual product offering, leading to an enhancement of engagement levels (Wedel et al., 2020).

### **2.1.3.2 AR Applications in Retail**

The emergence of innovative and disruptive technologies has initiated a technological revolution within the retail industry. Reshaping the traditional forms of product discovery, evaluation, and consumption; and with the potential to heighten service delivery and co-creation processes (Hilken et al., 2017; Singh et al., 2017), the implementation of these technologies demonstrates to be fundamental to achieve success in a hyper-connected marketplace (Grewal et al., 2020).

Compared to other emerging technologies, AR demonstrates a tremendous potential and readiness to be integrated into the retailing industry as a strategy to target consumers throughout different touchpoints of day-to-day routines since it can effortlessly be delivered through mobile devices (e.g., smartphones) (Heller et al., 2019b). Leveraged to particularly market high-involvement products (Huang et al., 2019), AR integration in the retail industry enables consumers to insert a virtual product offering into their home (Grewal et al., 2020; Huang et al., 2019), on an avatar or even on themselves (Hilken et al., 2019), and to recreate walkthrough experiences (Huang et al., 2019). Although, AR's application is not exclusive to online environments, having major market players integrated digital solutions to facilitate fitting processes (e.g., smart mirrors and holograms) in brick-and-mortar points of sale (Wedel et al., 2020).

The potential of AR applications in the retail industry is never-ending, being the most recent trend the development of virtual retail environments that simulate physical stores. Conceptualized as virtual shopping malls, these type of AR augments consumers' sense of control by allowing the customization of stores, products, and locations (Burke, 2018; Wedel et al., 2020).

However, digital retail channels have been the primary field of AR's application within the retail industry, contributing to the development of a disruptive and differentiating business strategy focused on increasing firm value (Dotzel et al., 2013; Hilken et al., 2017). The technology in discussion offers an added value to consumers, hence contributing to an enhanced online service experience from the stages of pre-purchase evaluation, being present in the steps of awareness, evaluation, decision making, and trial, to the stages of purchase and post-purchase evaluation (Wedel et al., 2020).

By leveraging on AR's environmental embedding and simulated physical control characteristics, retailers can digitalize the product trial experience through the overlaying of virtual content (e.g., a lipstick shade) into consumers' physical reality (e.g., consumers' face), providing additional visual product information which confers higher levels of decision comfort and heightens purchase intentions (Heller et al., 2019a; Hilken et al., 2017, 2019). Furthermore, this also minimizes virtual cart abandonment and product return rates and increases word-of-mouth (Hilken et al., 2017; Janakiraman et al., 2016).

AR interactive technology demonstrates so to have colossal strategic benefits for retailers, thus a thorough assessment of its managerial implications must be conducted.

#### ***2.1.3.2.1 AR Applications in the Make-Up Product Category***

Considered as a high-involvement market, the make-up industry has been leveraging on AR to simulate sensory try-on experiences in the online environment (Huang et al., 2019) since it demonstrates to drive higher levels of preference towards virtual product offerings than when these are presented in traditional product display solutions (Grewal et al., 2020; Roggeveen et al., 2015).

AR-enabled service augmentation potentializes cost reduction in the area of product trial (e.g., in-store sampling and free product return strategies) while still enabling consumers to grasp a feel for product offerings in the online retail channel (Hilken et al., 2017). This is extremely important, especially for product categories where sensory experiences are highly valued to evaluate different product offerings (Hilken et al., 2017; Rosa et al., 2006).

Focused on enhancing consumers' attraction towards virtual product offerings and consequently facilitate the decision-making process in the online retail environment, major companies of the beauty industry are already leveraging AR to potentialize the service delivery process (Hilken et al., 2017) (*Table 1*). As is the case of Sephora and Charlotte Tilbury.

By proving and AR-enabled mobile app, Sephora permits consumers to virtually to try-on distinctive make-up products, from lipsticks to eyeshadows, allowing for endlessness make-up looks' to be constructed in this channel. "Sephora's Virtual Make-Up Artist" service goes even further, providing personalized professional recommendations and assistance, as well as enabling consumers to share the different looks on social media platforms (Grewal et al., 2020; Scholz & Duffy, 2018).

Moreover, the luxury brand Charlotte Tilbury leverages AR's potential throughout its omnichannel selling points, augmenting consumers' in-store and online experiences. Powered by facial scanning, the "Charlotte Tilbury Magic Mirror" presents an effortless and comfortable approach to product trials (Heller et al., 2019a). Furthermore, the brand also offers virtual consultations on its online retail channel, fully digitalizing the service experience.

**Table 1 - Examples of AR's application by Make-Up Retailers**

Retailer	AR Application	Channel of Application
<b>Charlotte Tilbury</b>	Charlotte Tilbury Magic Mirror	Mobile App and In-store
<b>LANCÔME</b> PARIS	The Lancôme Virtual Gallery	Mobile App and Website
<b>L'ORÉAL</b>	Makeup Genius	Mobile App and Website
<b>MAC</b>	MAC's Virtual Try-On	Website and In-store
<b>SEPHORA</b>	Sephora's Virtual Make-Up Artist	Mobile App

**Source:** Developed by the author based on personal research and retailers' websites

(Charlotte Tilbury, n.d.; L'Oréal Paris, n.d.; Lancôme Paris, n.d.; MAC Cosmetics, n.d.; Sephora, n.d.)

#### **2.1.4 PSYCHOLOGICAL RESPONSES AND CONSUMER BENEFITS**

As the virtual environment's immersion level is heightened by the implementation of AR, so is this channel's ability to generate and evoke emotional and psychological triggers identical to those experienced in the equivalent physical reality (Meehan et al., 2002; Wedel et al., 2020).

The combination of AR's characteristics of environmental embedding and simulated physical control simulates a personal and self-focused product experience (Hilken et al., 2019; Scholz & Duffy, 2018; Scholz & Smith, 2016). This demonstrates to be of extreme importance in high-involvement product categories (Huang et al., 2019; Rosa et al., 2006), where consumers expect to attain self-enhancement and admiration through the shopping experience (Huang et al., 2019).

Therefore, AR-enabled virtual try-on technologies are highly valued by consumers since it permits for self-evaluation (e.g., self-assessment, self-enhancement, and self-verification) (Huang et al., 2019) in online retail environments (Huang et al., 2019; Merle et al., 2012), driving high self-admiration and enhancement perceptions since consumers can assess the benefits and impact that the product offering will have on their physical appearance (Baek et al., 2018; Huang et al., 2019).

AR heightens consumers' decision convenience by allowing them to experience a product offering in distinctive environments (Grewal et al., 2020; Heller et al., 2019a), as well as by contributing to the minimization of product information search costs since it offers a way to collect and evaluate a broad selection of alternatives without having to physically visit multiple retail stores (Childers et al., 2001). Also, AR's potential to deliver a hedonic service experience,

based on values such as entertainment and enjoyment, translates into higher levels of consumer satisfaction (Childers et al., 2001).

AR enables consumers' natural information processing in the online environment, thus reducing cognitive efforts and conferring an easiness and comfort to the online purchase decision (Heller et al., 2019b; Hilken et al., 2017).

#### **2.1.4.1 Decision Comfort**

Conceptualized as an individual's level of psychological ease, satisfaction, and wellbeing regarding a specific situation (Heller et al., 2019a; Parker et al., 2016), decision comfort is a soft-positive emotional response that explains consumers' overall perceptions and evaluations of a decision-making experience (Hilken et al., 2017). One's decision comfort level directly impacts the satisfaction towards the experience and the intention to purchase a determined product offering. Thus, decision comfort is a topic that has become a focal concern amongst retailers that aim to develop seamless and effortless purchase processes (Heller et al., 2019a; Sweeney et al., 2000).

AR-enabled services demonstrate an effective way to promote decision comfort throughout the critical stage of post-purchase evaluation of the decision-making journey since its spatial presence characteristic generates affect-based cues, critical drivers of this psychological response (Hilken et al., 2017; Parker et al., 2016). Reinforcing this, is the fact that decision comfort is directly correlated to mental imagery that presents itself as the "theoretical underpinning of AR" since this technology is often implemented to facilitate consumers' information processing, providing a more intuitive form of evaluating product offerings in online retail environments (Heller et al., 2019a).

Furthermore, the psychological state of decision comfort has substantial managerial implications. A heightened sense of decision comfort contributes to higher levels of willingness to pay, which the minimization of information processing efforts is not able to provoke by itself (Heller et al., 2019b).

## **2.2 SENSORY MARKETING**

### **2.2.1 SENSORY MARKETING AND AR**

In online retail environments, interactions with physical products are scarce, imposing a constrain to consumers' ability to formulate a mental representation of product trials since they

are not exposed to the necessary sensory stimuli to disrupt such psychological feedback. Therefore, in high-involvement product categories, conducting purchases in a digital channel provokes a sense of uncertainty since the consumer cannot promptly test its mental representations and expectations about the product offering in evaluation (Heller et al., 2019b). The application of AR demonstrates to be imperative to elevate service delivery processes in the online environment. Its unique character enables the transposition of the in-store experimental product evaluation to the online retail channels (Hilken et al., 2017; Wedel et al., 2020) by promoting the stimulation of touch, hearing and sight sensory triggers (Krishna, 2011; Wedel et al., 2020). Enabled by its spatial presence characteristic, AR is capable of influencing consumers' perceptions regarding the experience (Hilken et al., 2017) through the simulation of realistic multi-sensory stimuli that not only augment the authenticity of the online product trial experience but also contribute to a minimization of consumers' mental efforts to process information, leading to an augmentation of decision comfort levels towards the purchase decision (Heller et al., 2019b).

Fundamentally, AR combines the “touch-and-feel sensory richness” of physical reality with the endless benefits of an online retail environment (Brynjolfsson et al., 2013; Hilken et al., 2017), providing a context-sensitive interface that enables consumers' natural information processing while potentializing the level of enjoyment extracted from the experience (Hilken et al., 2017).

#### **2.2.1.1 Sense of Control**

Consumers demonstrate to perceive touch as a discovery enabler, often using it as a mechanism to navigate and evaluate the different product offerings in highly competitive and saturated markets (Heller et al., 2019b). Through its simulated physical control characteristic, AR facilitates the simulation of the sense of touch in online retail environments, which disrupts similar product ownership levels as physically interacting with the product (Elder et al., 2017; Peck et al., 2013).

The perceived control over a 3D product offering in an online retail environment obtained through the usage of hand gestures to control the device that serves as the AR service augmentation enabler (Heller et al., 2019b; Petit et al., 2019; Spence & Gallace, 2011) evokes similar touch sensory-motor experiences to the ones experienced while evaluating a product offering in-store. Moreover, the fact that AR enables the transformation of virtual objects (e.g., product rotation) facilitates consumers formulation of mental product representations during

the decision-making process (Heller et al., 2019a), creating the feeling that indeed that product is more tangible than when displayed in a traditional manner (Heller et al., 2019b).

### **2.2.1.2 Mental Intangibility**

Consumers' capability to imagine and generate mental visual representations that illustrate products and experiences is crucial throughout the decision-making process (Heller et al., 2019a; Pearson et al., 2015). Conceptualized as "an internally generated representation of an object, scene, or event" (Heller et al., 2019a; Schifferstein, 2009), mental imagery consists of the "process by which visual information is represented in the working memory" (Heller et al., 2019a; MacInnis & Price, 1987). Typically, this process is disrupted by touch sensory stimuli.

Moreover, the extent to which consumers are capable of developing mental images has a direct impact on a set of behavioral intentions (Heller et al., 2019a; Yoo & Kim, 2014), from which it is highlighted the development of purchase intentions (Hilken et al., 2017) and WOM effect (Heller et al., 2019a), as well as, on the perceived hedonic and utilitarian value of the service experience (Heller et al., 2019b; Hilken et al., 2017). Therefore, consumers' ability to formulate mental visual product representations in online retail channels, where sensory experiences are scarce, disrupts a set of managerial implications, being so its assessment of extreme importance.

To do so, it is established the study of consumers' level of mental intangibility – that is, an individual's ability to formulate a clear and vivid visual mental image of how a determined product offering would look and fit when usage, even if the sensory experience is not present (Heller et al., 2019b). Thus, when a consumer demonstrates an incapability to mentally reproduce the sensory interaction (e.g., product trial) with a virtual product offering, it is established that there is a high level of mental intangibility (Heller et al., 2019b; Vinhal Nepomuceno et al., 2012).

Mental product visualization yields a strong influence over consumers' behavioral intentions (Compeau et al., 1998; Heller et al., 2019a). Therefore, the inability to form a visual mental representation of the virtual product in evaluation demands stronger efforts to process information, translating into an increased level of discomfort during the decision-making process (Heller et al., 2019b).

By generating a digital 3D product representation and allowing its embedding and physical transformation in a relevant consumer context (Azuma, 1997; Heller et al., 2019a), AR presents an effective strategic solution to ease consumers' development of mental imagery (Heller et al., 2019a). The unique combination of its characteristics of environmental embedding and

simulated physical control, which potentializes spatial presence, demonstrates to relieve consumers' mental processing efforts allowing for a simulation of direct and realistic product interactions in digital environments (Hilken et al., 2017).

However, AR's effect on consumers' behavioral intentions (e.g., WOM and purchase intention) is not equal amongst consumers, being so subjective to psychological traits such as the level of emotional involvement with the experience, as well as the individual's natural mental imagery visualization ability (Hilken et al., 2017).

## **2.3 CONSUMER BUYING BEHAVIOR**

### **2.3.1 CONSUMER PURCHASE INTENTION**

Purchase intentions represent an individual's predictions of its behavior intentions towards a determined product offering based on the ability to visualize its usage (Schlosser, 2003). In online retail environments, when executing a purchase, consumers seek to attain product information in an effortless and personally relevant way that allows them to complete the objective in an efficient manner (Wang et al., 2011).

Therefore, implementing strategic solutions like AR is imperative since the extent to which consumers can visualize the trial and usage of a virtual product offering directly impacts their expectations and intentions to purchase (Schlosser, 2003).

### **2.3.2 CONSUMER SHOPPING SERVICE EXPERIENCE**

Theorized as the consumers' personal, self-motivated, multidimensional "cognitive, emotional, behavioral, sensorial, and social responses" to the exposure and interaction with a determined company's marketing actions and offerings throughout the different stages of the decision-making journey (Becker & Jaakkola, 2020; Wedel et al., 2020), consumer shopping experience encompasses behavior actions, affective (e.g., enjoyment, surprise, fear, anger, etc.), sensorial and cognitive responses, as well as, consumers relational behaviors towards products, brands and consumption situations (Hoffman & Novak, 2018; Wedel et al., 2020).

#### **2.3.2.1 Perceived Value of the Service Experience**

Characterized as either "problem-solvers" or fun, enjoyment and arousal seekers (Childers et al., 2001; Hirschman & Holbrook, 1982), consumers demonstrate to adopt a dual approach when it comes to the evaluation of the value extracted through a determined service experience, categorizing it as either utilitarian or hedonic value. The former is associated with the

“performance-related effectiveness” (Hilken et al., 2017; Schlosser, 2003) aspects of the service experience, being so characteristic of goal-oriented tasks that tend to occur in the pre-purchase information gathering stage; the latter refers to service experiences’ ability to provoke a sense of enjoyment and pleasure (Babin et al., 1994; Childers et al., 2001). The two dimensions presented can be simultaneously perceived by consumers as any service experience can confer both a utilitarian (e.g., cost of a haircut) and hedonic (e.g., style of a haircut) value (Dhar & Wertenbroch, 2000; Grewal et al., 2020).

The application of AR in online retail environments contributes to a heightening of both utilitarian and hedonic value perceptions by simulating a realistic product interaction and trial (Hilken et al., 2017), thus demonstrating that in this retail context, it can be leveraged beyond its utilitarian purposes (e.g., offering consumers the ability to try-out a product) since it can also be an entertainment provider that fulfills consumers’ hedonic needs (Childers et al., 2001; Wang et al., 2011). However, due to its highly experimental nature AR-enabled service experiences are more often perceived as drivers of hedonic rather than utilitarian value (Grewal et al., 2020).

## CHAPTER 3: CONCEPTUAL FRAMEWORK

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### 3.1 HYPOTHESIS DEVELOPMENT

By implementing AR as a strategic solution to surpass the sensory limitations of online channels, retailers offer a dynamic and interactive approach to the traditional product display solutions, enhancing consumers' preferences and behavioral intentions towards a determined product offering (Grewal et al., 2020; Roggeveen et al., 2015). Therefore, it is postulated that:

**H1:** The application of AR in an online retail environment positively affects consumers' purchase intentions.

The extent to which consumers demonstrate to be capable of generating visual mental product representations influences the sense of decision comfort, subsequently impacting consumers' purchase intentions towards the product offering in evaluation (Heller et al., 2019b; Hilken et al., 2017). Consumers with high levels of mental intangibility – that is, consumers who struggle to mentally visualize product interactions when the sensory experience is not present – tend not to be receptive of conducting purchases in online retail environments since it requires higher information processing efforts, leading to an increase of the perceived purchase risk (Heller et al., 2019b).

AR simulates realistic sensory experience in e-commerce channels, reducing the mental efforts associated with product evaluation and information processing (Heller et al., 2019a). This contributes to a reduction of the perceived risk which enhances the intention to purchase. Moreover, AR's effect on consumers' behavioral intentions in online retail environments tends to be subjective to consumers' personal traits such as the ability to mentally produce visual product representations (Hilken et al., 2017). Therefore, it is anticipated that the effect of AR on purchase intentions differs in accordance with consumers' level of mental intangibility. Thus:

**H2:** Consumers' mental intangibility level moderates AR's effect on the generation of purchase intentions in an online retail environment.

Major market players of the make-up industry (e.g., MAC Cosmetics, L'Oréal, Charlotte Tilbury) are already implementing AR as a service delivery intermediary in online retail environments to enhance consumers' service experience, heightening the levels of utilitarian and hedonic value provided (Hilken et al., 2017) that translates into an increase in consumers' behavioral intentions and satisfaction. It is so postulated that:

**H3:** There is a positive relationship between the exposure to AR and consumers' hedonic value perceptions of the service experience.

**H4:** Consumers' hedonic value perceptions of the AR-enabled service experience positively affect purchase intentions.

**H5:** There is a positive relationship between the exposure to AR and consumers' utilitarian value perceptions of the service experience.

**H6:** Consumers' utilitarian value perceptions of the AR-enabled service experience positively affect purchase intentions.

AR transposes the “touch-and-feel sensory richness” of physical reality to online retail environments (Brynjolfsson et al., 2013; Hilken et al., 2017), allowing for dynamic interactions with virtual products that permit a realistic assessment of its performance-based characteristics (Hilken et al., 2017) while contributing to an enhancement of feelings of enjoyment (Grewal et al., 2020). Supported by an AR-enabled context-sensitive interface, the interactions above-described ease consumers' natural information processing (Hilken et al., 2017) enhancing the sense of decision comfort regarding the purchase. So, it is proposed that:

**H7:** The hedonic value perceptions of the AR-enabled service experience positively affect consumers' sense of decision comfort.

**H8:** The utilitarian value perceptions of the AR-enabled service experience positively affect consumers' sense of decision comfort.

By generating digital 3D product representations, AR allows for the manipulation of virtual content (e.g., product rotation) creating the feeling that indeed that product is more tangible than when displayed in a traditional manner (Heller et al., 2019b). Furthermore, AR enables consumers to grasp an accurate sense of the product's fit through similar physical movements to the ones used to evaluate products in brick-and-mortar stores (Rosa & Malter, 2003; Hilken et al., 2017), contributing to minimization of the perceived risk associated with a determined purchase decision. Thus, it is anticipated that:

**H9:** There is a positive relationship between the exposure to AR and consumers' sense of control over a virtual product offering.

**H10:** Consumers' sense of control over virtual product offering enabled by AR positively affects purchase intentions.

**H11:** The sense of control over a virtual product offering enabled by AR positively affect consumers’ sense of decision comfort.

Moreover, AR’s spatial presence characteristic permits the formulation of affective-based cues that enhance consumers’ comfort towards the decision to purchase determined product offering in an online retail environment (Hilken et al., 2017; Parker et al., 2016). This psychological response directly influences consumers’ satisfaction and purchase intentions (Heller et al., 2019a; Sweeney et al., 2000). Therefore:

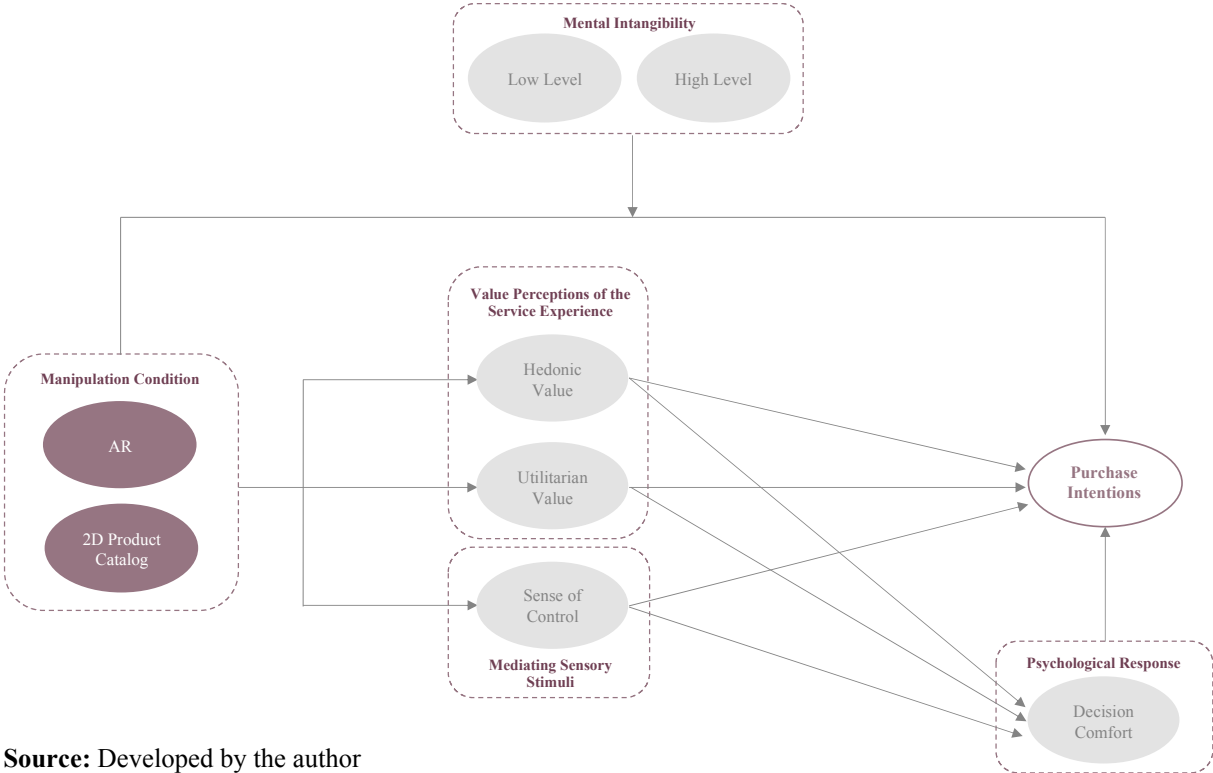
**H12:** Consumers’ decision comfort-driven from an AR-enabled service experience positively affects purchase intentions.

**H13:** The positive relationship between AR and purchase intentions is mediated by the effect of consumers’ (H13a) sense of control, (H13b) hedonic, and (H13c) utilitarian value perceptions of the service experience on the sense of decision comfort.

**3.2 CONCEPTUAL FRAMEWORK**

The following conceptual framework (*Figure 3*) aims to guide the research study's elaboration, providing a visual overview of the assumptions that need to be validated to solve the problem statement proposed. It also facilitates the comprehension of the existing dependency relationships amongst the different variables in analysis.

**Figure 3 - Conceptual Framework**



**Source:** Developed by the author

## CHAPTER 4: METHODOLOGY

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### 4.1 RESEARCH APPROACH

A quantitative research approach was conducted to collect primary data that enabled the testing of the thirteen hypotheses. The objective was to comprehend the effects of AR's application in online retail environments, focusing on understanding how it can be leveraged within the make-up industry to generate purchase intentions. A comparison between the service experience provided by the technology and the one delivered by a 2D product display solution was established.

An online survey methodology was employed to materialize the present study. Conceptualized in Portuguese and through the usage of the Qualtrics platform, it was composed by eleven sections that translated into eleven closed-ended questions. A non-probabilistic sample procedure was applied to facilitate data collection.

Collected throughout November 2020, the data was classified, coded, and analyzed using the SPSS statistics platform.

### 4.2 DESIGN AND PROCEDURE

#### 4.2.1 DESIGN

The present research study was set on a between-subjects (exposure to AR versus exposure to the 2D product catalog) experimental design. Two distinctive questionnaires were conceptualized, and participants randomly distributed amongst the two manipulation conditions. In each questionnaire, participants were exposed to one manipulation condition and asked to state their level of agreement with several statements regarding it.

Participants exposed to the AR manipulation integrated the experimental group (EG) (*Appendix B*) while participants assigned to the 2D product catalog condition composed the control group (CG) (*Appendix C*). The objective was to establish a comparison between the two strategies to be able to comprehend the added value that AR's application as a service enabler in online retail environments could disrupt within the make-up industry.

To do so, a concept testing approach was materialized through a video format. Conceptualized to ensure the cohesiveness and comparability of each participant's experience, both in terms of product choice and decision-making process, the video illustrated an online service experience with a make-up retailer. A fictional retailer (NUE Cosmetics & Skincare) was created to

manage the anticipated response bias that could arise due to relationships of brand knowledge and loyalty if an existing market player was used.

Supporting the choice of using a concept testing video method is the objective to minimize the anticipated study abandonment rates that could occur by asking participants to leave the questionnaire to conduct the desire experience on a third-party's e-commerce platform. This could also disrupt a set of privacy concerns since AR is enabled by biometrics identification, leading individuals to not be receptive to participate in the present research study.

The video started by conducting participants through an exploration of the retailer's product offerings, followed by the choice of what product to purchase. For this, a lipstick was chosen. This decision was supported by its pigmentation component that triggers a clear visual sensory stimulus facilitating the manipulation's perception; and by the product category's continuous growth that illustrates the general consumer's receptiveness towards this typology of products (Grand View Research, 2019).

Afterwards, participants were exposed to the manipulation condition. For the individuals in the EG, the concept testing video illustrated a simulation of an AR-enabled service experience with the selected product offering showcasing how it would look when in usage (*Figure 9 – Appendix D*). In contrast, the participants in the CG condition were exposed to a simulation of a 2D product catalog-enabled experience (*Figure 10 – Appendix D*). For both manipulation conditions, the simulated experience demonstrated the possibility to opt for distinctive shades of the product offering selected (hot pink versus nude) to ensure that the experience portrayed was as realistic as possible.

The duration of the concept testing video was equal amongst the two manipulation conditions (44 seconds) to further reinforce its cohesiveness. An upbeat soundtrack was employed to confer a greater dynamism to the experience and maintain participants attentive. Additionally, for both conditions the video was accompanied by a written description of the experience where participants were instructed to imagine that they were conducting it themselves.

#### **4.2.2 PROCEDURE**

The participants' recruitment was conducted via e-mail and social media platforms. An introduction message presenting the study's purpose was displayed upon entrance. Participants data confidentiality and contribution importance were also assured. Upon stating to be willing

to participate in the study, individuals were evenly and randomly assigned to one of the manipulation conditions (exposure to AR versus exposure to 2D product catalog).

Then, a screening question was presented to ensure that the appropriate target group was tested. An eligibility criterion defined that individuals who indicated to not consume make-up products did not meet the requirements necessary to participate in the study. For those, the survey terminated immediately.

Participants who met the requirements to integrate the sample - that is, stated to consume make-up products - proceeded to respond to a set of questions regarding their make-up consumption habits. This was followed by the exposition to the respective manipulation condition. Afterwards, a message was displayed to instruct participants to respond to the statements that followed imagining that they had just conducted the experience illustrated in the video.

The level of participant's agreement with several statements regarding the constructs under-analysis was assessed. For that, the items presented in subchapter **4.3. Measures** were used. Subsequently, participants responded to demographic questions regarding gender, age and monthly income to permit the sample's characterization.

A message was showcased at the end of the survey to ensure its successful completion and to further reinforce the appreciation for the provided contribution.

#### **4.2.2.1 Pre – Test**

A pre-test conducted before the study's implementation permitted the assessment of its structure flow and perceptibility of the manipulation conditions and questions. The objective was to ensure that the proposed relationships were tested and to reduce the possibility of questionnaire abandonment due to interpretation difficulties.

Responses of the four participants recruited, two per each manipulation condition, led to an improvement of some items phrasing and rearrangement of the manipulations' concept testing video improving its interpretation. The written description of experience demonstrated in the video was also added.

### **4.3 MEASURES**

To guarantee that the results' validity and reliability were not compromised, items and constructs used in previous research were adapted to materialize the present study (*Appendix A*). The scales implemented to assess consumers' consumption habits (e.g., "Please indicate the

importance that make-up products have for you. (Rate from 1 = Not Important to 7 = Extremely Important”) and demographic characteristics (e.g., “Please state your gender”) presented an exception to this since its objective was merely to further establish the sample’s profile.

A three-item measure (e.g., “I intent to buy a lipstick in this online store.”) was implemented to evaluate consumers’ purchase intentions, based on two items adapted from (Lian & Yen, 2014) and one from (Hilken et al., 2017). To assess consumers’ level of mental intangibility a four-item scale (e.g., “It is not easy to picture of how the lipstick would look on me.”) was adapted from (Laroche et al., 2001) and (Heller et al., 2019b) (*Appendix A*).

Consumers’ perceived value of the service experience was measured by combining constructs regarding hedonic and utilitarian value perceptions. A seven-item scale, four-items to assess hedonic value (e.g., “The virtual try-on/ product catalog experience in the video made me feel good”) and three-items to evaluate utilitarian value (e.g., “The virtual try-on/ product catalog experience in the video would be useful to evaluate make-up products online”) were adapted from the research of (Childers et al., 2001) and (Hilken et al., 2017) (*Appendix A*).

To evaluate consumers’ sense of control a three-item scale (e.g., “I got the sense that I could virtually touch the product.”) was conceived based on (Heller et al., 2019b). A five-item scale (e.g., “I feel good about choosing a lipstick in this online store.”) deployed from an adaptation of (Parker et al., 2016) and (Hilken et al., 2017) was implemented to determine consumers’ sense of decision comfort (*Appendix A*).

To guarantee the cohesiveness of the scales implemented, all the constructs were measured on a seven-point Likert scale (“Strongly Disagree” = 1; “Strongly Agree” = 7).

## CHAPTER 5: RESULTS ANALYSIS

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### 5.1 SAMPLE CHARACTERIZATION

Three hundred and sixty-five participants were recruited. 115 had to be excluded for not meeting the criteria to integrate the sample. So, the analyses that follow will only consider a sample size of 250 participants, randomly and evenly distributed amongst the two condition groups.

Thus, the experimental group was composed of 125 (Gender<sub>EG</sub> = 100% female, Age<sub>EG</sub> = 64.8% between less than 25 and 45 years old; Monthly Income<sub>EG</sub> = 71.2% between less than 600€ and 1500€), and the control group by the other 125 individuals (Gender<sub>EG</sub> = 98.4% female and 1.6% male, Age<sub>EG</sub> = 53.6% between less than 25 and 45 years old; Monthly Income<sub>EG</sub> = 52% between less than 600€ and 1000€) that met the requirements to participate in the study (*Table 4 – Appendix E*).

Additionally, the importance that the individuals that integrate the sample attribute to the typology of product under-analysis was assessed. For that, a threshold of 4.88, based on the item's mean (*Table 5 – Appendix E*) was established. The sample was divided between high (> 4.88) and low (< 4.88) level of importance (*Table 6 – Appendix E*). A dummy variable was constructed to proceed with the analysis (“High Importance” = 1; “Low Importance” = 0).

The individuals that compose the sample reveal to attribute a high importance level to make-up products (HighImportance<sub>EG</sub> = 60%, LowImportance<sub>EG</sub> = 40%; HighImportance<sub>CG</sub> = 68.8%, LowImportance<sub>CG</sub> = 31.2%) and to mainly prefer to conduct its purchase in specialized retailers (Preference SP<sub>EG</sub> = 52.5%; Preference SP<sub>CG</sub> = 60.5%). Furthermore, respondents demonstrate concerns regarding adopting e-commerce platforms to purchase make-up products (Preference OS<sub>EG</sub> = 12%; Preference OS<sub>CG</sub> = 8.7%), reinforcing the relevancy of the problem statement (*Table 4 – Appendix E*).

### 5.2 CONSTRUCTS VALIDITY AND RELIABILITY

Constructs and items implemented in previous research were used to ensure that the results' validity and accuracy were not compromised. Nevertheless, the scales' reliability amongst the sample was analyzed.

A **Cronbach's Alpha** test was so deployed to assess the scale's internal consistency. The test's threshold of acceptance – that indicates consistency amongst scales when Cronbach's Alpha > 0.7 – revealed the necessity to adapt the number of items initially used to assess the mental

intangibility construct (initial Cronbach's Alpha = .229) (*Table 7 – Appendix E*). Therefore, the item “I need more information about the lipstick to get a clear image of what it is” was eliminated from the scale.

The modification allowed for the approval of all the scales proposed, having registered Cronbach's Alpha values between .785 and .958 (*Table 7 – Appendix E*). The scales improvement led to the constructs' conceptualization based on a composite score methodology. Drawing on the sample size and its homogeneity characteristics, the normality of the distribution was assumed. Thus, specific parametric tests were conducted to test the research hypothesis veracity ( $p < .050$ ).

### **5.3 MANIPULATION CHECK**

A single-item control measure was defined to assess the success of the manipulation conditions. Participants were asked state the level of agreement with the item “I got the sense that I could virtually touch the product.” on a seven-point Likert scale (“Strongly Disagree” = 1 to “Strongly Agree” = 7). Supporting the decision to base the manipulation check on the selected item is the fact that it is directly correlated to AR's unique characteristic of simulated physical control.

As anticipated, participants in the AR condition demonstrated a significantly greater sense of ability to virtually touch the product than those in the control condition ( $M_{EG} = 3.69$ ,  $M_{CG} = 3.08$ ,  $t(248) = 2.964$ ,  $p = .000$ ) (*Table 8 – Appendix E*).

### **5.4 HYPOTHESES TESTING**

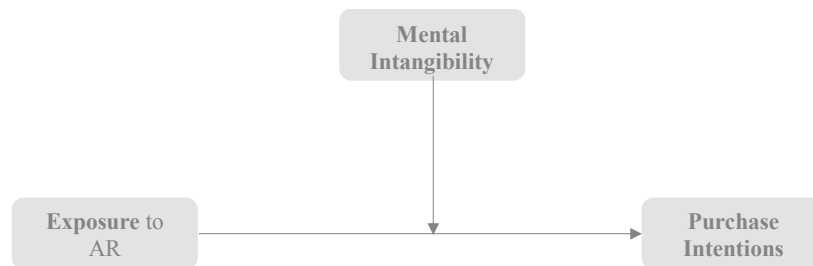
To investigate if “**H1**: The application of AR in an online retail environment positively affects consumers' purchase intentions.”, a simple linear regression was conducted between the exposure to the AR manipulation (“Exposure to AR” = 1; “Exposure to 2D product catalog” = 0) and purchase intentions. Results illustrated a significant effect ( $F(1, 249) = 24.392$ ,  $p = .000$ ,  $R\text{ Square} = .090$ ), therefore indicating that the exposure to AR positively influences consumers' purchase intentions in online retail environments ( $\beta = .299$ ,  $t(249) = 4.939$ ,  $p = .000$ ) (*Table 2*). Thus, the first hypothesis is accepted.

To assess if the effect of AR on purchase intentions is subjective to consumers' ability to mentally recreate multi-sensory experiences without the actual presence of sensory stimuli, two distinctive levels of mental intangibility were constructed. Assuming a threshold of 4.690, based on the construct's mean (*Table 9 – Appendix E*), the sample was split between high level ( $MI > 4.690$ ) and low level ( $MI < 4.690$ ) of mental intangibility (*Table 10 – Appendix E*). A

dummy variable was created to proceed with the second hypothesis testing (“High Level” = 1; “Low Level” = 0).

Supported by Hayes’ PROCESS macro (Model 1), a bootstrap procedure (5.000 samples) presented the simple moderation effect of mental intangibility on the effect of the exposure to AR (“Exposure to AR” = 1; “Exposure to 2D product catalog” = 0) on purchase intentions (**Figure 4**) not to be statistically significant as zero is present in the interactions’ confidence interval ( $\beta = -.1859$ ,  $p = .5914$ ,  $CI = [-.8671, .4953]$ ). Therefore, “**H2:** Consumers’ mental intangibility level moderates AR’s effect on the generation of purchase intentions in an online retail environment.” cannot be confirmed, indicating that the effect of AR on purchase intentions does not differ in accordance with consumers’ mental intangibility levels.

**Figure 4 - Simple moderation model with consumers' level of mental intangibility as the moderator of the effect of the exposure to AR on purchase intentions**



**Source:** Developed by the author based on the data collected through the online survey (2020)

A simple linear regression was employed between the exposure to AR (“Exposure to AR” = 1; “Exposure to 2D product catalog” = 0) and hedonic value perceptions to comprehend if “**H3:** There is a positive relationship between the exposure to AR and consumers’ hedonic value perceptions of the service experience”. The statistically significant procedure ( $F(1, 249) = 16.384$ ,  $p = .000$ ,  $R\text{ Square} = .062$ ) allowed to conclude that AR’s application has a positive relationship with consumers’ hedonic value perceptions of the service experience ( $\beta = .249$ ,  $t(249) = 4.048$ ,  $p = .000$ ) (**Table 2**). Subsequently, supporting the acceptance of the third hypothesis.

To determine if “**H4:** Consumers’ hedonic value perceptions of the AR-enabled service experience positively affect purchase intentions.” a simple linear regression was employed. Results showcased the significant relationship between the two constructs ( $F(1, 124) = 132.192$ ,  $p = .000$ ,  $R\text{ Square} = .518$ ), leading to the confirmation that consumers’ hedonic value perceptions of the AR-enabled service experience translate into an augmentation of the intention to purchase a make-up product in an online retail environment ( $\beta = .720$ ,  $t(124) = 11.497$ ,  $p = .000$ ) (**Table 2**). The fourth research hypothesis was so accepted.

A simple linear regression conducted between the exposure to AR (“Exposure to AR” = 1; “Exposure to 2D product catalog” = 0) and consumers’ utilitarian value perceptions of the service experience, illustrated the significant relationship between the two variables ( $F(1, 249) = 36.640, p = .000, R\text{ Square} = .129$ ). The exposure to AR demonstrates to have a positive effect on consumers’ utilitarian value perceptions of the service experience when purchasing make-up products in an online retail environment ( $\beta = .359, t(249) = 6.053, p = .000$ ) (*Table 2*). This confirms “**H5**: There is a positive relationship between the exposure to AR and consumers’ utilitarian value perceptions of the service experience”.

To understand if “**H6**: Consumers’ utilitarian value perceptions of the AR-enabled service experience positively affect purchase intentions.”, the results of a simple linear regression were analyzed. The test allowed to accept the sixth hypothesis since it showcased a significant effect of utilitarian value perceptions on consumers’ purchase intentions ( $F(1, 124) = 141.881, p = .000, R\text{ Square} = .536$ ). So, it is possible to affirm that the consumers’ utilitarian value perceptions of the AR-enabled service experience have a positive effect on the intention to purchase a make-up product through an e-commerce platform ( $\beta = .732, t(124) = 11.911, p = .000$ ) (*Table 2*).

Furthermore, two simple linear regressions were conducted to understand the separated effect of hedonic and utilitarian value perceptions of the AR-enabled service experience on consumers’ sense of decision comfort.

Regarding “**H7**: The hedonic value perceptions of the AR-enabled service experience positively affect consumers’ sense of decision comfort.”, results indicated a significant relation between hedonic value perceptions and decision comfort ( $F(1, 124) = 194.965, p = .000, R\text{ Square} = .613$ ). Therefore, the seventh hypothesis was confirmed, meaning that hedonic value perceptions of the AR-enabled service experience positively impact consumers’ sense of decision comfort regarding the purchase of a make-up product offering in an online retail environment ( $\beta = .783, t(124) = 13.963, p = .000$ ) (*Table 2*).

To what concerns “**H8**: The utilitarian value perceptions of the AR-enabled service experience positively affect consumers’ sense of decision comfort.”, results showcased the significant relationship between utilitarian value perceptions and decision comfort ( $F(1, 124) = 194.307, p = .000, R\text{ Square} = .612$ ). Utilitarian value perceptions of the AR-enabled service experience positively impact consumers’ sense of decision comfort towards the purchase of make-up

products in online retail environments ( $\beta = .783$ ,  $t(124) = 13.939$ ,  $p = .000$ ) (*Table 2*). Thus, accepting the eighth research hypothesis.

The impact of AR's application in online retail environments on consumers' sense of control over a virtual product offering, and subsequently its effect on purchase intentions and sense of decision comfort, was also analyzed through the ninth, tenth, and eleventh hypotheses, respectively.

Results of a simple linear regression demonstrated the significant relationship between individuals' exposure to AR ("Exposure to AR" = 1; "Exposure to 2D product catalog" = 0) and the sense of control over a virtual product offering ( $F(1,249) = 9.905$ ,  $p = .002$ ,  $R\text{ Square} = .038$ ). Drawing on this, "**H9**: There is a positive relationship between the exposure to AR and consumers' sense of control over a virtual product offering." was confirmed, leading to conclude that the application of AR has a positive effect on consumers' sense of control over a virtual product offering in an online retail environment ( $\beta = .196$ ,  $t(249) = 3.147$ ,  $p = .000$ ) (*Table 2*).

To investigate if "**H10**: Consumers' sense of control over virtual product offering enabled by AR positively affects purchase intentions.", the results of a simple linear regression were assessed. By analyzing the results obtained, it was possible to determine a significant effect of sense of control on purchase intentions ( $F(1, 124) = 106.059$ ,  $p = .000$ ,  $R\text{ Square} = .463$ ). The tenth hypothesis was so confirmed, indicating that consumers' sense of control over a virtual product offering has a positive effect on the intention to purchase a make-up product in an online retail channel ( $\beta = .680$ ,  $t(124) = 10.298$ ,  $p = .000$ ) (*Table 2*).

Furthermore, the simple linear regression employed to determine if "**H11**: The sense of control over a virtual product offering enabled by AR positively affect consumers' sense of decision comfort." established the existence of a significant relation between the two constructs ( $F(1,124) = 133.864$ ,  $p = .000$ ,  $R\text{ Square} = .521$ ). Therefore, it can be affirmed that the sense of control over a virtual product offering enabled by AR has a positive effect on consumers' sense of decision comfort regarding the purchase of make-up products in online retail environments ( $\beta = .722$ ,  $t(124) = 11.570$ ,  $p = .000$ ) (*Table 2*). The eleventh hypothesis was so accepted.

Regarding the impact of consumers sense of decision comfort-driven from an AR-enabled service experience on purchase intention, results of a simple linear regression showcased the of a significant relationship between the two variables ( $F(1,249) = 214.919$ ,  $p = .000$ ,  $R\text{ Square} = .636$ ). This led to the confirmation of "**H12**: Consumers' decision comfort driven from an AR-

enabled service experience positively affects purchase intentions.”, demonstrating that the sense of decision comfort-driven from an AR-enabled service experience has a positive influence on consumers’ intention to purchase a make-up product in an online retail environment ( $\beta = .798$ ,  $t(249) = 14.660$ ,  $p = .000$ ) (**Table 2**).

**Table 2 – Simple Linear Regression Results**

Independent Variable	Dependent Variable	Model Summary & ANOVA				Coefficient		
		R Square	F	df	Sig.	$\beta^*$	t	Sig.
Exposure to AR	Purchase Intentions	.090	24.392	1	.000	.299	4.939	.000
	Hedonic Value	.062	16.384	1	.000	.249	4.048	.000
	Utilitarian Value	.129	36.640	1	.000	.359	6.053	.000
	Sense of Control	.038	9.905	1	.002	.196	3.147	.000
Hedonic Value	Purchase Intentions	.518	132.192	1	.000	.720	11.497	.000
Utilitarian Value		.536	141.881	1	.000	.732	11.911	.000
Sense of Control		.463	106.059	1	.000	.680	10.298	.000
Decision Comfort		.636	214.919	1	.000	.798	14.660	.000
Hedonic Value	Decision Comfort	.613	194.965	1	.000	.783	13.963	.000
Utilitarian Value		.612	194.307	1	.000	.783	13.939	.000
Sense of Control		.521	133.864	1	.000	.722	11.570	.000

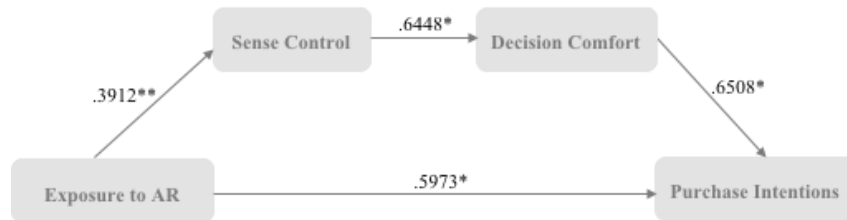
**Source:** Developed by the author based on the data collected through the online survey (2020)

The subjectiveness of the effect of AR on purchase intentions to the effect of consumers’ (**H13a**) sense of control over a virtual product offering and (**H13b**) hedonic and (**H13c**) utilitarian value perceptions of the service experience on decision comfort, was also analyzed. For that, three serial path mediations were conducted using Hayes’ PROCESS macro (Model 6), based on a confidence interval of 95%.

Results of a bootstrap procedure (5.000 samples) indicated the significance of (a) the indirect effect of the relationship between sense of control and decision comfort on the relationship between AR’s application and purchase intentions ( $\beta = .6508$ ,  $p = .000$ , CI [.0635, .2664]) (**Figure 5**); (b) the indirect effect of the existing relation between hedonic value perceptions and decision comfort on the impact of AR’s implementation on purchase intentions ( $\beta = .5316$ ,  $p = .000$ , CI [.1024, .3361]) (**Figure 6**); (c) the indirect effect of utilitarian value perceptions on decision comfort on the relation established between the application of AR and purchase intentions ( $\beta = .5121$ ,  $p = .000$ , CI [.1755, .4095]) (**Figure 7**). As zero is not present in none of the confidence intervals “**H13**: The positive relationship between AR and purchase intentions is mediated by the effect of consumers’ (H13a) sense of control, (H13b) hedonic, and (H13c)

utilitarian value perceptions of the service experience on the sense of decision comfort” was confirmed.

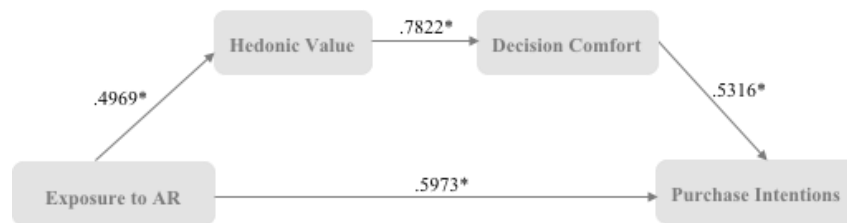
**Figure 5 - Mediation by the effect of consumers’ sense of control on decision comfort on the effect of exposure to AR on purchase intentions**



Standardized coefficients are reported. \* denotes  $p < .001$  \*\* denotes  $p < .050$

**Source:** Developed by the author based on the data collected through the online survey (2020)

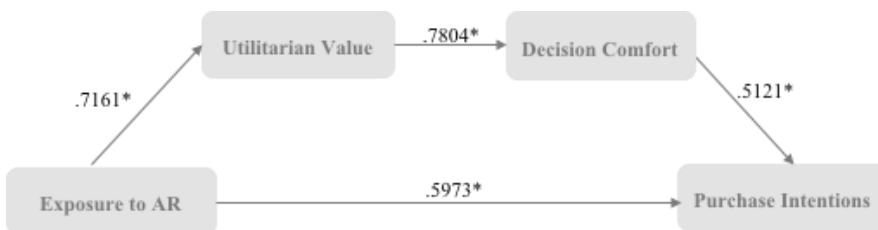
**Figure 6 –Mediation by the effect of consumers’ hedonic value perceptions on decision comfort on the effect of exposure to AR on purchase intentions**



Standardized coefficients are reported. \* denotes  $p < .001$

**Source:** Developed by the author based on the data collected through the online survey (2020)

**Figure 7 - Mediation by the effect of consumers’ utilitarian value perceptions on decision comfort on the effect of exposure to AR on purchase intentions**



Standardized coefficients are reported. \* denotes  $p < .001$

**Source:** Developed by the author based on the data collected through the online survey (2020)

The analyses antecedently presented led to a confirmation of the assumptions postulated by twelve of the thirteen research hypotheses.

## 5.5 FURTHER RELEVANT ANALYSIS

To comprehend further the competitive advantage that the implementation of AR in online retail environments could disrupt in the make-up industry, a comparison with a 2D product catalog strategy was established. Results of several independent t-tests conducted, corroborated that AR can indeed be leveraged to optimize online retail environments' potential within the make-up industry leading to (i) an heightening of hedonic ( $M_{HV\_EG} = 4.81$ ,  $M_{HV\_CG} = 4.17$ ,  $t(248) = 4.048$ ,  $p = .000$ ) and utilitarian ( $M_{UV\_EG} = 4.78$ ,  $M_{UV\_CG} = 3.65$ ,  $t(248) = 6.053$ ,  $p = .000$ ) value perceptions of the online service experience, (ii) an enhancement of consumers' sense of control ( $M_{SC\_EG} = 3.63$ ,  $M_{SC\_CG} = 3.02$ ,  $t(248) = 3.147$ ,  $p = .000$ ), and (iii) an augmentation of consumers' sense of decision comfort regarding the purchase ( $M_{DC\_EG} = 4.58$ ,  $M_{DC\_CG} = 3.84$ ,  $t(248) = 4.258$ ,  $p = .000$ ) (*Table 11 – Appendix E*).

As anticipated, the exposition to an AR-enabled service experience yields a greater intention to purchase make-products in retail channel under-analysis ( $M_{PI\_EG} = 4.12$ ,  $M_{PI\_CG} = 3.19$ ,  $t(248) = 4.939$ ,  $p = .000$ ) (*Table 11 – Appendix E*).

The simultaneous direct effect of hedonic and utilitarian value perceptions, sense of control and decision comfort on purchase intentions and its subjectiveness to the typology of the strategy implemented (AR versus 2D product catalog) was also analyzed. For that, two multiple linear regression models were conducted.

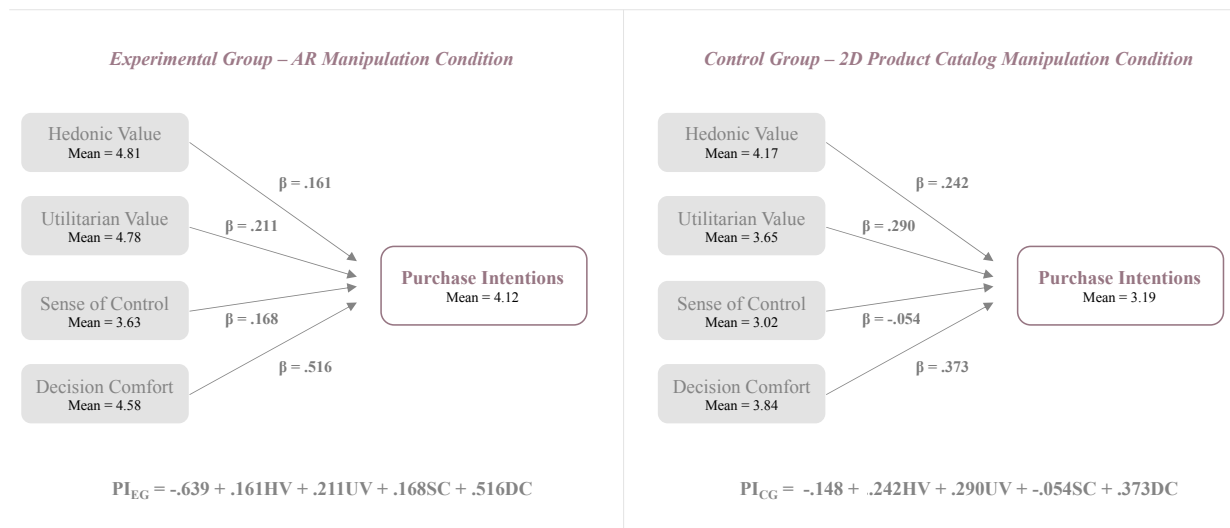
The experimental group model's outcome reported the simultaneous effect of the constructs on the dependent variable to be significant ( $F(4,121) = 65.920$ ,  $p = .000$ ,  $R\text{ Square} = .687$ ). The existence of significant positive relation between the direct effect of consumers' utilitarian value perceptions ( $\beta = .211$ ,  $t(121) = 2.401$ ,  $p = .018$ ), sense of control ( $\beta = .168$ ,  $t(121) = 2.085$ ,  $p = .039$ ) and decision comfort ( $\beta = .516$ ,  $t(121) = 4.219$ ,  $p = .000$ ) driven from an AR-enabled service experience and consumer's purchase intentions was also illustrated. The direct effect of consumers' hedonic value perceptions demonstrated not to be significant ( $\beta = .161$ ,  $t(121) = 1.372$ ,  $p = .173$ ) when simultaneously analyzed with the direct effect of the constructs above presented (*Table 12– Appendix E*).

A possible explanation for the compromised significance can be related to the existence of a significant mediation by the effect of consumers' hedonic perceptions on decision comfort on AR' effect on purchase intention. This might lead the effect of consumers' hedonic value perceptions to be captured by the effect of decision comfort on the dependent variable under-consideration when simultaneously analyzed.

Results of the control group’s model demonstrated the significance of the independent variables’ simultaneous effect on consumers’ purchase intentions ( $F(4,121) = 50.488, p = .000, R\text{ Square} = .627$ ). The presence of a significant positive direct effect of hedonic ( $\beta = .242, t(121) = 2.260, p = .026$ ) and utilitarian ( $\beta = .290, t(121) = 2.916, p = .004$ ) value perceptions and decision comfort ( $\beta = .373, t(121) = 4.051, p = .000$ ) extracted from a 2D product catalog-enabled service experience on purchase intentions was reported. The direct effect of sense of control revealed to not be significant ( $\beta = -.054, t(121) = -.790, p = .431$ ) (**Table 12– Appendix E**).

The non-significance of the sense of control was already anticipated since it is disrupted by a simulation of physical control over a virtual product offering, an AR-enabled characteristic that is not present in 2D product catalog strategy.

**Figure 8 – Multiple Linear Regression Model: AR versus 2D Product Catalog**



Multiple linear regression equation ( $Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n$ ) is reported for the two models. Comparison between the constructs’ means established by the T-Tests results explored in **Table 11 – Appendix E**

**Source:** Developed by the author based on the data collected through the online survey (2020)

The models’ discrepancy (**Figure 8**) illustrates the volatility of consumers’ intention to purchase make-up products in online retail environments in accordance with the typology of the strategy under-implementation. For make-up retailers that leverage AR as a service enabler in online retail environments, the intention to purchase demonstrates to be directly disrupted by consumers’ utilitarian value perceptions of the service experience, sense of control over a virtual product offering and sense of decision comfort. In contrast, for retailers that implement a 2D product catalog strategy, online purchase intentions are directly driven by consumers’ hedonic and utilitarian value perceptions and sense of decision comfort.

Decision comfort demonstrates to be the most influential factor over consumers' purchase intentions in the two models constructed. The divergence of its effect strength present on the models under-analysis ( $\beta_{DC\_EG} = .516$ ;  $\beta_{DC\_CG} = .373$ ) reveals AR's ability to generate an added-value for retailers since it drives a greater sense of decision comfort ( $M_{DC\_EG} = 4.58$ ,  $M_{DC\_CG} = 3.84$ ), translating into an enhancement of consumers intention to purchase a make-up product in an online retail environment ( $M_{PI\_EG} = 4.12$ ,  $M_{PI\_CG} = 3.19$ ).

## **CHAPTER 6: CONCLUSIONS**

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### **6.1 GENERAL DISCUSSION**

Today's hyper-connect marketplace's digitalization, and subsequently omnichannel strategies integration, presents itself as a challenge for the high-involvement industries (Huang et al., 2019). The online retail environments' inability to delivered meaningful sensory product experiences imposes a constraint to its adoption, that now more than never demonstrates to be a crucial mechanism to generate revenue since due to the Covid-19 pandemic, in-store service experiences are highly restricted, being subjective to lockdown periods and a set of healthcare guidelines that do not allow for product trial.

To surpass the online channel's sensory limitations, companies in the make-up industry are starting to bet on the adoption of AR to simulate the desired sensory experiences in its e-commerce platforms. So, it is imperative to comprehend the managerial implications associated to AR's implementation to determine further how it can be leveraged to generate revenue growth and deliver an added value for consumers.

Implementing AR as an enabler of an online service experience induces greater intention to purchase a make-up product through this channel. Consumer's enhanced sense of control driven from AR's simulation of realistic product trial experiences augments the comfort in the decision, leading to a greater predisposition to purchase make-up products through an online retail environment.

AR proves to have the capability to contribute to a generation of competitive advantage in the area of the service experience, demonstrating to be capable of transposing realistic sensory product interactions to online retail channels, augmenting the perceived hedonic and utilitarian value extracted.

Findings of the present dissertation have so an extreme relevancy for the optimization and leveraging of online retail channels' commercial potential within the make-up industry, as well for the development of unique online service experiences that can surpass the channel's sensorial limitations, resembling a similar experience to the one offered by brick-and-mortar channels with which consumers of this high-involvement product category have great affinity.

### **6.2 MANAGERIAL IMPLICATIONS**

The present dissertation aims to comprehend the impact, benefits and managerial implications that implementation of AR as a strategic solution to surpass the above-described challenge in

online retail environments can disrupt for make-up retailers. By enabling a dynamic approach to online service experiences, AR contributes to an enhancement of consumers' behavioral intentions (Grewal et al., 2020; Roggeveen et al., 2015). The positive relationship between the exposure to AR and purchase intentions indicates that consumers' intentions to purchase a make-up product in an online channel is enhanced by the possibility to virtual try-on the product. Additionally, consumers exposed to an AR-enabled service experience yield greater purchase intentions than the ones that experience a 2D product catalog service. Thus, leveraging on AR is fundamental to augment consumers' intentions to purchase make-up products in online retail environments (RQ1) and maximize the channels' commercial potential.

The combination of AR's environmental embedding and simulated physical control characteristics permits the digitalization of multi-sensory experiences (Hilken et al., 2017). By providing a realistic simulation of product trial, AR reduces the mental efforts required process information (Heller et al., 2019a) contributing to a minimization of the perceived risk, leading to an increase of consumers' intention to conduct a purchase. The effect of AR over consumers' behavioral intentions tends to be subjective to a set of personal physiological traits such as the state of emotional involvement, as well as to consumers' level of mental intangibility (Hilken et al., 2017).

However, the non-significant moderation refutes the subjectiveness of AR's effect on purchase intention to consumers' level of mental intangibility, indicating its cohesiveness regardless whether a consumer has a high or low mental intangibility level (RQ2). Nevertheless, this does not mean that the technology effect is not subjective to consumers' physiological traits; nor that its impact on other behavioral intentions (e.g., WOM and WTP) does not differ in accordance with consumers level of mental intangibility.

The application of AR digitalizes the "touch-and-feel sensory richness" of physical reality to (Brynjolfsson et al., 2013; Hilken et al., 2017) contributing to an enhancement of the service experience dynamism, as well as for the delivery of an added utility that allows for product trials in online retail environments. This heightens the hedonic and utilitarian perceptions of the service experience (Hilken et al., 2017), as shown by the positive relation established between the exposure to AR and hedonic and utilitarian value perceptions. Make-up consumers tend to extract a greater hedonic and utilitarian value from an AR-enabled experience than from one provided by a 2D product catalog solution, therefore reinforcing AR's potential to confer a competitive advantage in online retail environments within the make-up industry.

Permitting a realistic assessment of performance-based characteristics of virtual products (Hilken et al., 2017) and an enhancement of consumers' enjoyment (Grewal et al., 2020), AR augments consumers' sense of decision comfort (Hilken et al., 2017). The positive relation established between the hedonic and utilitarian value perceptions of the AR-enabled service experience and consumers' sense of decision comfort indicates that the service delivering improvements driven from AR's adoption are crucial to make consumers' feel comfortable with the decision to purchase make-up products in online retail environments.

Moreover, consumers' hedonic and utilitarian value perceptions of an AR-enabled service experience translate into an augmentation of the intention to purchase (Grewal et al., 2020; Hilken et al., 2017) make-up products in e-commerce platforms (RQ3). A conclusion supported by the positive relationship between hedonic and utilitarian value perceptions of the AR-enabled service experience and consumers' purchase intentions.

By enabling consumers to virtually try-on a determined product offering, AR arouses equal "touch sensory-motor experiences" to the ones experienced when product evaluating in brick-and-mortar channels (Heller et al., 2019b), leading to an increase of consumers' sense of control over said product offering. As is illustrated by the positive relation established between the exposure to AR and consumers' sense of control.

Furthermore, the usage of realistic sensory-motor experiences also translates into an enhancement of consumers sense of decision comfort (Heller et al., 2019b), revealing that the sense of control over a virtual product offering enhances consumers' comfort regarding the decision to acquire a make-up product through an online retail channel. Supporting this, is the positive relationship between sense of control and decision comfort.

Consumers' sense of control enabled by AR also demonstrate to increase purchase intentions (RQ4), as established by the positive relation between the sense of control and purchase intentions. AR's simulated physical control characteristic disrupts the feeling that indeed that product is more tangible than when displayed in a 2D product catalog (Heller et al., 2019b) generating so greater sense of control. Thus, its leveraging is essential.

AR's spatial presence characteristic enables the formulation of affective-based cues that contribute to an increase of consumers' sense of decision comfort towards a determined product offering in online retail environments (Hilken et al., 2017; Parker et al., 2016). Consumers' decision comfort driven from an AR-enabled service experience augments the intention to

purchase a make-up product in an online retail environment (RQ5), as demonstrated by the positive relation between decision comfort and purchase intentions.

The above-described influence is subjective to the effect of consumers' sense of control and hedonic and utilitarian value perceptions of the AR-enabled service experience. The positive mediation of the effect of (a) sense of control, (b) hedonic and (c) utilitarian value perceptions on decision comfort on the effect of the application of AR on purchase intentions indicates that consumers' intentions to purchase a make-up product in an online retail environment are greater when they can experience higher levels of sense of control of a virtual product offering and extract higher hedonic and utilitarian value of the service experience since it confers an increased sense of comfort towards the make-up product that they are considering to purchase.

Combining the fact that decision comfort is the most influential factor over consumers' intention to purchase make-up products in online retail environments with the significantly greater sense of decision comfort experienced by individuals when exposed to AR-enabled service experience (versus 2D product catalog); it is possible to conclude that implementing AR as a strategy to drive growth in online channels is imperative.

In sum, leveraging on AR in the high-involvement make-up industry demonstrates to be fundamental to potentialize the performance of online retail channels since this technology disrupts the offering of an unique value to consumers, enabling the digitalization of sensorial experiences, and has the potential to generate revenue growth since consumers' demonstrate greater intentions to purchase than when in the presence of the 2D product catalog strategy implemented by most of the industry's retailers.

### **6.3 THEORETICAL IMPLICATIONS**

The study findings demonstrate to disrupt a contribution to the existing literature in several manners. Previous research has contemplated the effects of AR on hedonic and utilitarian value perceptions of the service experience (Hilken et al., 2017), sense of control (Heller et al., 2019b) and decision comfort (Hilken et al., 2017). Nonetheless, each construct's direct impact and simultaneous direct effect on purchase intentions when AR is present have not been antecedently assessed. The present study further makes a contribution to the literature by exploring the discrepancy of the constructs' behaviors and influence on purchase intentions when the service experience is provided by AR versus a 2D product catalog solution.

Subsequently, the establishment of the existing mediation by the effect of (a) sense of control, (b) hedonic and (c) utilitarian value perceptions on decision comfort on the effect of AR on

purchase intentions expands existing research, introducing a set of unprecedentedly analyzed relations.

Furthermore, the direct effect of AR on consumers' intention to purchase a determined product offering in an online retail environment also represents a new approach to the existing literature. By analyzing its subjectiveness to consumers' ability to formulate mental visual product representations when the sensory experience is not present, this study advances the research of (Heller et al., 2019b) and (Hilken et al., 2017).

The present research study elaborates an industry-specific analysis, leading its findings to contribute to research regarding the adoption of online retail environments and proposing a strategy to surpass its insufficiencies to deliver sensory experiences.

#### **6.4 LIMITATIONS AND FUTURE RESEARCH**

The conceptualization of the present research study faced several limitations. The scarcity of the resources available to construct the manipulation conditions is identified as the first constraint. The inaccessibility to technology resources necessary to develop an actual AR interface led to the decision to test the postulated relationships through a concept testing video methodology. Adding on to this, is the Covid-19 pandemic restrictions and healthcare guidelines that imposed a constraint to the elaboration of a presential experiment.

Therefore, although it demonstrates to drive accurate and coherent results, the model should be tested in a presential experiment where participants could conduct the experience themselves to validate further the relationships accepted. For that, existing AR and 2D product catalog interfaces could be manipulated to represent the fictional retailer's online platform as controlling for possible response bias due to brand knowledge and loyalty is of extreme importance. Moreover, the elaboration of a set of instructions regarding the experience flow with the manipulation condition would be imperative to ensure the comparability of each participants' experiences.

Furthermore, the study focuses on understanding AR's impact on purchase intentions in a specific segment leading its managerial implications and recommendations not to be transposable to other product segments that integrate the cosmetic industry. Therefore, the proposed model must be tested for the following product categories that, just like the make-up one, struggle to thrive in digital retail platforms due to the existent limitations to deliver the desired sensorial experiences.

The proposed conceptual framework solely focusses on comprehending the impact of visual and touch sensory stimuli limitations not accounting for the possible impact of other relevant senses that might influence consumers decision-making – for example, in the fragrances product category the product differential factor is highly correlated to one’s olfactory sensations, being so imperative that this is taken into consideration when assessing the digitalization of its the retail service experience.

It is so recommended that future research focuses on understanding other sensory stimuli’s impact on the performance of online retail environments and on discovering a strategic solution to surpass the constraints to it related in order maximize the potential of online retail environments, and subsequently, attain greater levels of revenue growth and deliver unique service experiences.

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## APPENDIX

### APPENDIX A – CONSTRUCTS AND MEASUREMENTS

Table 3 - Overview of constructs and measurement items

Main Topics	Research Objectives	List of Items	Items	Adapted from
Screening Question	Ensure that the individuals that compose the sample have a relationship with the product category in analysis.	<b>SQ1:</b> Are you a consumer of make-up products?	Yes No	Developed by the author
Consumption Habits	Understand consumers' level of involvement with the make-up product category. Analyze make-up consumers' level of e-commerce adoption. Determine the sample's consumption profile.	<b>CH1:</b> Please indicate the importance that make-up products have for you. (Rate from 1= Not Important to and 7 = Extremely Important)	1. Not Important ... 7. Extremely Important	Developed by the author
		<b>CH2:</b> Please indicate where do you usually purchase make-up products.	Supermarkets Specialized Retailers (e.g., Douglas, Sephora) Online Stores Pharmacies Others	
Purchase Intentions	Analyze make-up consumers' purchase intentions in an online retail environment. Determine the effect that AR-enabled service experience have on consumers' purchase intentions.	<b>PI Intro:</b> Please indicate the extent to which you agree with the following statements. (Rate from 1 = Strongly Disagree to 7 = Strongly Agree)	N.A.	Developed by the author
		<b>PI1:</b> I intent to buy a lipstick in this online store.	1. Strongly Disagree	(Lian & Yen, 2014) (Hilken et al., 2017)
		<b>PI2:</b> I would buy make-up products in this online store in the future.	... 7. Strongly Agree	

		<b>PI3:</b> I would consider this online store as one of my first choices to buy make-up products.		
Mental Intangibility	Understand how consumers' ability to formulate mental representations of a product offering affects their behavioral intentions in online retail environments.	<b>MI Intro:</b> Please state the extent to which you relate to the following statements. (Rate from 1 = Strongly Disagree to 7 = Strongly Agree)	N.A.	Developed by the author
		<b>MI1:</b> I need more information about the lipstick to get a clear image of what it is.	1. Strongly Disagree ... 7. Strongly Agree	(Laroche et al., 2001) (Heller et al., 2019b)
		<b>MI2:</b> It is not easy to picture how the lipstick would look on me. (R)		
		<b>MI3:</b> I have a clear picture of how the lipstick would look on me.		
		<b>MI4:</b> The image of how the lipstick would look on comes to my mind right away.		
Perceived Value	Understand how consumers characterize the value obtained through an online service experience.  Analyze if the application of AR potentializes hedonic and/or utilitarian value perceptions.  Determine if consumers' value perceptions of the service experience influence purchase intentions and decision comfort.	<b>PV Intro:</b> Please state the extent to which you identify with the following statements. (Rate from 1 = Strongly Disagree to 7 = Strongly Agree)	N.A.	Developed by the author
		<b>Hedonic Value</b>	1. Strongly Disagree ... 7. Strongly Agree	(Childers et al., 2001) (Hilken et al., 2017)
		<b>HV1:</b> The virtual try-on/ product catalog experience in the video made me feel good.***		
		<b>HV2:</b> The virtual try-on/ product catalog experience in the video was boring. (R)***		
		<b>HV3:</b> The virtual try-on/ product catalog experience in the video was exciting.***		
		<b>HV4:</b> The virtual try-on/ product catalog experience in the video was enjoyable.***		

		<p><b>Utilitarian Value</b></p> <p><b>UV1:</b> The virtual try-on/ product catalog experience in the video would improve my performance when evaluating a make-up product online.***</p> <p><b>UV2:</b> The virtual try-on/ product catalog experience in the video would be useful to evaluate make-up products online.***</p> <p><b>UV3:</b> Using the virtual try-on/ product catalog experience in the video would enhance my effectiveness in shopping make-up products online. ***</p>		
Sense of Control	Determine if consumers can experience a sense of control over a product offering in online retail environments.	<b>SC Intro:</b> Please indicate the extent to which you agree with the following statements. (Rate from 1 = Strongly Disagree to 7 = Strongly Agree)	N.A.	Developed by the author
	Analyze if the application of AR enhances consumers' sense of control in online retail environments.	<b>SC1:</b> I got the sense that I could virtually touch the product.	1. Strongly Disagree ... 7. Strongly Agree	(Heller et al., 2019b)
	Comprehend the impact of consumers' sense of control on the generation of purchase intentions and decision comfort.	<b>SC2:</b> I got the sense that I could rotate the product using my hands.		
Decision Comfort	Understand what drives consumers decision comfort when purchasing a make-up product in an online retail environment	<b>DC1 Intro:</b> Please state the extent to which you identify with the following statements. (Rate from 1 = Strongly Disagree to 7 = Strongly Agree)	N.A.	Developed by the author
	Determine if the application of AR increases consumers' levels of decision comfort.	<b>DC1:</b> I am comfortable with choosing a lipstick in this online store.	1. Strongly Disagree ... 7. Strongly Agree	(Parker et al., 2016) (Hilken et al., 2017)
		<b>DC2:</b> I feel good about choosing a lipstick in this online store.		

	Analyze the impact of consumers' level of decision comfort on the generation of the intention to purchase a determined product offering in online environments.	<p><b>DC3:</b> I am experiencing negative emotions about choosing a lipstick in this online store. (R)</p> <p><b>DC4:</b> Whether or not it is “the best choice,” I am okay with choosing to buy a lipstick in this online store.</p> <p><b>DC5:</b> Although I don't know if this product is the best, I feel perfectly comfortable with purchasing it in this online store.</p>		
Demographic Data	Gather information about the demographic characterization of the respondents to further define the sample's profile.	<p><b>DD1:</b> Please indicate your gender.</p> <p><b>DD2:</b> Please state your age.</p> <p><b>DD3:</b> Please select which group of monthly income you fall under (after-tax reduction).</p>	<p>Male</p> <p>Female</p> <p>Prefer not to say</p> <p>Less than 25 years old</p> <p>26 – 35 years old</p> <p>36 – 45 years old</p> <p>46 – 55 years old</p> <p>&gt; 55 years old</p> <p>&lt; 600€</p> <p>601 – 800€</p> <p>801 – 1000€</p> <p>1001 – 1500€</p> <p>1501 – 2000€</p> <p>&gt; 2000€</p>	Developed by the author

(R) Reserve-coded item. \*\*\* Item adapted in accordance with the manipulation condition. For the experimental group (AR Manipulation Condition) the item mentions the virtual try-on experience. For the control group (2D Product Catalog Manipulation Condition) the item refers the product catalog experience.

Source: Developed by the author based on the scales implemented by (Lian & Yen, 2014), (Hilken et al., 2017), (Laroche et al., 2001), (Heller et al., 2019b), (Childers et al., 2001), (Parker et al., 2016)

## **APPENDIX B – EXPERIMENTAL GROUP SURVEY**

### **Introduction**

**PT:** Caro/a participante,

O presente questionário está a ser conduzido por uma aluna do Mestrado em Gestão com Especialização em Marketing Estratégico da Católica Lisbon School of Business & Economics, no âmbito do seminário de dissertação "Digital Marketing: Revamping the Marketing-Mix as we know it".

Este estudo tem como objetivo analisar as opiniões dos consumidores relativamente à compra de produtos de cosmética através de canais de venda online.

A sua contribuição e honestidade são de extrema importância para recolher as informações necessárias para a condução deste estudo, sendo assegurada a sua total confidencialidade. Não existe respostas certas ou erradas.

A duração deste questionário é de aproximadamente 4 minutos

Agradeço desde já, a atenção e tempo despendido a completar este questionário!

**ENG:** Dear Participant,

The present questionnaire is being conducted by Master in Management with Specialization in Strategic Marketing student at Católica Lisbon School of Business & Economics, within the scope of the dissertation "Digital Marketing: Revamping the Marketing-Mix as we know it".

This study aims to analyze consumers opinions regarding the purchase of cosmetic products in online retail environments.

Your contribution and honesty are of extreme importance to collect the necessary information for the conduction of this study. The total confidentiality of your data is ensured. There are no right or wrong answers.

The duration of this questionnaire is approximately 4 minutes.

Thank you in advance for your attention and time spent completing this questionnaire!

### Section 1: Screening Question

**Q1 PT:** É consumidor/a de produtos de maquiagem? / **ENG:** Are you a consumer of make-up product? (SQ1)

- PT:** Sim / **ENG:** Yes (1)
- PT:** Não / **ENG:** No (2)

### Section 2: Experimental Group - Consumption Habits

**Q2 PT:** Por favor, indique qual a importância que produtos de maquiagem têm para si. (Classifique de 1 = Nada Importante a 7 = Extremamente Importante) / **ENG:** Please indicate the importance that make-up products have for you. (Rate from 1= Not Important to and 7 = Extremely Important)

PT	1 = Nada Importante (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Extremamente Importante (7)
Importância dos Produtos de Maquiagem (CH1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ENG	1 = Not Important (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Extremely Important (7)
Importance of make-up products (CH1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q3 PT:** Por favor, indique onde costuma comprar produtos de maquiagem. / **ENG:** Please indicate where do you usually purchase make-up products. (CH2)

- PT:** Supermercados/ **ENG:** Supermarkets (1)
- PT:** Lojas Especializadas (ex: Sephora, Douglas, KIKO) / **ENG:** Specialized Retailers (ex: Sephora, Douglas, KIKO) (2)
- PT:** Farmácias/ **ENG:** Pharmacies (3)
- PT:** Lojas Online / **ENG:** Online Stores (4)
- PT:** Outros/ **ENG:** Others (5)

### Section 3: Experimental Group - Concept Testing - AR Manipulation

**PT:** NUE Cosmetics & Skincare é uma marca de maquiagem emergente no mercado, que acabou de lançar a sua loja online. O vídeo que se segue, ilustra a experiência de um consumidor ao comprar um produto de maquiagem através desta plataforma.

Por favor, veja o vídeo imaginando que está a conduzir uma experiência similar à demonstrada:

Começa por explorar a homepage da loja online para poder conhecer as diferentes ofertas de produtos disponíveis, em seguida avalia através do menu principal que tipo de produto deseja comprar, acabando por escolher comprar um batom.

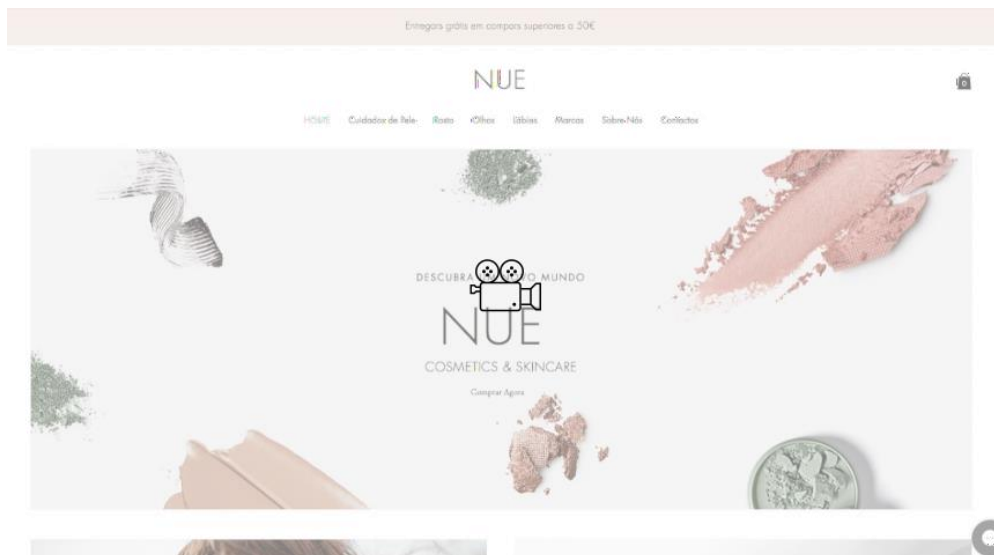
Ao explorar as diferentes ofertas opta por saber mais sobre o batom NUE Collection Matte HotPink através da sua página de produto. Ao entrar nesta, verifica no menu lateral que existe a possibilidade de experimentar o produto em si através de uma funcionalidade de **virtual try-on**. Decide então, experimentar o produto em si para melhor perceber como este lhe ficaria. Inicialmente, experimenta o batom na tonalidade HotPink mas decide também experimentá-lo em Nude, acabando assim por escolher comprar o batom nesta tonalidade.

**ENG:** NUE Cosmetics & Skincare is an emerging makeup brand that has just launched its online store. The following video illustrates a consumer's experience when purchasing a make-up product through this platform.

Please watch the video imagining that you are conducting an experience similar to the one shown:

Starting by exploring the online store's homepage to discover the different product offers available. Proceeding to use the main menu to decide which typology of product you desire to purchase. After evaluating the offers available, you choose to purchase a lipstick.

When exploring the different lipstick offers available, you choose to learn more about the NUE Collection Matte HotPink lipstick through its product page. Upon entrance, you observe that there is the possibility to try the product on yourself through a **virtual try-on** functionality. You then decide to try the product to better understand how it would look. At first, you try the lipstick in the HotPink shade but then you also decide to try it on the Nude shade. You end up choosing to purchase the lipstick in the latter shade.



(Concept testing video presented in the questionnaire platform.)

#### Section 4: Experimental Group: Questions Introduction Message - Instructions

**PT:** Peça agora então, que responda as questões que se seguem baseando-se na experiência de compra através do **virtual try-on** que acabou de experienciar no vídeo, indicando como se sentiria caso tivesse na presença de uma situação similar à apresentada.

**ENG:** I now ask you to answer the following questions based on the **virtual try-on** purchase experience that you just experienced in the video, indicating how you would feel if you were in the presence of a similar situation to the one presented.

#### Section 5: Experimental Group - Purchase Intentions Construct

**Q4 PT:** Por favor, indique o seu nível de concordância com as afirmações que se seguem. (Classifique de 1 = Discordo Totalmente a 7 = Concordo Totalmente)/ **ENG:** Please indicate the extent to which you agree with the following statements. (Rate from 1 = Strongly Disagree to 7 = Strongly Agree)

PT	1 = Discordo Totalmente (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Concordo Totalmente (7)
Tenciono comprar um batom através desta loja online. (PI1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No futuro, compraria produtos de maquilhagem nesta loja online. (PI2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Consideraria esta loja online como uma das minhas primeiras opções para comprar produtos de maquiagem. (PI3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>ENG</b>	1 = Strongly Disagree (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Strongly Agree (7)
I intent to buy a lipstick in this online store. (PI1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would buy make-up products in this online store in the future. (PI2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would consider this online store as one of my first choices to buy make-up products. (PI3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Section 6: Experimental Group - Mental Intangibility Construct

**Q5 PT:** Por favor, indique até que ponto se relaciona com as afirmações que se seguem. (*Classifique de 1 = Discordo Totalmente a 7 = Concordo Totalmente*)/ **ENG:** Please state the extent to which you relate to the following statements. (*Rate from 1 = Strongly Disagree to 7 = Strongly Agree*)

<b>PT</b>	1 = Discordo Totalmente (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Concordo Totalmente (7)
Preciso de mais informação sobre o batom para ter uma imagem clara das suas características. (MI1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Não é fácil imaginar como o batom ficaria em mim. (MI2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Tenho uma imagem clara sobre como o batom ficaria em mim. (MI3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A imagem de como o batom ficaria em mim vem-me imediatamente à cabeça. (MI4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>ENG</b>	1 = Strongly Disagree (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Strongly Agree (7)
I need more information about the lipstick to get a clear image of what it is. (MI1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is not easy to picture how the lipstick would look on me. (MI2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a clear picture of how the lipstick would look on me. (MI3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The image of how the lipstick would look on comes to my mind right away. (MI4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Section 7: Experimental Group - Perceived Value Construct

**Q6 PT:** Por favor, declare até que ponto se identifica com as afirmações que se seguem. (*Classifique de 1 = Discordo Totalmente a 7 = Concordo Totalmente*) / **ENG:** Please state the extent to which you identify with the following statements. (*Rate from 1 = Strongly Disagree to 7 = Strongly Agree*)

<b>PT</b>	1 = Discordo Totalmente (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Concordo Totalmente (7)
A experiência com o virtual try-on no vídeo fez-me sentir bem. (HV1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

A experiência com o virtual try-on no vídeo foi aborrecida. (HV2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A experiência com o virtual try-on no vídeo foi excitante. (HV3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A experiência com o virtual try-on no vídeo foi agradável. (HV4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A experiência com o virtual try-on no vídeo iria melhorar a minha performance a avaliar produtos de maquilhagem em lojas online. (UV1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A experiência com o virtual try-on no vídeo seria útil para avaliar produtos de maquilhagem em lojas online. (UV2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A experiência com o virtual try-on no vídeo iria melhorar a minha eficácia a comprar produtos de maquilhagem em lojas online. (UV3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>ENG</b>	1 = Strongly Disagree (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Strongly Agree (7)
The virtual try-on in the video made me feel good. (HV1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The virtual try-on experience in the video was boring. (HV2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The virtual try-on experience in the video was exciting. (HV3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The virtual try-on experience in the video was enjoyable. (HV4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The virtual try-on experience in the video would improve my performance when evaluating a make-up product online. (UV1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The virtual try-on experience in the video would be useful to evaluate make-up products online. (UV2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using the virtual try-on experience in the video would enhance my effectiveness in shopping make-up products online. (UV3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Section 8: Experimental Group - Sense of Control Construct

**Q7 PT:** Por favor, indique o seu nível de concordância com as seguintes afirmações. (*Classifique de 1 = Discordo Totalmente a 7 = Concordo Totalmente*) / **ENG:**

Please indicate the extent to which you agree with the following statements. (*Rate from 1 = Strongly Disagree to 7 = Strongly Agree*)

PT	1 = Discordo Totalmente (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Concordo Totalmente (7)
Tive a sensação de que conseguia tocar no produto virtualmente. (SC1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tive a sensação de que conseguia rodar o produto com as minhas mãos. (SC2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tive a sensação de que conseguia mover o produto com as minhas mãos. (SC3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ENG	1 = Strongly Disagree (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Strongly Agree (7)
I got the sense that I could virtually touch the product. (SC1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I got the sense that I could rotate the product using my hands. (SC2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I got the sense that I could rotate the product using my hands. (SC3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Section 9: Experimental Group - Decision Comfort Construct

**Q8 PT:** Por favor, declare até que ponto se identifica com as seguintes afirmações. (*Classifique de 1 = Discordo Totalmente a 7 = Concordo Totalmente*) / **ENG:** Please state the extent to which you identify with the following statements. (*Rate from 1 = Strongly Disagree to 7 = Strongly Agree*)

PT	1 = Discordo Totalmente (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Concordo Totalmente (7)
Sinto-me confortável em escolher um batom nesta loja online (DC1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sinto-me bem sobre escolher um batom nesta loja online. (DC2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Estou a sentir emoções negativas sobre escolher um batom nesta loja online. (DC3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quer ou não esta escolha seja "a melhor escolha", sinto-me bem sobre escolher um batom nesta loja online. (DC4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Embora não saiba se este produto é o melhor, sinto-me completamente confortável em comprá-lo nesta loja online. (DC5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>ENG</b>	1 = Strongly Disagree (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Strongly Agree (7)
I am comfortable with choosing a lipstick in this online store. (DC1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel good about choosing a lipstick online in this online. (DC2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am experiencing negative emotions about choosing a lipstick in this online store. (DC3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whether or not it is “the best choice”, I am okay with choosing to buy a lipstick in this online store. (DC4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Although I don’t know if this product is the best, I feel perfectly comfortable with purchasing it in this online store. (DC5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Section 10: Experimental Group - Demographic Data

**Q9 PT:** Por favor, indique o seu género. / **ENG:** Please indicate your gender. (DD1)

- PT:** Feminino/ **ENG:** Female (1)
- PT:** Masculino / **ENG:** Male (2)
- PT:** Prefiro não dizer / **ENG:** Prefer not to say (3)

**Q10 PT:** Por favor, indique a sua idade. / **ENG:** Please indicate your age. (DD2)

- PT:** < 25 anos / **ENG:** < 25 years old (1)

- **PT:** 26 - 35 anos / **ENG:** 26 - 35 years old (2)
- **PT:** 36 - 45 anos / **ENG:** 36 - 45 years old (3)
- **PT:** 46 - 55 anos / **ENG:** 46 - 55 years old (4)
- **PT:** > 55 anos / **ENG:** > 55 years old (5)

**Q11 PT:** Por favor, indique o seu nível de rendimento mensal líquido./ **ENG:** Please select which group of monthly income you fall under (after-tax reduction). (DD3)

- **PT / ENG:** < 600€ (1)
- **PT / ENG:** 600 - 800€ (2)
- **PT / ENG:** 801€ - 1 000€ (3)
- **PT / ENG:** 1 001€ - 1 500€ (4)
- **PT / ENG:** 1 501€ - 2 000€ (5)
- **PT / ENG:** > 2 000€ (6)

#### **Section 11: Experimental Group - Ending Message**

**PT:** Agradecemos a sua participação neste inquérito. A sua resposta foi registada. / **ENG:** We thank you for your time spend taking this survey. Your response has been recorded.

## **APPENDIX C – CONTROL GROUP SURVEY**

### **Introduction**

**PT:** Caro/a participante,

O presente questionário está a ser conduzido por uma aluna do Mestrado em Gestão com Especialização em Marketing Estratégico da Católica Lisbon School of Business & Economics, no âmbito do seminário de dissertação "Digital Marketing: Revamping the Marketing-Mix as we know it".

Este estudo tem como objetivo analisar as opiniões dos consumidores relativamente à compra de produtos de cosmética através de canais de venda online.

A sua contribuição e honestidade são de extrema importância para recolher as informações necessárias para a condução deste estudo, sendo assegurada a sua total confidencialidade. Não existe respostas certas ou erradas.

A duração deste questionário é de aproximadamente 4 minutos

Agradeço desde já, a atenção e tempo despendido a completar este questionário!

**ENG:** Dear Participant,

The present questionnaire is being conducted by Master in Management with Specialization in Strategic Marketing student at Católica Lisbon School of Business & Economics, within the scope of the dissertation "Digital Marketing: Revamping the Marketing-Mix as we know it".

This study aims to analyze consumers opinions regarding the purchase of cosmetic products in online retail environments.

Your contribution and honesty are of extreme importance to collect the necessary information for the conduction of this study. The total confidentiality of your data is ensured. There are no right or wrong answers.

The duration of this questionnaire is approximately 4 minutes.

Thank you in advance for your attention and time spent completing this questionnaire!

### Section 1: Screening Question

**Q1 PT:** É consumidor/a de produtos de maquiagem? / **ENG:** Are you a consumer of make-up product? (SQ1)

- PT:** Sim / **ENG:** Yes (1)
- PT:** Não / **ENG:** No (2)

### Section 2: Control Group - Consumption Habits

**Q2 PT:** Por favor, indique qual a importância que produtos de maquiagem têm para si. (Classifique de 1 = Nada Importante a 7 = Extremamente Importante) / **ENG:** Please indicate the importance that make-up products have for you. (Rate from 1= Not Important to and 7 = Extremely Important)

PT	1 = Nada Importante (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Extremamente Importante (7)
Importância dos Produtos de Maquiagem (CH1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ENG	1 = Not Important (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Extremely Important (7)
Importance of make-up products (CH1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q3 PT:** Por favor, indique onde costuma comprar produtos de maquiagem. / **ENG:** Please indicate where do you usually purchase make-up products. (CH2)

- PT:** Supermercados/ **ENG:** Supermarkets (1)
- PT:** Lojas Especializadas (ex: Sephora, Douglas, KIKO) / **ENG:** Specialized Retailers (ex: Sephora, Douglas, KIKO) (2)
- PT:** Farmácias/ **ENG:** Pharmacies (3)
- PT:** Lojas Online / **ENG:** Online Stores (4)
- PT:** Outros/ **ENG:** Others (5)

### Section 3: Control Group - Concept Testing - 2D Product Catalog Manipulation

**PT:** NUE Cosmetics & Skincare é uma marca de maquiagem emergente no mercado, que acabou de lançar a sua loja online. O vídeo que se segue, ilustra a experiência de um consumidor ao comprar um produto de maquiagem através desta plataforma.

Por favor, veja o vídeo imaginando que está a conduzir uma experiência similar à demonstrada:

Começa por explorar a homepage da loja online para poder conhecer as diferentes ofertas de produtos disponíveis. Em seguida avalia através do menu principal que tipo de produto deseja comprar, acabando por escolher um batom.

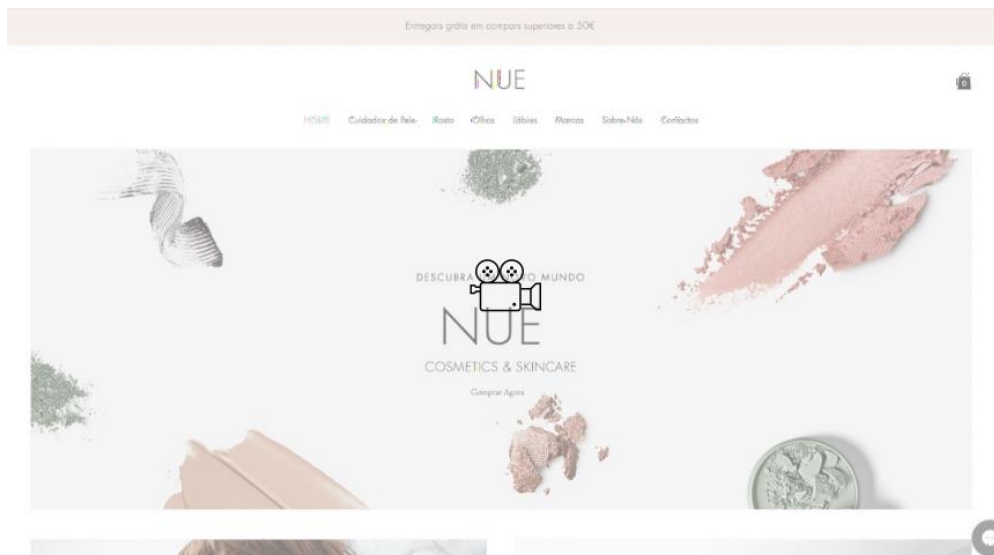
Ao explorar as diferentes ofertas opta por saber mais sobre o batom NUE Collection Matte HotPink através da sua página de produto. Ao entrar nesta, verifica através do **catálogo de produtos** que o batom que escolheu existe também na cor Nude, acabando assim por escolher comprar o batom nesta tonalidade.

**ENG:** NUE Cosmetics & Skincare is an emerging makeup brand that has just launched its online store. The following video illustrates a consumer's experience when purchasing a make-up product through this platform.

Please watch the video imagining that you are conducting an experience similar to the one shown:

Starting by exploring the online store's homepage to discover the different product offers available. Proceeding to use the main menu to decide which typology of product you desire to purchase. After evaluating the offers available, you choose to purchase a lipstick.

When exploring the different lipstick offers available, you choose to learn more about the NUE Collection Matte HotPink lipstick through its product page. Upon entrance, through the **product catalog** displayed you are able to understand that the lipstick chosen is also available in a Nude shade. You end up choosing to purchase the product in the latter shade.



(Concept testing video presented in the questionnaire platform.)

#### Section 4: Control Group - Questions Introduction Message - Instructions

**PT:** Peça agora então, que responda as questões que se seguem baseando-se na experiência de compra através do **catálogo de produtos** que acabou de experienciar no vídeo, indicando como se sentiria caso tivesse na presença de uma situação similar à apresentada.

**ENG:** I now ask you to answer the following questions based on the **product catalog** purchase experience that you just experienced in the video, indicating how you would feel if you were in the presence of a similar situation to the one presented.

#### Section 5: Control Group - Purchase Intentions Construct

**Q4 PT:** Por favor, indique o seu nível de concordância com as afirmações que se seguem. (Classifique de 1 = *Discordo Totalmente* a 7 = *Concordo Totalmente*) / **ENG:** Please indicate the extent to which you agree with the following statements. (Rate from 1 = *Strongly Disagree* to 7 = *Strongly Agree*)

PT	1 = Discordo Totalmente (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Concordo Totalmente (7)
Tenciono comprar um batom através desta loja online. (PI1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No futuro, compraria produtos de maquilhagem nesta loja online. (PI2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Consideraria esta loja online como uma das minhas primeiras opções para comprar produtos de maquiagem. (PI3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>ENG</b>	1 = Strongly Disagree (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Strongly Agree (7)
I intent to buy a lipstick in this online store. (PI1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would buy make-up products in this online store in the future. (PI2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would consider this online store as one of my first choices to buy make-up products. (PI3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Section 6: Control Group - Mental Intangibility Construct

**Q5 PT:** Por favor, indique até que ponto se relaciona com as afirmações que se seguem. (*Classifique de 1 = Discordo Totalmente a 7 = Concordo Totalmente*) / **ENG:** Please state the extent to which you relate to the following statements. (*Rate from 1 = Strongly Disagree to 7 = Strongly Agree*)

<b>PT</b>	1 = Discordo Totalmente (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Concordo Totalmente (7)
Preciso de mais informação sobre o batom para ter uma imagem clara das suas características. (MI1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Não é fácil imaginar como o batom ficaria em mim. (MI2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Tenho uma imagem clara sobre como o batom ficaria em mim. (MI3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A imagem de como o batom ficaria em mim vem-me imediatamente à cabeça. (MI4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>ENG</b>	1 = Strongly Disagree (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Strongly Agree (7)
I need more information about the lipstick to get a clear image of what it is. (MI1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is not easy to picture how the lipstick would look on me. (MI2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a clear picture of how the lipstick would look on me. (MI3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The image of how the lipstick would look on comes to my mind right away. (MI4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Section 7: Control Group - Perceived Value Construct

**Q6 PT:** Por favor, declare até que ponto se identifica com as afirmações que se seguem. (*Classifique de 1 = Discordo Totalmente a 7 = Concordo Totalmente*) / **ENG:** Please state the extent to which you identify with the following statements. (*Rate from 1 = Strongly Disagree to 7 = Strongly Agree*)

<b>PT</b>	1 = Discordo Totalmente (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Concordo Totalmente (7)
A experiência com o catálogo de produtos no vídeo fez-me sentir bem. (HV1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

A experiência com o catálogo de produtos no vídeo foi aborrecida. (HV2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A experiência com o catálogo de produtos no vídeo foi excitante. (HV3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A experiência com o catálogo de produtos no vídeo foi agradável. (HV4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A experiência com o catálogo de produtos no vídeo iria melhorar a minha performance a avaliar produtos de maquilhagem em lojas online. (UV1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A experiência com o catálogo de produtos no vídeo seria útil para avaliar produtos de maquilhagem em lojas online. (UV2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A experiência com o catálogo de produtos no vídeo iria melhorar a minha eficácia a comprar produtos de maquilhagem em lojas online. (UV3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>ENG</b>	1 = Strongly Disagree (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Strongly Agree (7)
The product catalog experience in the video made me feel good. (HV1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The product catalog experience in the video was boring. (HV2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The product catalog experience in the video was exciting. (HV3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The product catalog experience in the video was enjoyable. (HV4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The product catalog experience in the video would improve my performance when evaluating a make-up product online. (UV1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The product catalog experience in the video would be useful to evaluate make-up products online. (UV2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using the product catalog experience in the video would enhance my effectiveness in shopping make-up products online. (UV3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Section 8: Control Group - Sense of Control Construct

**Q7 PT:** Por favor, indique o seu nível de concordância com as seguintes afirmações. (*Classifique de 1 = Discordo Totalmente a 7 = Concordo Totalmente*) / **ENG:**

Please indicate the extent to which you agree with the following statements. (*Rate from 1 = Strongly Disagree to 7 = Strongly Agree*)

PT	1 = Discordo Totalmente (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Concordo Totalmente (7)
Tive a sensação de que conseguia tocar no produto virtualmente. (SC1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tive a sensação de que conseguia rodar o produto com as minhas mãos. (SC2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Tive a sensação de que conseguia mover o produto com as minhas mãos. (SC3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>ENG</b>	1 = Strongly Disagree (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Strongly Agree (7)
I got the sense that I could virtually touch the product. (SC1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I got the sense that I could rotate the product using my hands. (SC2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I got the sense that I could rotate the product using my hands. (SC3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Section 9: Control Group - Decision Comfort Construct

**Q8 PT:** Por favor, declare até que ponto se identifica com as seguintes afirmações. (*Classifique de 1 = Discordo Totalmente a 7 = Concordo Totalmente*) / **ENG:** Please state the extent to which you identify with the following statements. (*Rate from 1 = Strongly Disagree to 7 = Strongly Agree*)

<b>PT</b>	1 = Discordo Totalmente (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 = Concordo Totalmente (7)
Sinto-me confortável em escolher um batom nesta loja online (DC1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sinto-me bem sobre escolher um batom nesta loja online. (DC2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Estou a sentir emoções negativas sobre escolher um batom nesta loja online. (DC3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Quer ou não esta escolha seja "a melhor escolha", sinto-me bem sobre escolher um batom nesta loja online. (DC4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Embora não saiba se este produto é o melhor, sinto-me completamente confortável em comprá-lo nesta loja online. (DC5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>ENG</b>	<b>1 = Strongly Disagree (1)</b>	<b>2 (2)</b>	<b>3 (3)</b>	<b>4 (4)</b>	<b>5 (5)</b>	<b>6 (6)</b>	<b>7 = Strongly Agree (7)</b>
I am comfortable with choosing a lipstick in this online store. (DC1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel good about choosing a lipstick online in this online. (DC2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am experiencing negative emotions about choosing a lipstick in this online store. (DC3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whether or not it is "the best choice", I am okay with choosing to buy a lipstick in this online store. (DC4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Although I don't know if this product is the best, I feel perfectly comfortable with purchasing it in this online store. (DC5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Section 10: Control Group - Demographic Data

**Q9 PT:** Por favor, indique o seu género. / **ENG:** Please indicate your gender. (DD1)

- PT:** Feminino/ **ENG:** Female (1)
- PT:** Masculino / **ENG:** Male (2)

- **PT:** Prefiro não dizer / **ENG:** Prefer not to say (3)

**Q10 PT:** Por favor, indique a sua idade. / **ENG:** Please indicate your age. (DD2)

- **PT:** < 25 anos / **ENG:** < 25 years old (1)
- **PT:** 26 - 35 anos / **ENG:** 26 - 35 years old (2)
- **PT:** 36 - 45 anos / **ENG:** 36 - 45 years old (3)
- **PT:** 46 - 55 anos / **ENG:** 46 - 55 years old (4)
- **PT:** > 55 anos / **ENG:** > 55 years old (5)

**Q11 PT:** Por favor, indique o seu nível de rendimento mensal líquido./ **ENG:** Please select which group of monthly income you fall under (after-tax reduction). (DD3)

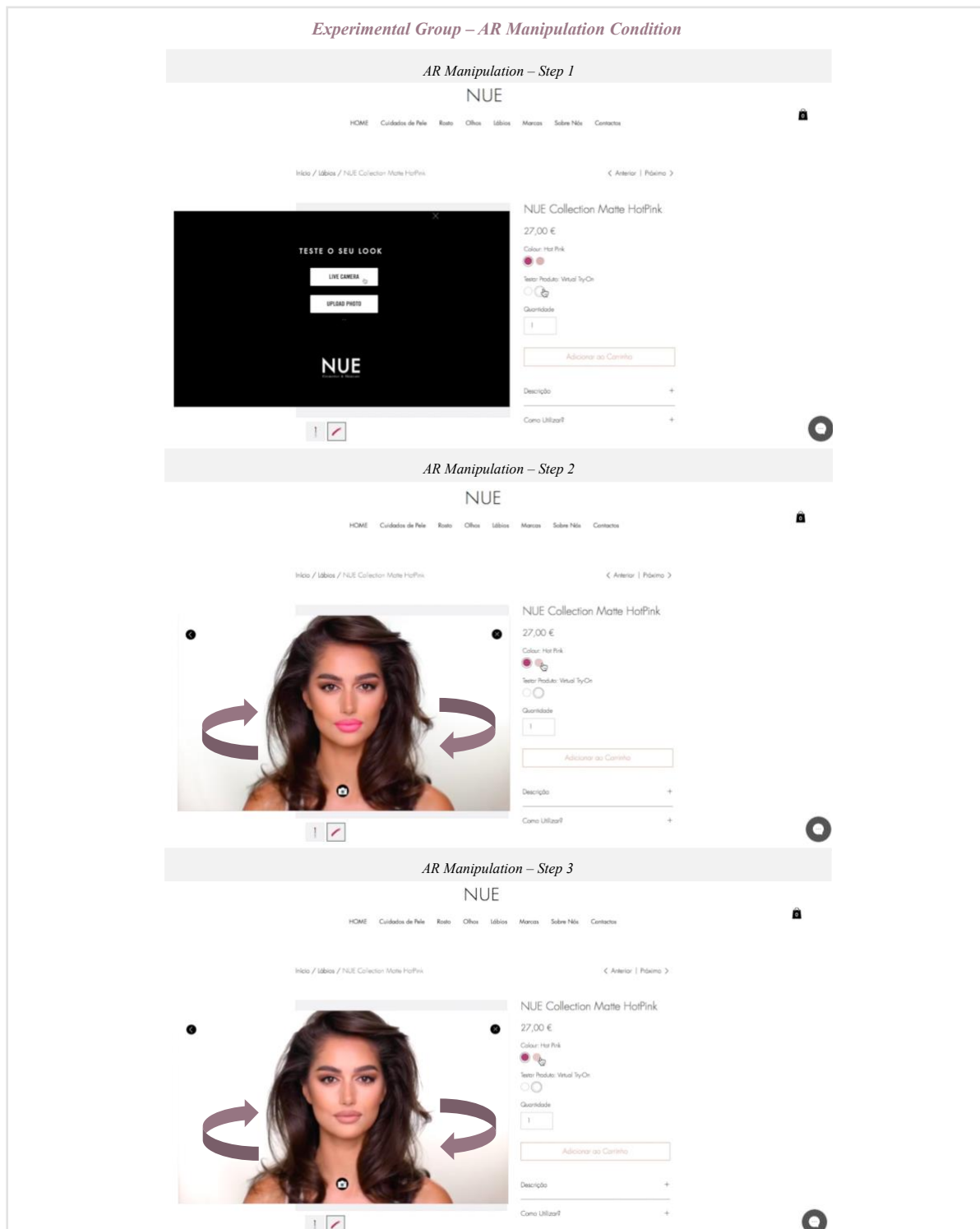
- **PT / ENG:** < 600€ (1)
- **PT / ENG:** 600 - 800€ (2)
- **PT / ENG:** 801€ - 1 000€ (3)
- **PT / ENG:** 1 001€ - 1 500€ (4)
- **PT / ENG:** 1 501€ - 2 000€ (5)
- **PT / ENG:** > 2 000€ (6)

#### **Section 11: Control Group - Ending Message**

**PT:** Agradecemos a sua participação neste inquérito. A sua resposta foi registada. / **ENG:** We thank you for your time spend taking this survey. Your response has been recorded

## APPENDIX D – MANIPULATION CONDITIONS OVERVIEW

Figure 9 - Experimental Group - AR Manipulation Condition

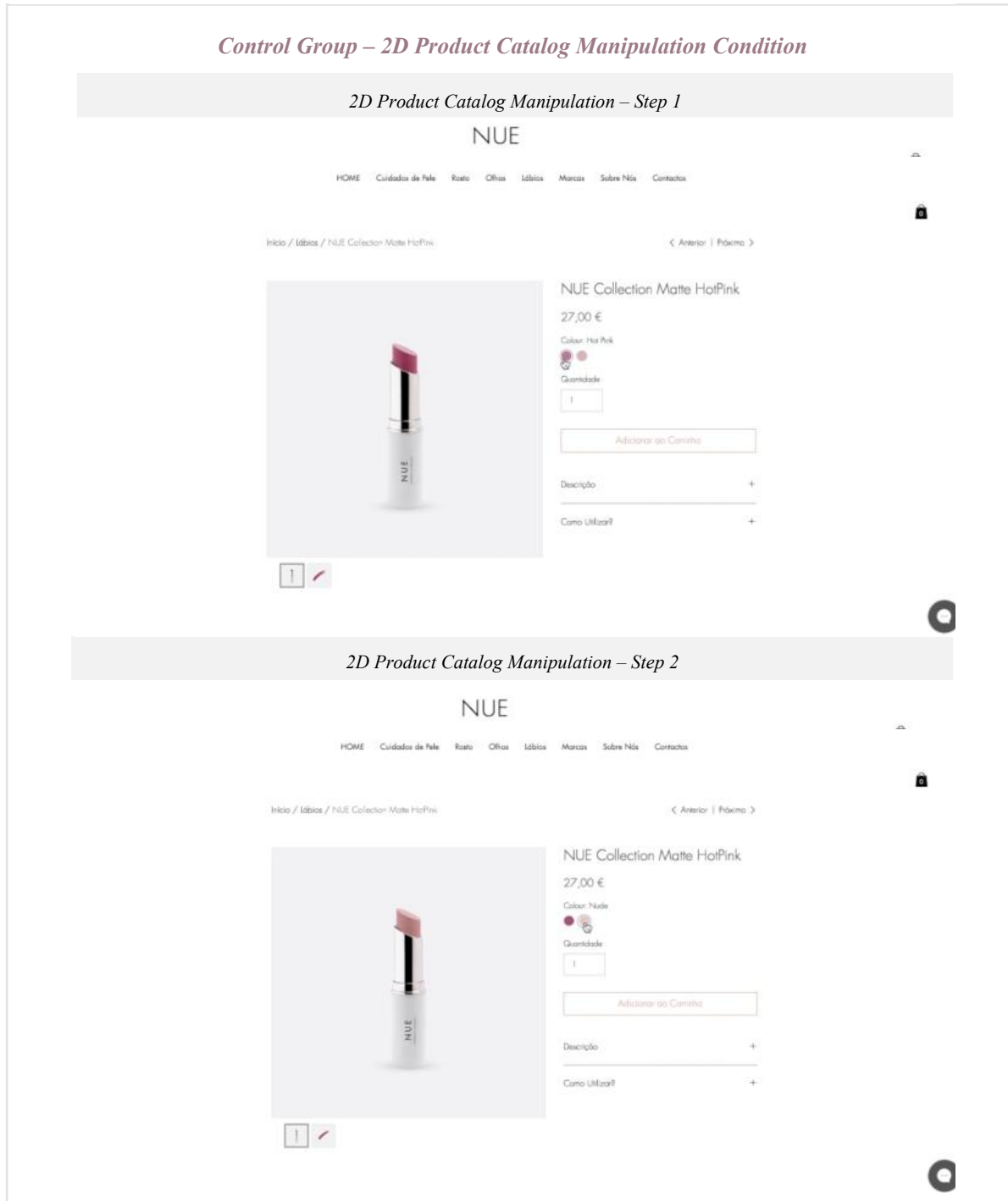


For conceptualization purposes, a model was used for steps 2 and 3. Participants were instructed to imagine that they were the ones conducting the experience with the virtual try-on.

**Access to the Experimental Manipulation Concept Testing Video:** [https://youtu.be/PWoEFz\\_Aha0](https://youtu.be/PWoEFz_Aha0)

**Source:** Developed by the author through the manipulation of contents from (MAC Cosmetics, n.d.) and (Vannogo, n.d.) using Adobe's Photoshop and a video editor platform. Website simulation developed in the Wix platform.

**Figure 10 - Control Group - 2D Product Catalog Manipulation Condition**



**Access to the Control Manipulation Concept Testing Video:** <https://youtu.be/rm5sOXw995w>

**Source:** Developed by the author through the creation of different product offerings' packaging using Adobe's Photoshop and a video editor platform. Website simulation developed in the Wix platform.

## APPENDIX E – RESULTS ANALYSIS

**Table 4 - Sample Characterization: Demographic Data and Consumption Habits**

		Experimental Group (n = 125)			Control Group (n = 125)		
		n	Valid Percent (%)	Cumulative Percent (%)	n	Valid Percent (%)	Cumulative Percent (%)
Gender	Female	125	100.0	100.0	123	98.4	98.4
	Male	0	0	0	2	1.6	100.0
Age	< 25 years old	35	29.0	28.0	32	25.6	25.6
	26 – 35 years old	17	13.6	41.6	21	16.8	42.2
	36 – 45 years old	29	23.2	64.8	14	11.2	53.6
	46 – 55 years old	33	26.4	91.2	37	29.6	83.2
	> 55 years old	11	8.8	100.0	21	16.8	100.0
Monthly Income ( <i>aft. tax</i> )	< 600€	21	16.8	16.8	19	15.2	15.2
	601 – 800€	13	10.4	27.2	20	16.0	31.2
	801€ - 1000€	22	17.6	44.8	26	20.8	52.0
	1001€ - 1500€	33	26.4	71.2	26	20.8	72.8
	1501€ - 2000€	20	16.0	87.2	18	14.4	87.2
	> 2000€	16	12.8	100.0	16	12.8	100.0
Imp. make-up products	Low Importance	50	40.0	40.0	39	31.2	31.2
	High Importance	75	60.0	100.0	86	68.8	100.0
Preferred Channel	Supermarkets	35	19.1		24	14.0	
	Spec. Retailers	96	52.5		104	60.5	
	Pharmacies	21	11.5	N/A	21	12.2	N/A
	Online stores	22	12.0		15	8.7	
	Others	9	4.9		8	4.7	

Cumulative Percent (%) not applicable for Preferred Channel as it was a multiple response variable.

**Source:** Developed by the author based on the data collected through the online survey (2020)

**Table 5 - Importance of Make-Up Products Item – General Analysis**

	n	Minimum	Maximum	Mean	Std. Dev.
<b>Importance of Make-Up Products</b>	250	1.00	7.00	4.88	1.408

**Source:** Developed by the author based on the data collected through the online survey (2020)

**Table 6 - Importance of Make-Up Products Item – Comparison Analysis (Low versus High Importance)**

Importance of Make-up Products	n	Valid Percent (%)	Cumulative Percent (%)
Low Importance	89	35.6	35.6
High Importance	161	64.4	100.00

**Source:** Developed by the author based on the data collected through the online survey (2020)

**Table 7 - Reliability Analysis - Cronbach's Alpha Test**

Construct	Initial number of items	Cronbach's alpha	Cronbach's alpha if items deleted****	Items deleted	Final number of items	Final Cronbach's alpha
Purchase Intention	3	.896	-	-	3	.896
Mental Intangibility	4	.229	.785	1	3	.785
Perceived Value	7	.922	-	-	7	.922
Sense of Control	3	.958	-	-	3	.958
Decision Comfort	5	.895	-	-	5	.895

\*\*\*\* Highest Cronbach's Alpha if item deleted value is reported

**Source:** Developed by the author based on the data collected through the online survey (2020)

**Table 8 - Manipulation Check – Independent Samples T- Test Results**

Item	Manipulation Condition	Mean	Std. Dev.	Statistical Values
I got the sense that I could virtually touch the product.	AR	3.69	1.64	t (248) = 2.964, p = .000, CI [.2040, .1.012]
	2D Product Catalog	3.08	1.59	

**Source:** Developed by the author based on the data collected through the online survey (2020)

**Table 9 - Mental Intangibility Construct - General Analysis**

	n	Minimum	Maximum	Mean	Std. Dev.
<b>Mental Intangibility</b>	250	1.00	7.00	4.690	1.483

**Source:** Developed by the author based on the data collected through the online survey (2020)

**Table 10 - Mental Intangibility Construct - Comparison Analysis (Low versus High Level)**

Mental Intangibility Level	n	Valid Percent (%)	Cumulative Percent (%)
Low Level	122	48.8	48.8
High Level	128	51.2	100.00

**Source:** Developed by the author based on the data collected through the online survey (2020)

**Table 11 – Constructs’ Analysis – AR versus 2D Product Catalog - Independent Samples T-Test Results**

Construct	Manipulation Condition	Mean	Std. Dev.	Statistical Values
Hedonic Value	AR	4.81	1.26	t (248) = 4.048, p = .000, CI [.3285, .9514]
	2D Product Catalog	4.17	1.23	
Utilitarian Value	AR	4.78	1.63	t (248) = 6.053, p = .000, CI [.7609, .1.4950]
	2D Product Catalog	3.65	1.29	
Sense of Control	AR	3.63	1.57	t (248) = 3.147, p = .000, CI [.2265, .9841]
	2D Product Catalog	3.02	1.46	
Decision Comfort	AR	4.58	1.34	t (248) = 4.258, p = .000, CI [.3947, 1.0741]
	2D Product Catalog	3.84	1.38	
Purchase Intentions	AR	4.12	1.64	t (248) = 4.939, p = .000, CI [.5595, .1.3018]
	2D Product Catalog	3.19	1.31	

Source: Developed by the author based on the data collected through the online survey (2020)

**Table 12 - Multiple Linear Regression Results – AR versus 2D Product Catalog***Experimental Group*

Independent Variable	Dependent Variable	Model Summary & ANOVA				Coefficient		
		R Square	F	df	Sig.	$\beta$	t	Sig.
Hedonic Value	Purchase Intentions	.687	65.920	4	.000	.161	1.372	.173
Utilitarian Value						.211	2.401	.018
Sense of Control						.168	2.085	.039
Decision Comfort						.516	4.219	.000

*Control Group*

Independent Variable	Dependent Variable	Model Summary & ANOVA				Coefficient		
		R Square	F	df	Sig.	$\beta$	t	Sig.
Hedonic Value	Purchase Intentions	.627	50.488	4	.000	.242	2.260	.026
Utilitarian Value						.290	2.916	.004
Sense of Control						-.054	-.790	.431
Decision Comfort						.373	4.051	.000

Unstandardized coefficients are reported. All variables measured on seven-point Likert scale (“Strongly Disagree” = 1; “Strongly Agree” = 7)

Source: Developed by the author based on the data collected through the online survey (2020)