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EXPERIENCING AR IN RETAIL: THE INFLUENCE OF MOMENT MARKETING AND AVATARS ON CONSUMER BEHAVIOUR

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Abstract

The development of augmented reality experiences is growing, as its adoption from companies and consumers registers a steady rise. As research is still catching up with the fast adoption of augmented reality solutions, the aim of this study was to investigate the effects of using a shopping assistant, through augmented reality technology, on the consumers' emotional and cognitive responses, and how it would affect their buying behaviours. A prototype of an application to assist consumers inside a supermarket store was developed, applying a moment marketing strategy, and using HoloLens glasses. By studying the reactions to a number of product suggestions, it was found that whilst the level of brand-moment fit is not yet a big influencer on consumers' responses and behaviours, the presence of the avatar as the assistant impacts their decisions and heightens their cognitive responses. The results show that a media rich augmented reality experience influences how customers behave in a retail store, and how they make their purchase decisions, ultimately changing how consumers relate to the brands involved in such experiences. At a time when managers in every industry work to capture the attention of consumers, the present study shows how relevant content remains important in every communication activity, even in an innovative augmented reality retail shopping experience.

Keywords: Augmented reality; Moment marketing; Social Presence; Avatar; Emotions; Retail; Technology.

JEL: M30 – General, M31 – Marketing, L81 – Retail and Wholesale Trade

Resumo

O desenvolvimento de experiências de realidade aumentada tem vindo a crescer, ao mesmo tempo que empresas e consumidores têm vindo a adotar esta tecnologia. Enquanto os investigadores estão ainda a tentar acompanhar a rápida adoção de soluções que envolvem tecnologia de realidade aumentada, o objetivo deste estudo foi investigar que efeitos se poderiam verificar nas respostas emocionais e cognitivas dos consumidores, tal como nos seus comportamentos de compra, ao usar um assistente de compras, através de tecnologia de realidade aumentada. Recorrendo aos óculos HoloLens, foi desenvolvido um protótipo de uma aplicação que assiste os consumidores dentro de um supermercado, aplicando também uma estratégia de marketing em tempo-real. Ao estudar as reações às sugestões de vários produtos, concluiu-se que, enquanto uma alteração nos níveis de *brand-moment fit* não têm ainda influência nas respostas emocionais e cognitivas dos consumidores, a presença de um avatar como assistente tem um impacto nas decisões de compra, tal como estimula as respostas cognitivas das pessoas. Numa altura em que gestores de qualquer indústria trabalham para captar a atenção dos consumidores, o presente estudo mostra como o conteúdo permanece uma parte importante de qualquer forma de comunicação de marketing, mesmo numa experiência inovadora de realidade aumentada.

Palavras-chave: Realidade aumentada; Moment marketing; Social Presence; Avatar; Emoções; Retalho; Tecnologia

Classificação JEL: M30 – General, M31 – Marketing, L81 – Retail and Wholesale Trade

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1. Introduction

Technology has been changing and moulding our daily lives ever since it first appeared. It has influenced the reality of businesses, how they work, and how do they stand out from its competitors. This has become increasingly true over time. It is obvious that, nowadays, technology is a big part of our lives, and we have been 'forced' to adapt to all the changes that come with it. Regarding major brands and companies, they too had to adapt to the most recent technology to fully capture consumers' attention.

Technology innovation is seen as an outcome of a collision between technological opportunities and user needs, whose focus is upon the interaction between producers and users of innovation (Lundvall, 2009). This has been a present reality and so, marketing managers have turned to information technology to cope with the ongoing challenge of getting more from marketing resources, while simultaneously meeting greater expectations to establish durable relationships with customers (Trainor et al., 2011). Companies must then be aware that it is, ultimately, all about how consumers perceive their brand. Since consumers are becoming more mature, sophisticated, and intelligent, they are also demanding higher levels of product information before making purchasing decisions (Pereira, 2000). In recent years, several new technologies have emerged and started to allow consumers to search for information, interact with brands, communicate with other consumers, try out products, and buy real and digital products over the internet (Gabisch, 2011). Thus, an affective attitude and active behaviour towards the technology appears to be invaluable to all technology developers and marketers (Fan et al., 2017). Today, the market has completely shifted, and currently runs and changes at a frenetic pace. Large multinational corporations such as Google, Facebook, Amazon, Alibaba, eBay, and Uber, unheard of twenty years ago, have emerged as key players in our modern economy. All these businesses are technology and internet-based, and without these two factors, they could not exist (Kannan and Li, 2017).

One of the most recent advancements in technology is the use of Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR). This is a technology that it is still being developed and optimized, but even so, has already a large set of different uses. As a response to the ever-demanding market, it is clear that creating attractive and interesting content inside the AR experience is key. Research shows that the technological progress that provides technologies with new capabilities (i.e. high realistic interfaces and interaction modalities) and

new uses has increased (Sekhavat, 2016). Retailers have become aware of the importance of continuously innovating within the process (Pantano, 2014; Pantano, Rese & Baier, 2017) and offering their audience new ways of presenting their products, or delivering their services.

The rapid advancements in technological innovation brings several benefits and leads to a variety of self-service technologies equipped with interactive touchscreen displays, 3D virtual reality systems, mobile apps, and others (Sha et al., 2013; Papagiannidis et al., 2014; Blázquez, 2014; Dennis et al., 2014; Pantano, 2016). However, "the lack of direct experience in touching, feeling, smelling and trying on an item makes the evaluation difficult and may negatively affect enjoyment and the purchase decision" (Pantano, Rese & Baier, 2017: 1). Nevertheless, there is proof that when consumers register a higher sense of social presence and realism in an online or virtual experience, it positively influences their shopping behaviour (Hyun & O'Keefe, 2012), beliefs and attitudes (Klein, 2003) and even the level of brand engagement (Algharabat et al., 2018).

A lot of research has also been done concerning the effects of advertising offline and online. Focusing on moment marketing, many companies have opted to go through with such a strategy, and many researchers have studied its effects. When it comes to real-time marketing (RTM), timing plays a big part as an influencer, and it can condition the consumers' response to the information that it is exposed to, as well as the company's communication effectiveness (Wibisurya, 2018). It is then imperative for retailers to be able to serve consumers with immediate and personalized content, anytime and anywhere: delivering an immersive and personalized shopping experience, improving flow among consumer touchpoints, and providing content that has emotional and cognitive fit (Parise et al., 2016). Of course that being Augmented Reality a rather recent practice, there is yet much to know about how effective an AR experience can be (Scholz and Smith, 2016). Although the effects of moment marketing on online platforms, games, and the many strategies surrounding product advertisement, have been studied, there is a lack of research about this strategy applied in an Augmented Reality experience environment. Furthermore, consumer studies using HoloLens technology and how it is used for commercial settings or purposes are also scarce. Hence our belief that this study can be a positive contribution to the research collection that exists on Augmented Reality until this day.

Parallelly, as VR based studies concerning food retail environments grow (Waterlander, Mhurchu, & Steenhuis, 2012; Kim et al., 2014; Massara, Liu, and Melara, 2010; Breen, 2009; Shankar at al., 2011), there is yet a lot to learn about how AR can influence the buying process, whether in a food store, or concerning any other industry's retail space. Some retailing industries are not worried about the disappearance of their physical stores. Much due to the appeal of traditional store shopping, which is believed to fulfil the need for social interaction, entertainment, movement, or trip chaining (Mokhtarian, 2004). According to Hsiao (2009: 86-87), "the appeal cannot be easily displaced by e-shopping, making traditional store shopping still quite competitive over e-shopping". Mokhtarian (2004) concluded that neither type completely dominated the other, by reviewing each of their comparative advantages. Mou, Robb, and DeHoratius (2018: 413), say that "physical stores still remain the primary shopping destination despite the increase in online sales, but store operations have changed significantly in the omnichannel retailing environment (Fisher & Raman, 2010; PwC, 2015)". So, it does not come as a surprise to know that there has been various research on how retailers can improve their customers' experience when inside these physical spaces (Dacko, 2017; Moes and Vliet, 2017; Foroudi et al., 2018; Terblanche, 2018). It is also important to always keep in mind how these improvements can provide a better service and trigger higher satisfaction on consumers, as well as a higher willingness to buy. Simultaneously, since the online world will keep allowing consumers to buy whatever, whenever, wherever they are, the best companies could do, would be to align their offline strategy, with the one they (should) have online (Moes and Vliet, 2017). It is then important to analyse consumer behaviour in a physical store, whilst using digital resources and resorting to marketing strategies on communication. The true applicability of the present study relies partially on the fact that the use of AR and even HMDs will be done through more seamless and lean devices in the future. Weight and the whole apparel of wearing HoloLens in a public space might have compromised the reliability of the obtained results, as users might have not felt as comfortable and relaxed while wearing them, as they normally would (were they not wearing the HMD). At the same time, interestingly, increasing demand for a more seamless experience between online, mobile, and in-store shopping is considered as one of the key drivers in retail (Barthel, Hudson-Smith, and de Jode, 2015).

Accepting the fact that AR technologies can have a big impact on more than one industry, this dissertation will focus on the retail food industry and analyse how consumers evaluate and make their decisions when wearing wearable technology as the HoloLens. As pointed by van Herpen et al. (2016), previous research using virtual supermarket systems has explored what are the

consumers' reactions to price changes of food products (Waterlander et al., 2011; 2014), point--of-sale displays (Kim et al., 2014) and emotional responses to retail environments (Massara, Liu, and Melara, 2010). To this, they added that "a 3D virtual store has been called an innovative and unique research tool with great potential in the study of food choice behaviour and the In--Store Marketing Institute predicts that the use of virtual reality in store simulation will become standard practice as an indispensable tool for understanding in-store consumer behaviour" (van Herpen et al., 2016: 196). However, Pham (2013) supports that virtual reality techniques and experiments place people in artificial conditions where the link with real-life phenomena may be low. Using augmented reality would surpass some of the problems that arise with these "artificiality" obstacles, by placing the information that normally virtual reality would make available in a fictitious environment, in the physical space where the user is. By bringing realism to not only the information presented, but also to the experience as a whole, it may influence the overall satisfaction of the user. It is within the hopes of the author to increase the external validity of lab experiments, using HoloLens in a real supermarket store.

As the ones presented before, there are already a few studies that assessed consumers' reactions to experiences, such as AR and VR (Pantano, Rese & Baier, 2017; Yim, Shu and Sauer, 2017; Kourouthanassis et al., 2014; Klein, 2003; Li, Daugherty and Biocca, 2002), all of them considering one of the two types of technology, whilst considering different sets of measurements. Even more so, since AR has such a broad applicability and uses, it is difficult to find existing research papers that focus their attention in all the industries by which AR technology can be adopted. Although special attention has been given to the retail markets, the uses of AR can also go from health-related markets to entertainment purposes. The studies involving augmented reality and its impact on marketing and consumer behaviour are now growing, but still scarce, meaning more insights need to be provided on the subject. The present study intends to help to fill this gap. Focusing on the use of a moment marketing strategy, and including social presence elements, it is important to assess the magnitude of its underlying effects.

The current dissertation intends to focus on how consumers act and react when using AR technology. More specifically, the experiment conducted in this study will analyse the consumers' level of satisfaction (arousal and pleasure) and attitude towards certain brands, as well as the perceived level of information quality and their level of brand engagement and willingness to buy, after being subjected to an AR experience in a supermarket. Whether by

implementing different levels of media richness (resorting to the use of an avatar, or just 2D images), it is also proposed to discover how does the level of brand-moment fit (where there is high transferability of knowledge between the moment and the brand) influences the users' reactions and opinions on the brands and products suggested. Consequently, the objectives to be tackled in this thesis are to (1) study the cognitive and emotional responses of consumers after an AR experience, (2) explore their buying intentions after the experiment, (3) test the moderating effects of a moment marketing strategy and social presence elements, and (4) analyse the drivers of engagement with brands that use AR technology.

The present dissertation is organized as follows: Chapter 1 begins by presenting the research background and this study's main objectives. Chapter 2 covers the related works on augmented reality, its uses in a marketing perspective, as well as previous findings on the concepts of moment marketing and social presence. Following this, Chapter 3 introduces the theoretical framework used in this study and presents all of the concepts used. The followed methodology and the procedures conducted to create an AR experience are further explained in Chapter 4. The results and statistical conclusions are included in Chapter 5. Finally, in Chapter 6, 7 and 8, the discussion, managerial implications and future research suggestions are offered, in that order.

2. Literature Review

2.1. Augmented Reality

The conceptualization of virtual, augmented, and mixed realities can be sometimes confusing, and the concepts mixed up between each other. Even more so, because they do occasionally overlap in practical terms. That is why, in this dissertation, the definitions that are believed to be most accurate and pertinent for this study's goals, are provided. Among the conceptualizations created by several researchers, Augmented Reality (AR) is defined as a special case of Virtual Reality (VR), as others argue that AR is a more general concept and see VR as a special case of AR (Bimber and Raskar, 2005). According to Scholz and Smith (2016), AR is the practice of augmenting a real-time direct or indirect view of the physical world with virtual information. AR is also defined by Faust et al. (2012: 1164) as "the superposition of virtual objects (computer generated images, texts, sounds, etc.) on the real environment of the user". It is important to point out that even though AR may be similar to virtual reality in the sense it aims to enhance or enrich a viewer's experience, unlike VR – that electronically generates the image of the entire real-life setting – AR creates a superimposed overlay of the viewer in the electronically generated setting (Milgram et al. 1994; Billinghurst, Clark and Lee, 2015).

Almost as if contradicting these definitions, Milgram et al. (1994: 283) defended that AR and VR are related and that it would be quite valid to consider the two concepts together. They commonly held a view of a VR environment as one in which the user is "totally immersed in a completely synthetic world, which may or may not mimic the properties of a real-world environment, either existing or fictional, but which may also exceed the bounds of physical reality by creating a world in which the physical laws governing gravity, time and material properties no longer hold. In contrast, a strictly real-world environment clearly must be constrained by the laws of physics". The authors then decided to look at both concepts not as antitheses but, more conveniently, viewing them as lying at opposite ends of a continuum, naming it as the "Reality-Virtuality (RV) continuum" (Milgram et al., 1994: 283). This concept is illustrated in figure 1 below.

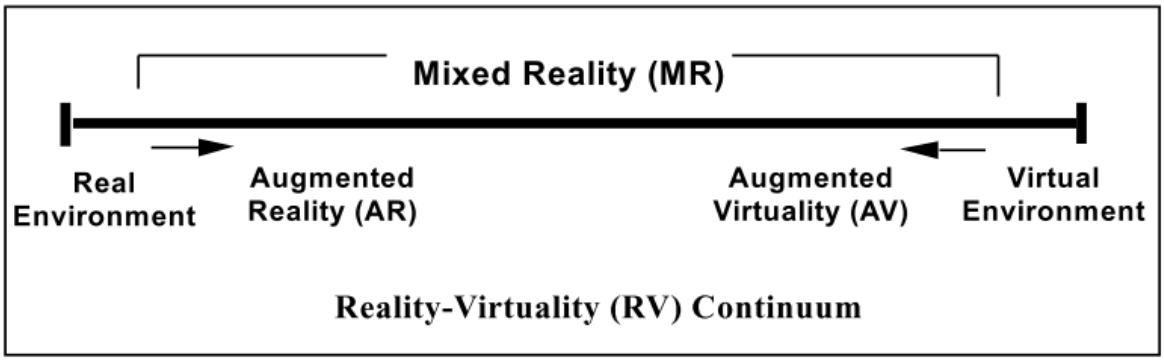


Figure 1 Simplified representation of a RV Continuum. Source: Milgram et al. (1994)

Therefore, through this perspective, AR supplements reality, rather than completely replacing it, and ideally appearing to the user that the virtual and real objects coexist in the same space (Billinghurst, 2015). AR can then be thought of as the "middle ground" between Virtual Environment (completely synthetic) and Real Environment (Milgram and Kishino, 1994; Milgram et al., 1994).

Unlike Virtual Reality, AR, in some cases, does not require a headset, which makes it easier to adopt. The technology overlays digital content onto the real world in front of you, altering the existing space – all that is required is a smartphone and forward-facing camera in hand, or a derivative of it (Dyakovskaya, 2017). By looking at the types of AR platforms currently available, the following AR items can be identified today (Glockner et al., 2014): Handheld Devices; Stationary AR Systems; Spatial Augmented Reality (SAR) Systems, Head-mounted Displays (HMDs) and Smart Glasses. Thus, AR can be considered more beneficial than VR to both retailers and consumers in the way that, rather than immersing a person into a completely synthetic world, AR attempts to embed synthetic supplements into the real environment (Bimber and Raskar, 2005). This allows for consumers to, for example, view themselves actually wearing diverse virtual products without physically trying them on at a store (Verhagen et al. 2014) or adding a variety of types of other information onto the real-life setting.

Although HMDs are the dominant display technology for AR applications today, “they still suffer from optical (e.g., limited field of view and fixed focus), technical (e.g., limited resolution and unstable image registration relative to eyes) and human-factor (e.g., weight and size) limitations” (Bimber and Raskar, 2005: 5). The reason for this dominance might be the long-time unique possibility of HMDs to support mobile AR applications, however, the

increasing technological capabilities and advancements on smartphones and other mobile devices clear the way to more promising display platforms. If we consider other displays than HMDs, there are AR uses and applications which do not necessarily require mobility, in which case, "spatial display configurations can come of use, becoming a more efficient solution" (Bimber and Raskar, 2005: 8).

The fact is that, in contrast to VR, in AR, the real environment is not completely suppressed; instead, it plays a dominant role (Bimber and Raskar, 2005). This is an opportunity where marketers must work to strive on. Scholz and Smith (2016), in their research, have pertinently shown why marketers must design user experiences that take into consideration their communication objectives, target audience characteristics, content management strategies, triggers, and the social-physical context of consumers' lives. Because, where the opportunity lies, there is also the risk where the technology and the business objectives and positioning do not match. This also serves as an important starting point for the present research study, since it is intended to unravel the influences that an AR experiences can have on the user. Moreover, we should also look at the importance of marketers to focus on the levels of consumer engagement, when designing an AR experience, and the dimensions that drive it (Scholz and Smith, 2016).

The tech industry's largest players are all racing ahead with their own efforts to define what the augmented future will look like and capture the profits from it. Microsoft has the HoloLens, a mixed reality headset designed primarily for gaming, and Google had its initial go at it with Google Glasses (Mind Commerce, 2012). After that, Google and its parent company, Alphabet, continued to work on possible uses for VR and AR technologies, leading to the creation of a mixed reality start-up called Magic Leap (Bercovici, 2017). Looking at the initiative taken by these two major technological companies, it seems they have paved the way for others to start considering resorting to this technology. To help, the present study aims to disclose relevant contributions for managers and marketers in all industries, interested in the reach that AR can have.

2.2. Augmented reality's influence on the marketing reality

In a world where companies are all trying to get consumers' virtual attention, AR experiences give them the potential to engage with audiences in new exciting ways that they are curious to explore. More realistically, at the same time, brands are also finding it difficult to stand out and reach their targeted audience: With the need to evolve and stay relevant whether in social media, print ads, or online marketing, marketers are recognizing augmented and virtual reality as a way to break through the clutter and better reach their audiences.

It is believed that AR will affect companies in every industry and many other types of organizations, from universities to social enterprises. In the coming years, it will transform how we learn, make decisions, and interact with the physical world. It will also change how enterprises serve customers, train employees, design and create products, manage their value chains, and, ultimately, how they compete (Porter and Heppelmann, 2017). But it is of common agreement that the possible uses and applications for AR are extensive, no matter the industry, sector, nor audience. There is research on the possible uses of AR for learning purposes, collaborative product and service development, gaming, fashion and cosmetics, and many more. In the next few paragraphs, some of the uses that have been developed over the years are summarized.

Being the vehicle where this futuristic technology was launched on, the gaming industry – with the 2016's unprecedented proliferation of Pokémon Go – proved that AR could become a mainstream technology. Since then the experiences around augmented reality have improved and became more accessible (Dyakovskaya, 2017). On the other side, as an example of using AR as a learning platform, Ambarish Mitra's "Blippar" app (Bercovici, 2017), allows the user to explore the world around him/her, aiming to build a visual search engine that can recognize anything to which the device's camera is pointing at and serve up relevant facts, games, shopping information, and user-generated content. The "Blippar for Education" version, allows teachers to create their own files using existing digital images, and add overlays of video, sound files, and text to be viewed via the app. Besides the learning purposes, here also lies an opportunity to market a company's product or service, given that, according to Bercovici (2017), 65 million people have downloaded the app to "blipp" an advert or product, generating tens of millions of dollars in revenue from Blippar's advertising partners (Goerner, 2016).

For the cosmetics industry, the best example would be L'Oréal and its several branded AR apps like Makeup Genius and Style My Hair, letting users apply makeup and hair looks to their pictures before trying or buying a certain product. As stated by Johnson (2017), this sort of investments leads to a great source of insight in terms of trends and helps designing a whole makeup collection. Also, it has been proven this can have an impact on the brand's sales, mostly offline rather than online (Johnson, 2017). It is also an opportunity to develop the retail customer experience, with more interactive and technological experiences.

Many more of the world's largest businesses – including Coca-Cola, McDonald's, and General Electric – have embraced augmented reality in their strategic marketing programs (Scholz and Smith, 2016). They have used AR to create interactive advertising and packaging, enhancing retail experiences, and develop engrossing games. These types of AR initiatives already allow marketers to craft immersive brand narratives and enable consumers to experience products and spaces in novel ways. Moreover, future advancements in smart glasses and transparent screen technologies (Dibble, 2014) will integrate the human gaze with digital information ever more seamlessly, propelling AR into an estimated $120 billion business by 2020 (Gaudiosi, 2015). According to predictions relative to how will AR glasses generate as revenue, worldwide (as it seen in figure 2), it is estimated that it reaches almost 20.000 million dollars by the year of 2022, representing a compounded annual growth of about 45.3 percent (Statista, 2018).

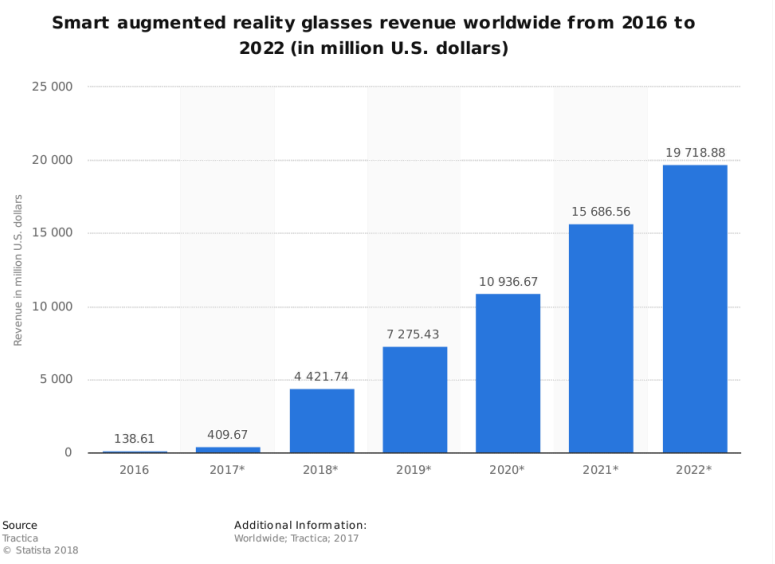


Figure 2 "Smart augmented reality glasses revenue worldwide from 2016 to 2022 (in million U.S. dollars) Source: Statista 2018

At the other end, consumers want entertainment and practical functionality put together: How these two requirements join will be the deciding factor as to which platform will lead the way.

As technology evolves, consumers, as more informed individuals that they have become, also expect more from what it can deliver. In the past years, augmented reality has changed the marketing industry's vision of what the future will bring. However, it is the opinion of Scholz and Smith (2016) that managers need to understand the dynamics of augmented reality beyond its technical qualities and non-commercial applications. Most importantly, they "need to focus on consumer engagement and the dimensions that drive it" (Scholz & Smith, 2016: 160).

Concerning the points of contact with customers of any company or industry, according to Porter and Heppelmann (2017: 53), Marketing and Sales departments may be transformed by AR, since it is redefining the concept of showrooms and product demonstrations and transforming the customer experience. "The fact that customers can visualise how products will look or function in a real setting before buying them, they have more accurate expectations, more confidence about their purchase decisions, and greater product satisfaction". In a more practical perspective, a study conducted by Poushneh and Vasquez-Parraga (2016) concluded that AR significantly and positively influences the user experience – by providing more 3D information which enhances users' perception of reality. Also, through a more enriched AR user experience, by being more entertaining, it enables potential customers to have endless interaction with virtual information, producing higher user satisfaction. In e-commerce, AR applications are allowing online shoppers to download holograms of products. Good examples of companies who have invested in this strategy, are the cases of Wayfair and IKEA, both offering libraries with thousands of 3D product images and apps that integrate them into a view of an actual room, enabling customers to see how furniture and decor will look in their homes (Porter and Heppelmann, 2017).

More than having an impact on Business to Consumer (B2C) type of business, some professionals believe that AR could have a bigger impact in a Business to Business (B2B) reality, or on how the company works internally. In their piece, Porter and Heppelmann (2017), sustain that this technology, by turning a company's processes more efficient, can lower the cost of training, service, assembly, design, and other parts of the value chain. It can also substantially cut manufacturing costs by reducing the need for physical interfaces. Each company will need to prioritize AR-driven cost-reduction efforts in a way that is consistent with its strategic positioning. The literature on AR has emphasized the technological aspects of AR, but it has neglected the end user's needs and problems (Swan and Gabbard, 2005). Yet, even though Poushneh and Vasquez-Parraga (2016) say that AR is being increasingly employed in

designing and delivering products, research has not been able to catch up with the trend from a marketing perspective (Swan and Gabbard, 2005), especially when it concerns to the growing impact of AR on user experience. For Javornik (2016) AR-related studies should also aim to reach beyond separated consumer responses and investigate the consumer experience as a whole. Previous research, for instance, shows that some of the interactive technologies can be highly immersive, as is the case for virtual reality. Future studies could investigate to which extent the immersion defines AR consumer experience, given that AR possesses some traits of virtual technologies, but also differs from it in the sense that it does not create a disruption between the physical and virtual world.

2.3. Moment marketing

The practice of moment or real-time marketing (RTM) messages has grown significantly during the past several years. However, little academic research exists to help understand the effect of RTM on relevant brand outcomes. As Rodriguez-Vila, Bharadwaj and Chae (2016: B-49) point out, the "real-time" opportunity has been receiving "some attention by scholars, primarily from the perspective of the role that marketing plays in turning "real-time" market data into customer knowledge, developing customized offerings and managing improvisation in the new product development process". However, it is the opinion of Rodriguez-Vila, Bharadwaj and Chae (2016) that a focus in its impact on consumer behaviour and emotional responses is lacking from the existing research.

As the world is changing and as there is a growing number of platforms that encourage us to share our daily activities, keeping us connected at all times, being included in a real-time interaction with consumers is key. But, as people resort, more and more, to all sorts of technology, they start replacing their daily chores with just a few clicks. With the growing number of devices that make these activities possible, establishing a new brand inside a consumer's mind is growingly a much harder task for any business. And this is a reality some researchers can agree on: Today, the noise level of the media is deafening, and it takes longer to break through and develop the market (McKenna, 1995). Using current and emerging technologies, such as high-speed communications, computer networks, social media platforms and advanced software programs, companies can start real-time dialogues with their customers and provide interactive services, creating binding relationships with their target audience (McKenna, 1995). This means the channel of communication between businesses and

customers is opened as they experience the company's product or service. As such, marketers are currently facing this 'crisis of immediacy' challenge: where they must know how to meet consumers' needs to receive content, expertise, and personalized solutions in real time during their shopping experience (Parise et al., 2016). Today, companies and customers, can know more about one another and work more closely together than they ever could before. It is also important to note this is not only about customers anymore, as companies must keep the dialogue flowing and maintain conversations with suppliers, distributors, and others in the marketplace.

Although marketers do not need to know technical details about information systems, they must be able to develop a business understanding of technology and how to use it strategically (McKenna, 1995). What social and digital devices have done was really transform marketing, customer service, and even sales: as opposed to simply pushing messages out through email or various other channels, marketing now requires organizations to interact with customers (Roe, 2016). To take on the advantage of strengthening a consumer's idea of a brand, brands must act when consumers are most opened to listen, retrieve, and most likely remember the information that is being communicated to them. From this, the concept of "moment marketing" was further developed. Using online advertising, TVTY (2016), the first moment marketing company, saw it as finding a connection between what a brand does online with what the audience witnesses offline, in real time.

Keller (1993) gives a theoretical background for how the real-time marketing concept came to exist. Following his work, brand associations are defined as connections consumers make in their minds leading to the meaning of the brand they develop in their memory. How strong, unique, or favourable are the brand associations, varies from one person to the other, according to Keller (1993), and they can help strengthen the consumer's overall idea of a brand. Working on top of these concepts, analysing the effects of a well-constructed moment marketing approach, Penke (2017) defined the concept of brand-moment fit as the degree to which there's transferability of knowledge about a brand from a certain event. Hoeffler and Keller's research (2002), indicate that there is a "high transferability of knowledge" from a moment to a brand, when the brand associations are strong, favourable, and unique. Additionally, it is known that from a high transferability of knowledge situation, it is expected that positive judgements and feelings arise related to the brand in question (Hoeffler and Keller, 2002). The research done by Becker-Olsen and Hill (2006) differentiates between the concepts of high and low-fit

pairings when it comes to the associations between a brand and the sponsorships programs they choose to be involved in. Defining a high-fit pairing as when there is a clear connection between the two parts (a brand and an event, for example), the meanings of each part are clearly shared for the specific situation. In a low-fit pairing situation, there is no identifiable linkages, nor shared meanings are easily identified by consumers (Becker-Olsen and Hill, 2006). As discovered by the two authors, "a high-fit sponsorship can help build brand relationships that ultimately lead to brand engagement" (Becker-Olsen and Hill, 2006: 78). Penke (2017) then associates the definitions of high-fit pairings with high transferability of knowledge and affirms that when the link between a moment and a brand is clearer and stronger, the moment marketing strategy will be more effective. As the more knowledge there is around a certain moment, and the perceived brand-moment fit is clearer, the stronger will be the effect on the consumer's brand image (Penke, 2017).

The concept of having a high brand-moment fit is important, mostly because, nowadays, in the moment when consumers want or need something, they tune in via convenient, self-initiated, bursts of digital activity. Statistics presented in the report "Think with Google" by Adams, Burkholder and Hamilton (2015) indicates that users check their phones 150 times a day and spend about 177 minutes on them, per day. Behind these mobile bursts, there are occasions when consumers are very open to the influence of brands: these are the moments when we want to help by informing them on their choices or making decisions. For marketers, these moments are an open invitation to engage (Adams, Burkholder and Hamilton, 2015: 4): "These I-want--to-know, I-want-to-go, I-want-to-buy, and I-want-to-do moments are loaded with intent, context, and immediacy". Being critical touchpoints within today's consumer journey, across screens, devices, and channels, and when added together, these micro-moments ultimately determine how the journey ends.

It is crucial for businesses to anticipate these micro-moments, and then commit to being there to help when those moments occur. Adams, Burkholder and Hamilton's report (2015) sustains that when consumers are not absolutely certain of the specific brand they want to purchase, they begin searching online, and 51% of mobile users have discovered a new company or product when performing a search on their devices. To take advantage of this uncertainty, brands must show up. Furthermore, companies should always share relevant information in order to respond to their customers' needs and connect people to the answers they are looking for. For this, companies must know their audience, and through these fleeting micro-moments, take

advantage of a great opportunity to engage with them. It yields great viral potential, but a same amount of risk, also creates the possibility for huge errors if the company, or brand, if it's not providing useful content.

Simultaneously, in any marketing communication strategy, the main goal is to create a lasting, almost permanent, impression on the target customer. The best marketing efforts, ideally, result in a brand being capable of basically lodge itself in the consumer's mind so that, when they have a need, they remember the company's product and purchase it (Dames, 2017). As Gabisch (2011: 305), studied for the case of VR, it is important to note that "virtual world brand experiences may be perceived as more meaningful and memorable when the consumer is able to identify with other users of the brand in the virtual world, and the brand's image in the virtual environment is consistent with the consumer's self-concept". As stated in the previous section, brands such as Coca-Cola, McDonalds, L'Oréal, have realised how impactful these experiences can be in the eyes of consumers. AR joins these two factors beautifully: by being capable of delivering real time experiences, even before the purchase of a product or service, and by being a continuous form of innovation, it gives, more easily, a more meaningful and memorable experience.

As these micro-moments provide an opportunity for value-based exchanges in an era of fleeting attention spans, and as consumers bounce between various digital touch-points, the main goal when adopting a moment marketing strategy is to perfectly align a timely occurrence, a branded opportunity, and the right social media platform to get noticed. Accepting all the previous premises, a new definition of the moment marketing concept is developed. Here, moment marketing is assumed as a strategy that finds the fit between a moment of a consumer's life (or buying process) and the brand, but not as a strategy used in social media, as opposed to a digital marketing strategy, communicating through the use of HoloLens (or any other type of HMD). This connection does not depend on when will the user reach for his phone. It will depend on communicating with the consumer when he or she is most receptive to it. That being said, while in accordance with the definitions formulated by the previously presented researchers and corresponding studies, moment marketing will be introduced as the ability for a brand to communicate with the consumer at the "right place, right time". This is done by studying the effects of presenting product suggestions with (or without) an avatar, at the time when the consumer is most opened to it. Similar to what VR technology offers (Mahdjoubi, Hao Koh, Moobela, 2014), AR experiences win over conventional product presentation media, as it makes

the consumer more engaged and entertained. This interactivity between where the consumer is in the store, and the suggestions that are presented to him, can be enriched by the use of an avatar. That is why the concept of social presence is used in this study, and its definition presented in the next paragraphs.

2.4. Telepresence and Social Presence

Telepresence, as a concept, was firstly introduced in virtual reality research and it can be described as the feeling of "being there" (Steuer, 1992). Hyun and O'Keefe (2012: 29) support that "telepresence relies on how closely computer-mediated experiences simulates real-world interaction with a product". Previous research suggests it is possible to raise the sense of a user's telepresence if, for example, a website exhibits a high level of interactivity and vividness (Hyun and O'Keefe, 2012; Mollen and Wilson, 2010).

In the Adams, Burkholder and Hamilton (2015) report, it is shown that 81% of consumers seek out online information before making a purchase, but what they can find online is often limited in the sense that usually there is no other interaction, neither with the product nor someone from the store or company. In an attempt to minimize this gap, augmented reality makes it also possible, through 3D rendering and virtual fitting rooms, for consumers to interact more with the product before purchasing, whether inside the store, or not. Additionally, AR nowadays is also developing its capability to connect customers with salespeople through the creation and display of avatars, or holograms, where the communication is more direct and more realistic. As it has been done through virtual worlds, with Second Life, by creating a virtual environment and studying the effects of having present a salesperson and even peer avatars, Moon et al. (2013) the effects of these elements on consumers' and purchase behaviour have been analysed.

In the present study, it is intended to use AR, not to analyse the effects of different levels of telepresence in a customer, but to evaluate the effects of *Social Presence* elements on the consumer's behaviour in a real retail environment. Described as the sense of "being with others," by Biocca, Harm, and Burgoon (2003), and by Durlach and Slater (2000) who call it "virtual togetherness". Focusing on the effects of social presence in a consumer experience in a mediated shopping environment, Holzwarth, Janiszewski, and Neumann (2006: 32) found that "adding an avatar to web-based information increased the customer's satisfaction with the retailer, attitude toward the product, and purchase intention".

In addition, the augmented reality technology, by allowing avatars to take the form of a real person, enhances the realism of social interactions. For virtual shopping environments, in order to prove that consumer behaviour can be influenced by a salesperson avatar, previous research has suggested that they are able to, at least, fulfil a consumer's desire for interpersonal communication while shopping (Papadopoulou, 2007) or increase the consumers' levels of pleasure while shopping, their satisfaction, and even purchase intentions (Moon et al., 2013; Holzwarth, Janiszewski, and Neumann, 2006). Since the effects of avatar-based social interactions begin with a perceived social presence that positively influences shopping enjoyment, subsequently enhancing the brand attitude, in turn, this increases the likelihood of a purchase.

3. Theoretical Framework

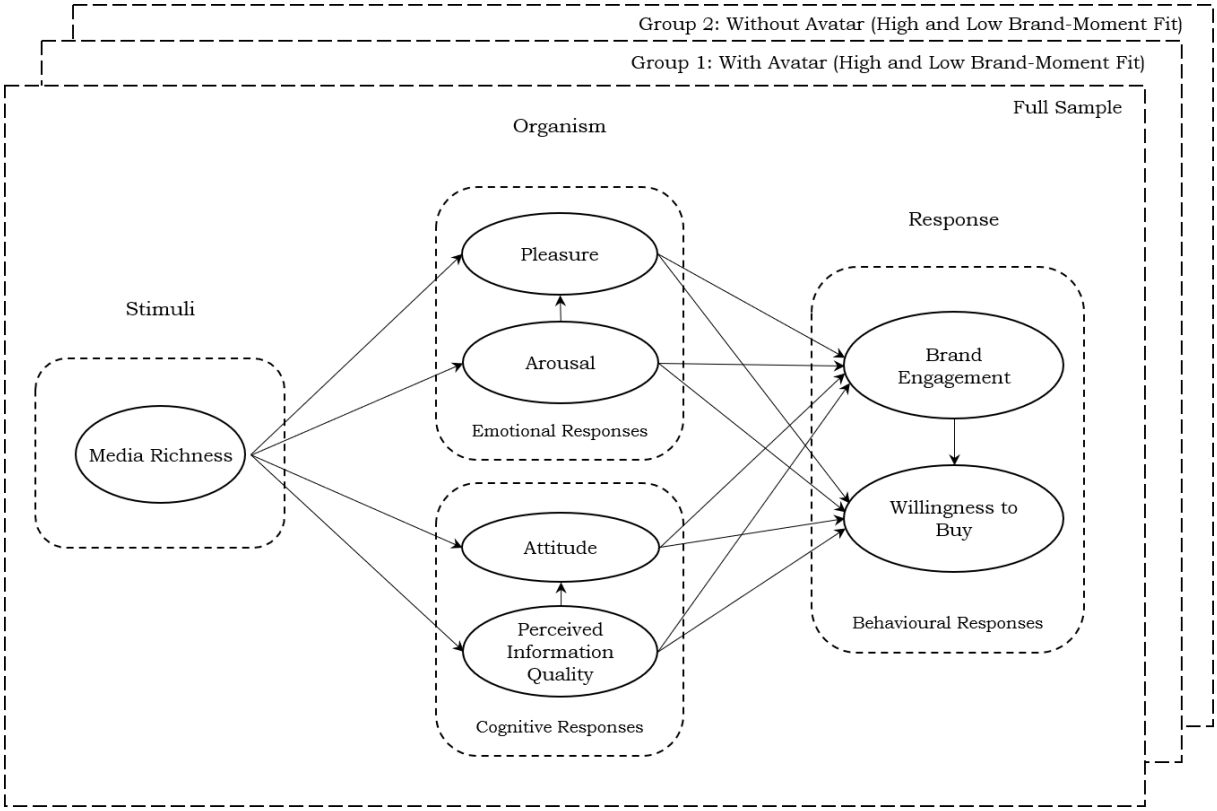


Figure 3 Proposed Conceptual Framework

The Stimulus-Organism-Response (S-O-R) theoretical model from environmental psychology, originally developed by Mehrabian and Russell (1974), dictates that stimuli (e.g., performance of an information system) evokes individuals' emotional states, which in turn determines behavioural responses. The framework has been used in studies to understand online consumer behaviour (Zhang, et al., 2014) for predicting consumer responses to services (Jang and Namkung, 2009), traditional brick-n-mortar stores (Baker, Levy, and Grewal, 1992), and online stores (Eroglu, Machleit, and Davis, 2001; Mazaheri, Richard, and Laroche, 2010). It has also been validated in the context of high-technology products (Lee, Ha and Widdows, 2011), as in the case of Mobile Augmented Reality applications (Kourouthanassis, Boletsis and Bardaki, 2014), therefore constituting a suitable core for our analysis (see figure 3).

3.1. Stimuli: Media Richness

Given that stimuli embrace object and social-psychological stimuli (Slama and Tashchian, 1987), in the context of an AR experience, the stimuli elements were established as the user's perceptions of the level of media richness.

The Media Richness Theory (also referred as information richness theory) developed by Daft and Lengel (1984) suggests that communication media varies in its ability to convey information and enable users to communicate and exchange understanding. As presented by Lu et al. (2014), in research done by Newberry (2001: 7) on raising the students' level of social presence in online classes, various media types were identified, from richest to leanest: "face--to-face communication being the richest, threaded discussion being the leanest". In Sundar's research (2000) about how people evaluated online news, depending on its level of media richness, it was proved that the news composed by both text and pictures received more positive evaluations than the ones that only had text. Lu et al. (2014) also gathered a number of studies which proved there were positive effects of media-rich content on consumers' evaluations of commercial websites and products included in them. Although one of the most popular and commonly used rich media element is said to be a 3D view of objects and other images, in the present research, and integrated experiment, social presence and the effects triggered by it, will be represented through the use of a hologram, or human-like imagery, which has been referred previously in this work as the "avatar". The users' reactions will be examined by resorting, or not, to these elements, which represent, to some extent, the level of media richness of the AR experience. The AR experiment will then be considered to have a high level of media richness when resorting to the use of an avatar during the whole experience in the supermarket. On the other hand, it will have a lower level of media richness when there is no avatar, where 2D images will be used accompanying the textual information presented in both conditions.

As it is intended to analyse consumers' emotional and cognitive reactions based on the amount of information that each scenario delivers, and their performance, this approach is supported by what Li, Daugherty, and Biocca (2002) found on the fact that 3D advertising can enhance the sense of presence leading to an increase on consumers' product knowledge, brand attitude and purchase intention. Supporting this discovery, Sundar (2007) suggested that the level of a user's sense of social presence, in a mediated environment, influences the way they process the received information, and ultimately, how they behave in such environment. It is then important to further investigate these topics and retrieve more information on the effects and usefulness of social presence and media richness in an AR experience and a company's communication strategy. For example, it can be expected that, as a result, the suggestions made by the avatar are perceived as more reliable, pleasing, and better welcomed, than when presenting only an image of the products suggested.

3.2. Organism: cognitive and affective states

In this study, both emotional and cognitive responses of users will be analysed. Cognitive states refer to "everything that goes in the consumers' minds concerning the acquisition, processing, retention, and retrieval of information" (Eroglu et al., 2001: 181). In this case, it relates to how consumers evaluate the information provided by the AR experience. This can be translated into how they form their attitude towards the products used in the prototype, and its attributes. *Attitude*, in this context, as a cognitive reaction, refers to a person's enduring favourable or unfavourable evaluations of the brands displayed in the augmented layer – where they can find further product information and recipes that can be created from these same products. Previous research has found support for the possibility that media richness positively affects users' attitude towards online advertising (Li, Daugherty and Biocca, 2002; Suh and Lee, 2005) by turning the online shopping experience more enjoyable (Davis, 1989). It has also been proved, in an online context, that a user's cognitive and affective processes positively influence their reaction towards the presented ads, as well as a more positive attitude towards its contents (Ducoffe, 1996). Laroche, Kim and Zhou (1996) found that, consequently, positive attitudes towards a product can also predict higher purchase intention.

As another cognitive response to the experience, *perceived information quality* refers to the level to which augmented reality is able to generate useful, trustworthy, personalized, and reliable virtual content to the user (Poushneh, 2018). The amount of virtual content shown on the screen should be in accordance with the user's expectation and needs. Thus, a real-time interaction is important, and variations on the strategy applied should be studied. As AR designers need to develop applications that display outputs based strictly on the users' needs and desires, the notion of brand-moment fit is also important to take into account. In this dissertation, it is intended to study the effects of displaying information that is considered be, or not, useful, being the time when it is communicated pertinent, or not. Furthermore, not only is the reliability of the virtual information important, as is the quantity of information: presenting too little information fails to satisfy users who have tasks to perform, while displaying too much information can overwhelm them (Poushneh, 2018). As Lee, Ha and Widdows (2011) concluded in their study, the attributes of technology products, such as ease of use, usefulness, and innovativeness, positively influenced their attitudes towards such products. Kim and Niehm (2009), proved that the ease of use and how entertaining a website presented itself to be, had a positive effect on the consumer's level of perceived information

quality. Building on these discoveries, the present study also intends to evaluate a consumer's cognitive reactions to an AR shopping experience. Based on these notions, the first hypothesis of this research is drawn:

H1: The level of media richness, will positively influence the consumer's cognitive responses (a. attitude, b. perceived information quality).

As pointed out by Guerreiro, Rita and Trigueiros (2015: 1729), "the complexity and abundance of stimuli during purchase decisions may influence consumers' cognitive and emotional states which, in turn, may trigger approach or avoidance responses". Focusing on the variables that compose the emotional responses to the experiment, Mehrabian and Russell (1974) categorize the emotional state along the pleasure, arousal, and dominance (PAD) dimensions. *Pleasure* refers to the degree to which a consumer feels good, happy, or satisfied with the information and interaction available (in this case, during the AR experience). *Arousal* concerns the degree to which a consumer feels stimulated, active or excited from. To what it concerns previous research, Moes and Vliet (2017) have proved that the consumer's enjoyment influences the effect that the medium's richness has on purchase intention. At the same time, Pantano, Rese and Baier (2017) analysed the influence that a higher level of aesthetic quality can have on the consumer's level of enjoyment. In their research, support is found to conclude that one influences the other, at the eyes of the consumer. Additionally, Lee, Ha and Widdows (2011), conducted a study that evaluated the relationship between technology product attributes and emotional responses (pleasure and arousal). Here, they established a relevant connection between the product's performance, appearance, and communication. Looking at the obtained results, Lee, Ha and Widdows (2011) found that the level to which a product appeals visually (appearance) has a significant effect on the consumer's level of pleasure. Consequently, it was found pertinent for the study to evaluate how the perceived level of media richness could influence the level of pleasure and arousal of a consumer, while wearing AR technology during a shopping experience. Thus, the following hypotheses predict the associations between the stimuli provided by the AR experience and affective states:

H2: The level of media richness, will positively influence the consumer's emotional responses (a. pleasure, b. arousal).

3.3. Brand Engagement

The consumer engagement concept has been continuously developed by several researchers (van Doorn et al., 2010; Vivek et al., 2012; Goldsmith, 2012; Hollebeek et al., 2016), and built from different perspectives, creating a valuable amount of knowledge concerning this topic. Simultaneously, it has also been generated a considerable amount of different definitions, concepts and arguments used to define the construct. However, some concepts appear somewhat constant and coherent throughout the whole literature.

For Goldsmith (2012), *brand engagement* is described as the emotional tie that connects customers to brands. Van Doorn et al. (2010, p. 254) elaborate on the construct, defending that customer engagement "may be specifically defined as a customer's behavioural manifestations that have a brand or firm focus, beyond purchase, resulting from motivational drivers". Kumar et al. (2010) argues that it should also be taken into consideration that an engaged customer will purchase more from a firm, and that this factor should be included when defining the concept. Adapting the conclusions drawn by Kim and Johnson (2016) to the present case, brand engagement is here considered as a consequence of emotional and cognitive states evoked by the brand (Allen, Fournier and Miller, 2008; Goldsmith, 2012) and it could be induced by a higher level of media richness or interactivity in an AR experience.

Aligning with these definitions, Hollebeek et al. (2014) presents three different dimensions that compose consumer engagement: a person's cognitive processing, their emotional and behavioural responses to a certain level of 'engagement'. In this context, the terms used are cognitive processing (consumer's level of relationship with a brand through processing and elaboration in a particular consumer/brand interaction), affection (degree of positive affective-relation with a brand) and activation (level of energy, effort and time spent on a brand). In the present study, this is the adopted perspective, as the effects of the consumers' emotional and cognitive responses on brand engagement will be evaluated while distinguishing these three components of the construct.

Looking then to what it was studied in previous research, there are a few examples that help to support the hypotheses that follow. The previously exposed work of Lee, Ha and Widdows (2011), shows that pleasure can influence the consumers' behavioural responses, in terms of their approach-avoidance behaviour. Through these discoveries the authors show that the

product's visual appeal is important to create pleasure, thus leading to an approach behaviour. Similarly, the work done by Eroglu, Machleit and Davis (2003), proves that both pleasure and arousal influence the consumer's approach-avoidance behaviour, in an online store. Furthermore, Kim and Johnson's (2016) research on the influences of social media in online brand-related content, contributes to what is intended to be uncovered in the present study. According to their results, both pleasure and arousal significantly influenced brand engagement. In their study, Kim and Johnson (2016) also proved that the level of the user's perceived information quality presented a significant connection with brand engagement, being a reliable predictor of this construct. Considering what was discovered in other areas of studies, it is intended to discover how some of these concepts relate when it comes to an augmented reality experience. Further examples of research that also studied the effects of cognitive responses on the consumers' level of engagement towards brands, are the works of Pantano, Rese and Baier (2017), concerning the use of AR technology; Lee, Ha and Widdows (2011); and Eroglu, Machleit and Davis (2003). Interesting conclusions were also drawn by Lu et al. (2014). In their study on web design, media richness positively influenced attitude, which also played its part as a mediator between the first construct and the probability of website users recommending the chosen establishment to others (which can be interpreted as a descriptive behaviour of brand activation). Having found enough support to proceed, the following hypotheses were originated:

H3: Emotional responses (a. pleasure, b. arousal) positively influence brand engagement.
H4: Cognitive responses (a. attitude, b. perceived information quality) positively influence brand engagement.

3.4. Willingness to buy

In general, a consumer's willingness to buy refers to a future purchase intention of a particular product or service (Adelaar et al., 2003). Ultimately, it is within the interests of any marketer to know and raise the level of willingness to buy of every consumer. As explained before, through the findings of previous studies, the use of a moment marketing strategy has high implications on how consumers think about certain brands, and how do they relate to them.

According to Kim and Johnson (2016), within the S-O-R framework, purchase intention represents an intention to act favourably in response to informational stimuli related to brands

or products. Regarding relationships between emotional responses and purchase intention, researchers have demonstrated that intention to purchase follows positive internal states (Kim and Johnson, 2016). Given the fact that virtual brand experiences may affect a consumer's decision to try and purchase the brand offline, the findings suggest that establishing a virtual world brand presence may be effective for increasing a consumer's interest in purchasing a brand, having the potential to turn into real life sales (Gabisch, 2011; Domina, Lee & MacGillivray, 2012). A consumer's interactions with a brand in the virtual environment may provide important information about his desire to develop a relationship with the brand in other marketing channels and serves as an opportunity for the marketer to assist in the buying process. Baker et al. (1992), in their study on the retail store environment, found that participants' willingness to purchase was enhanced as pleasure and arousal increased. It is important to keep in mind that since a consumer's consideration set contains all the brands he can think of when making a purchase, it means that those included in the set may be recalled and purchased in the future. This translates into a requirement for companies to work on their ability to make lasting impressions in consumers' minds: by using the right set of tools and finding a strategy that best fits their specific audience. The combination chosen by each business will influence consumers' perceptions. So, it is important to find which are the main characteristics of an AR experience that can influence consumers' perceptions, and how impactful can each of those elements be on their level of engagement with brands.

Results from research done by Poushneh and Vasquez-Parraga (2016), indicates that the impact of an AR-enriched user experience empowers users to better perform their tasks and better appreciate the functionality of a product. By being more entertaining and enabling potential customers to have endless interaction with virtual information produces higher user satisfaction and willingness to buy. As proven by Kim and Johnson (2016), in the context of online consumer social behaviours, pleasure and arousal can influence a consumer's level of willingness to buy. Additionally, in the same study, Kim and Johnson (2016), found a connection between the consumer's perceived level of information quality and the intention to purchase something in the future. Similar to this, Moon et al. (2013) conducted a study on the role of avatars in virtual shopping. In their study, it was found a relevant relationship between the user's brand attitude and his intention to purchase. With this in mind, an increase in the levels of willingness to buy by adding virtual information to real information and presenting it in various formats, is part of what this research intends to analyse by using avatars and the HoloLens technology. Thus, the following hypotheses were developed:

H5: Emotional responses (a. pleasure, b. arousal) positively influence consumer's willingness to buy.
H6: Cognitive responses (a. attitude, b. perceived information quality) positively influence consumer's willingness to buy.

Finally, as pointed by Algharabat (2018) and Papagiannidis et al. (2017), it is important to evaluate the relationship between brand engagement and willingness to buy, and how much does the first explains the latter. As previous research (Epple, 2018; Blasco-Arcas, Hernandez-Ortega, and Jimenez-Martinez, 2016; Papagiannidis et al., 2013; Mollen and Wilson, 2010) has successfully proven in different contexts, customer engagement has a positive impact on purchase intention. Aiming to reach the same conclusions in an AR experiment, a seventh hypothesis is formed:

H7: Brand engagement positively influences the consumer's willingness to buy.

3.5. Moderating effects

As presented in the conceptual framework above, there are two concepts that may influence the levels of emotional and cognitive responses of users, during the experience. As researched by Holzwarth, Janiszewski and Neumann (2006), the use of avatars in web-based shopping environments, leads to a higher level of satisfaction from consumers towards the retailer, as well as a more positive attitude towards the product being advertised and a greater purchase intention. In a study conducted by Moon et al. (2013), it was found that when consumers interacted with other avatars in a virtual shopping scenario, they experienced a higher sense of social presence. More pertinently, in this same study, it was found the interaction with the avatars to enhance the overall shopping enjoyment, their attitudes towards the brands and a higher purchase intention.

Assuming then that the use of an avatar can have a moderating effect between what are the consumers' emotional states (arousal and pleasure) or cognitive responses (their attitude on the brand and perceived information quality), and their behavioural responses, it is important to test the following hypotheses:

H8: The use of an avatar strengthens the relationship between media richness and the consumer's (a.) emotional and (b.) cognitive responses.

H9: The use of an avatar strengthens the relationship between emotional responses (a. pleasure, b. arousal) and the consumer's brand engagement.

H10: The use of an avatar strengthens the relationship between cognitive responses (a. attitude, b. perceived information quality) and brand engagement.

H11: The use of an avatar strengthens the relationship between emotional responses (a. pleasure, b. arousal) and the consumer's willingness to buy.

H12: The use of an avatar strengthens the relationship between cognitive responses (a. attitude, b. perceived information quality) and willingness to buy.

H13: The use of an avatar strengthens the relationship between the consumer's level of brand engagement and their willingness to buy.

Conversely, the variance in the level of brand-moment fit will also be tested as a possible moderator. This is done so that it is possible to learn if this element influences the relationships between the cognitive and emotional responses, and the consumers' behaviours. As studied by Mahdjoubi, Hao Koh and Moobela (2014), real-time interactive simulations in an online shopping situation can have significant effects on a consumer's cognitive and emotional reactions. In the same study, it was also possible to find support on the fact that a real-time simulation can also significantly affect a shopper's purchasing behaviour. Additionally, Penke (2017) proved in her study that the level of brand-moment fit can influence the consumers' relationship with a brand and motivate them to participate in an online conversation. Thus, a final set of hypotheses is drawn.

H14: The use of a well-timed communication strengthens the relationship between emotional responses (a. pleasure, b. arousal) and the consumer's brand engagement.

H15: The use of a well-timed communication strengthens the relationship between cognitive responses (a. attitude, b. perceived information quality) and brand engagement.

H16: The use of a well-timed communication strengthens the relationship between emotional responses (a. pleasure, b. arousal) and the consumer's willingness to buy.

H17: The use of a well-timed communication strengthens the relationship between cognitive responses (a. attitude, b. perceived information quality) and willingness to buy.

H18: The use of a well-timed communication strengthens the relationship between the consumer's level of brand engagement and their willingness to buy.

The previously enumerated hypotheses are more simply presented in figure 4.

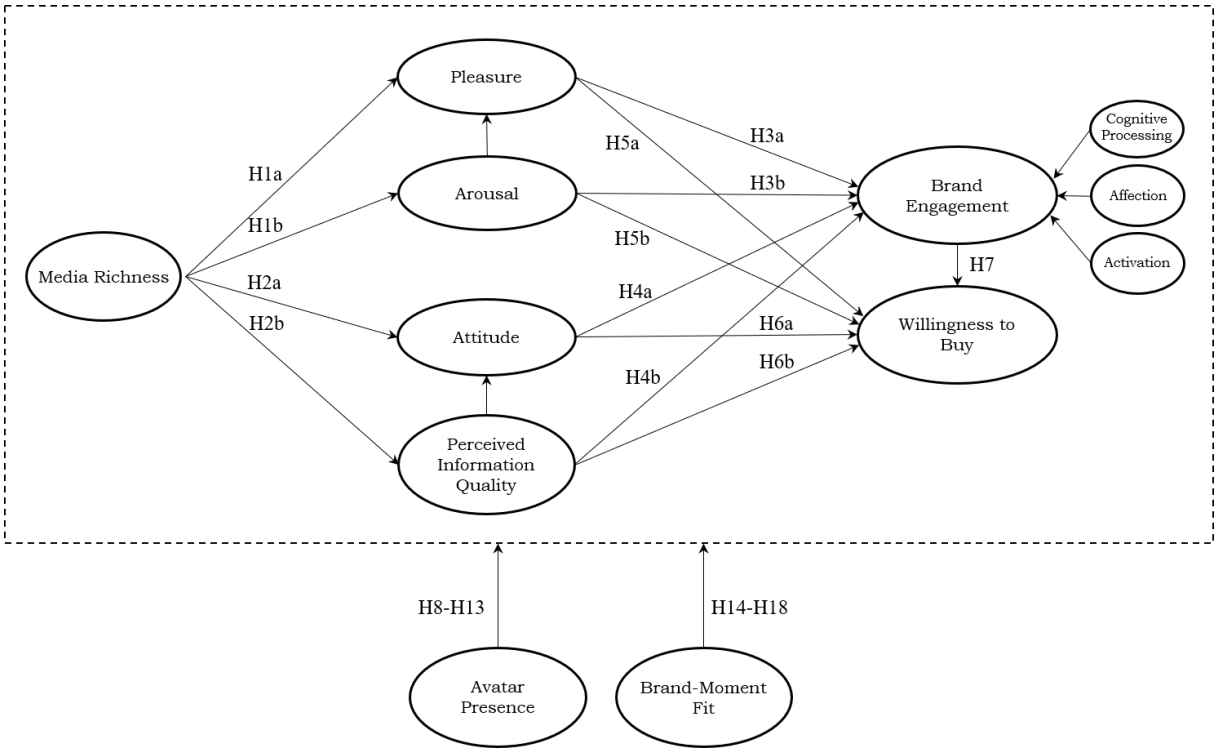


Figure 4 Overall model with proposed hypotheses

4. Methodology

To find support from the previously announced hypotheses, a set of relevant data had to be retrieved from the collected sample. By applying the S-O-R model, it is expected the environmental stimuli (S) to affect an organism's internal state (O), which then drives the organism's behavioural response (R). In the case of an AR experience in a food retail setting, it is suggested digital stimuli of technology (media richness) impacts the customers' experience and their cognitive and emotional responses. These responses are expected to affect a consumer's behaviour and attitudes, such as engagement and purchase intention. Learning more about the moderating effects of moment marketing constitutes one of the main goals of the present study, as does the evaluation of the effects that the presence of the avatar in one of the versions of the experiment (opposing to one without it) will have on the relationships between the constructs shown in figure 4.

Crucial to corroborate the proposed theoretical framework, the methodology applied included the creation of a new innovative service. A prototype of an app was built, using the HoloLens technology. The process under which this prototype was developed will be explained further in this chapter. The necessary data was then fully collected through a final questionnaire, given to participants after they underwent the experiment.

4.1. Research Design

A 2 x 2 mixed design was conducted, and two different conditions of the AR experience were created operationalizing two levels of media richness (with or without avatar) as the between--participants variable and two levels of brand-moment fit (high and low) as the within--participants variable (see table 1).

Table 1 Research Design Matrix

		Avatar Presence		
		AR experience with Avatar	AR experience with no Avatar	Total
Brand-Moment Fit	High	44	41	= 85
	Low	44	41	= 85

Total number of participants allocated to each condition (Avatar Presence analysed between--subjects, Brand-Moment Fit analysed within-subjects)

For the experiment, the content of the AR experience was manipulated. In one condition, there was no use of an avatar, and suggestions on different products were made throughout different places inside the store. To present these suggestions, static billboards were developed, with the image and name of the product being displayed. Representing a lower level of media richness, only textual and 2D images were used in this condition. Ideally representing a higher level of media richness, the second condition of the experiment was shown to a different group of participants. Here the information was not only visually shown, but also heard, as the avatar talked about it, and held the product. The level of brand-moment fit was manipulated also at two levels. One of the conditions of the AR experience showed no congruence between the type of the product being suggested and the location of the user. In this first part of the experiment, the shopping assistant suggested products that were unrelated to the participants' location, and therefore, where they were expected to be less receptive to the information. In the second condition, there was some congruence between the location of the user and the prototype's suggestion of products and its brands, thus having a high level of brand-moment fit. Here, the suggested product was somewhat connected to the location of the participant or the category of products (complementary products) surrounding the participant at a given point in their shopping experience.

The participants' cognitive and emotional reactions were collected through a single set of data, as a final questionnaire. This task allowed the gathering of all the needed data to the study. Through a set of questions, it was evaluated not only the participants' perceived level of media richness (Suh, 1999; Maity, Dass, Kumar, 2016), but also the level of pleasure and arousal, towards the service provided by the prototype of the app (through the Self-Assessment Manikin, Lang, 1980). Additionally, the consumer's attitude towards the suggested brands (Mitchell and Olson, 1981), and perceived information quality (Yang et al., 2005) were also assessed in the questionnaire. In this stage, it was also important to inquire participants about their willingness to buy the products (Kim and Johnson, 2016) presented in the augmented layer, and how likely were they to feel engaged towards the brands included in the experiment (Hollebeek et al., 2014), in terms of cognitive processing, brand affection and activation.

4.1.1. Procedure

The experiment took place during the third week of the month of July of 2018, in one of the Portuguese supermarket stores "My Auchan", in Lisbon. Subjects who participated were firstly given a brief explanation on the context and main objectives of the experiment and then handed a consent form (see Annex 1 and 2). Participants were also briefed about the trajectory they should follow inside the store, once the glasses were placed on their heads. The main purpose was to get a picture of how the shopping assistant would normally function, where participants could easily picture themselves wearing the HMD more seamlessly in their day-to-day activities.

In the second moment, it was explained what participants could expect from the prototype developed. They were instructed to, once the equipment would be ready to use, walk through the store in a calm manner. Made aware of the areas where they should expect the messages to appear, it was important not to give details about its content (see Annex 3). Once the equipment was placed on the participant's head, he or she was then told to enter the store, while being reminded of the previously explained instructions. Throughout the whole experience, subjects were accompanied by someone, in case of a technical malfunction, or a general question (only answered in case it was considered not to interfere with the following phase of the experiment).

A final questionnaire was then handed to the participants, where the results concerning the subjects' cognitive responses (perceived information quality and brand attitude) and emotional responses (pleasure and arousal) were all collected. In a post-experiment moment, the questionnaire also allowed to retrieve all the valuable information concerning the consumer's level of brand engagement and their future purchase intentions.

4.2. Experimental Design

In this section, the prototype development process is explained. First, the profile of two personas is presented, and the scenarios in which the app would prove to be most useful is explained. Secondly, the functionalities and the mock-ups designed for the app are exposed. This allows to later describe how the chosen measures and scales lead to a reliable analysis of the results obtained, and discover if the proposed hypotheses are supported, or not.

4.2.1. Personas

Sofia

Sofia is 39 years old, married and has two children. She works as an account manager at a tech company, in the centre of Lisbon, and loves her job almost as much as she loves her family. She likes to cook but whenever entering the supermarket, she struggles to find variety in meals that are both healthy and delicious for her and her family.

Figure 5 Persona: Sofia

Luís

Luís is a 25-year-old Marketing Master student, with a bachelor in Electrotechnical Engineering. He lives in Lisbon but must share the apartment with three more people in order to afford rent. He is not a fan of spending too much time in the kitchen, so he tries to create simple yet complete meals. Although he always has lunch at school, when comes to dinner time, the challenge of not eating the same sort of food week after week, gets increasingly difficult.

Figure 6 Persona: Luís

4.2.2. Scenarios

4.2.2.1. Scenario 1

Although Sofia can usually count with her husband's help to pick up the kids from school, and sometimes even cook dinner, it is usually she who goes to the supermarket to do the shopping. As she leaves work, and when the family is already home, she goes directly to the supermarket closest to home. Once she arrives, like many other days, she realizes she hadn't had the time to plan or think about what she was going to cook for dinner. And very often she tries to come up with a complete meal, preferably a healthy one, but also enjoyable for all.

As she enters the supermarket, she turns on her "Shopping Assistant" app, while using her HoloLens device. Being connected to her online account, the app already knows her name, how many people she usually cooks for, what sort of products she usually buys, how much she usually spends, when online, or in-store. Without retrieving any other information on her buying

behaviours, other than what Sofia allows, she really feels the company and the usefulness of her "Shopping Assistant".

As she turns on the app and starts going through the aisles of the store, she grabs, almost randomly, a bag of pasta – a package of spaghetti – and by detecting Sofia's interest in the product, her Shopping Assistant displays more information about it: brand chosen, nutrients and ingredients, and current price. As Sofia keeps on deciding if this is the sort of pasta she wants, unsure of what to make out of it, the app suggests a recipe: "Spaghetti à Bolognese". Sofia notices that the tomato sauce suggested is the one she usually buys and realizes she has not cooked that dish for a while. She loves the idea and is sure her kids will love it too. Sofia goes through the suggested list of ingredients and decides to follow it.

As she checks out, the purchase is registered in her account, and her Shopping Assistant will renew its suggestions for her next shopping experience to be optimized and just as pleasant.

4.2.2.2. Scenario 2

Luís has been studying for his exams the whole week. As he usually stays at home to focus on his studies, he realizes that he has run out of all the food he had bought the weekend before. Before heading out, he does a quick internet search on what sort of food helps people focus and has proven to enhance memory abilities. Registering some items in his shopping list, on the supermarket's website, he then decides to go out, HoloLens in the bag, with his list saved online.

As Luís enters the supermarket, he puts on the HoloLens, and opens the "Shopping Assistant" app. After being greeted by his shopping assistant, it immediately shows Luís's previously recorded shopping list and so, he heads straight to the vegetables stand, and looks for avocados, one of the ingredients at the top of the list. As he grabs the avocados, looking at the tag with the price and code bar, the Shopping Assistant immediately informs him of what avocado is usually is used for, its characteristics and eventually suggests a dish: "Avocado Pasta". Luís looks at the list of things he would have to buy, and being on a short budget, he decides to dismiss the suggestion. The app registers the choice of the user and suggests another meal: "Chicken Avocado Burgers". He gets the ingredients that the Burgers recipe demands, and then goes to get the remaining products that he had already planned to buy, before leaving the house. Once again, the user selections are registered and saved, the choice of a new recipe considered, improving the service that is to be provided in the future.

4.2.3. Functionalities and mock-ups

The developed prototype of the "Shopping Assistant" app, was simplified and focused only on showing participants a small example of its usability and usefulness. Also, given the short time available for development, and the fact that the technology was new to most consumers, this version had a rather low level of interactivity. As it was intended to evaluate the moderating effects of using an avatar, the control and the experimental groups of participants were exposed to one of the two developed conditions of the prototype (Figure 7 of the prototype: Two images where the "Shopping Assistant" takes form, with a display of a person or avatar, and the other without it).

Figure 7 Supermarket entrance: Left (Without Avatar) and Right (With Avatar)

To replace general advertising posters signs, which are nowadays placed along any supermarket store, the shopping assistant was considered to be a more focused advertising technique for customers. By suggesting products that are related to the consumers' usual preferences or interests, this service turns the store's communication more effective and pertinent for any customer that has the "Shopping Assistant" app.

Once the HoloLens were prepared to use, the participants were able to assist to first functionality of the prototype developed. Whether just in a textual form, or with the avatar, participants were greeted at the entrance of the store (see figure 7), assuring the user they would be accompanied throughout their shopping journey.

The second point of 'interaction' inside the experiment was the one that allowed the study of the effects of having a low brand-moment fit, in an AR experience, at a food retail setting. By approaching a specific area of the store, customers were presented with the suggestion of a product, from a completely different category from the ones they were standing near. While

designing the experiment of the present study, a package of frozen fish fillet was selected to be suggested near the bread and bake area of the store (as depicted in figure 8).

Figure 8 Product suggestion in an aisle (Low Brand Moment Fit): Left (Without Avatar) and Right (With Avatar)

By studying the participants' post-experience reactions, it was possible to assess how much did a high brand-moment fit communication affected their buying behaviour and compare it to the effects of what was considered to be a low brand-moment fit (Figure 8). By studying how participants reacted to the change in the way the app approached them, it was also assessed how much this affected their responses (intention to buy and brand engagement) as well as their cognitive (perceived information quality and attitude) and emotional reactions (arousal and pleasure).

In the same logic as explained before, in a third moment, the customer continued the journey through the store, and while standing in a specific aisle, looking at a certain category of products, a call for attention to a specific product appeared. In this prototype, the pack of pasta from "Nacional", was used to this test (Figure 9). When approaching the area where this product was actually displayed, the participant was presented with a recipe suggestion.

Figure 9 Product Suggestion in an aisle (High Brand-Moment Fit)

The recipe showed various information including the time that it took to cook the meal, for how many people could be cooked for, and the price range it would cost the customer, as well as the whole list of ingredients needed (Figure 10).

Figure 10 High Brand-Moment Fit: List of Ingredients (Without and With Avatar)

This was the core of the whole customer experience while using the app and, to this study, it represented one of its most important moments. It was about this interaction that the final questionnaire focussed mostly on, as it inquired participants on how they felt, and what do they retrieved from the experience. With the suggestion of a recipe, a number of ingredients (products) were presented. The focus of this study partially laid on discovering if the suggestions had any influence on the consumers' decisions, and their cognitive and emotional responses to the experience.

It was also important to find what were the differences between the reactions of participants who experienced the "avatar" element and the ones who did not. By addressing this subject also in the final questionnaire, it was expected the results to give clarity on how much impact on customers' intention to buy, and level of brand engagement, a social presence element can have.

4.3. Measures

The level of media richness was considered as an independent variable of the model, as well as the level of brand-moment fit. To measure and compare the participants' reaction between the different conditions, 27 attributes were employed, which were categorized in three groups including Cognitive Responses, Emotional Responses and Behavioural Responses. For the purpose of evaluating emotional attributes, information that was gathered through the use of the Self-Assessment Manikin (SAM), these were analysed to realize how the participants felt after being exposed to the AR experience. As a reliable measure of emotional traits used in psychology research (Cook et al., 1988) and in other fields such as advertising (Morris, 1995; Morris and Boone, 1998), the SAM scale was used in this work. However, since the dominance construct has proved to have a low correlation with behavioural responses (Mehrabian, 1995;

Vieira, 2013), the two-dimensional approach was adopted. On the other hand, the purpose of cognitive attributes is to measure participants' reactions to the brands presented in the experience. As such, their perceived level of information presented by the service, and their attitudes towards brand, are analysed. Finally, the behavioural response items cover a set of attributes related to the real-life implications of such service, as how the participants' behaviour was influenced by the experiment.

The questionnaire began with questions concerning participants cooking and food shopping habits, as well as general demographic data. Following this, there were several questions regarding the chosen measures of the investigated variables, which are explained next.

4.3.1.1. *Media Richness.* The questions developed to measure media richness, were based on existing work (Suh, 1999; Maity, Dass and Kumar, 2018). The original measure (Suh, 1999) contained 8 items, which were reduced to 6 in Maity et al. research (2018). Both research papers used these scales to assess consumers' behaviour on e-commerce and online buying behaviours. For the purposes of this study, the original scales were adapted given the developed AR experience, and the measuring items were reduced to four. Participants responded to each of these items using seven-point Likert scales (1 = "Totally Disagree"; 7 = "Totally Agree").

4.3.1.2. *Emotional Responses: Pleasure and Arousal.* Participants' emotional responses were assessed using measures of pleasure, arousal, and dominance (PAD) developed by Lang (1994). The SAM scale "is based on a picture-oriented scale, which enables arousal and pleasure level towards each product in the shelf to be reported" (Guerreiro, Rita and Trigueiros, 2015: 1735). In this study, however, only the dimensions of pleasure and arousal were considered, given the correlation issues that dominance presents when it comes to behavioural responses. All items measuring pleasure and arousal were presented on a nine-point semantic differential scale.

4.3.1.3. *Cognitive Responses: Attitude and Perceived Information Quality.* Perceived information quality was measured using a scale developed by Yang et al. (2005). From the 5 final items used to assess usefulness/quality of information, the "up-to-date information" item was removed, since the goals of the experience focused mostly on the "where" the customer was in the store, and not so much when. It was then irrelevant for the author to know the participant's opinion on how updated the information was. To evaluate

participants' attitude towards the advertised brands, the scale developed Mitchell and Olson (1981), was adapted considering the purposes of this study. Both measures used a five-point Likert scale (1= strongly disagree; 5 = strongly agree).

4.3.1.4. *Behavioural Responses: Brand Engagement and Willingness to Buy*. Both constructs were measured using a seven-point Likert scale (1= Strongly Disagree; 7= Strongly Agree). The items formulated to assess the level of brand engagement were adapted from Hollebeek et al. (2014), including cognitive processing using three items, affection was assessed using four items and activation was evaluated using three items. To assess the participants' level of willingness to buy the suggested products and/or brands the scale used by Kim and Johnson (2014) was adapted to this study's context. This was done with a 4-item set of questions.

4.3.1.5. *Control variables.* As control variables, questions on the consumer's age, gender and level of education were used. Its effects on the participants' levels of brand engagement were assessed.

The questionnaire developed for this study was translated to Portuguese in order to reduce misunderstandings and misinterpretations of questions by respondents due to language barriers. A direct translation was performed, since the author is fluent in both English and Portuguese languages. The questionnaire presented to the participants can be found in Annex 4.

5. Result Analysis

5.1. Sample

The study was conducted using a snowball sampling and additional participants were accepted in case interested regular customers shopping at the store volunteered to participate. 85 participants agreed to take part of the study. Common method bias (CMB) is a potential concern (Podsakoff et al., 2003) when collecting behavioural and attitudinal data from self-report questionnaires at one point in time (Chang, van Witteloostuijn, and Eden, 2010). This was mitigated, through procedural design and post-hoc analysis following Podsakoff et al. (2003) recommendations. For procedural design, the questionnaire was developed in consultation with senior academics ensuring the questions to be clear, concise, and specific for the created retail experience. Finally, it was implemented a counterbalancing of the question order by separating the survey sections, making it less obvious which items intended to evaluate which constructs (Podsakoff et al., 2003). At the beginning of the questionnaire, a section containing personal demographic questions was inserted, related to the participant's age, gender, and level of education, which were followed by questions about their usual shopping experience and habits. A post-hoc analysis of CMB was conducted using Harman's (1967) one factor test. The eigenvalue unrotated exploratory factor analysis solution detected seven factors, with the highest portion of the variance explained by a single factor being 37.26% (see table 11 in Annex 5). This result indicated that CMB was unlikely to be an issue for this study, as most of the variance was not due to a single factor (Fraj, Matute, & Melero, 2015).

Relatively to the sample population characteristics, a summary of the sample demographics is presented in table 2. As a brief reading on the sample profile, it can be reported that from the population that participated in the experience, there were 47 females and 38 males. As most of the participants were between the ages of 21 and 30 years old, 42.3% of the whole sample held a bachelor's degree, and 37.6% a master's degree. Finally, although there were 9 people that had less than 21 years old, it is known to the author they were living alone, or cooked for themselves regularly, thus fitting the criteria for a valid sample, given the present study's goals.

Table 2 Demographic sample data

Demographic characteristics	Frequency	Percentage (%)
Age		
0-20	9	10.6%
21-30	42	49.4%
31-40	5	5.9%
41-50	11	12.9%
51-60	12	14.1%
60+	6	7.1%
Gender		
Male	38	44.7%
Female	47	55.3%
Education level		
9th Grade	2	2.4%
12th Grade	13	15.3%
Bachelor	36	42.3%
Master	32	37.6%
PhD	2	2.4%

5.2. Data preparation and treatment

Before analysing the data by statistical means, the data set retrieved from Google Forms had to be prepared. Since the answers were given in person (after being exposed to the experiment), and the Google Forms platform was used, it was predefined that all questions had to be answered, avoiding having unanswered questions or incomplete questionnaires. Once the data set was downloaded, and transported to an Excel file, the first step was to eliminate answers related to two of the products participants were inquired about. It was only after completing all experiments, that it was realised it was not necessary to gather participant's opinions on all the suggested products and brands, rather than the two different moments they were attached to (where there was first a low brand-moment fit, and then a high brand-moment fit). In practical terms, since the olive oil "Oliveira da Serra", the tomato sauce "Guloso" and the spaghetti "Nacional", all represented a high brand-moment fit situation, only the answers relative to the olive oil were considered in this analysis. However, it is believed that presenting all three options allowed a truer distinction between the participants' opinions and less confusion when answering the survey. The second step was related to the presence of repeated measures in the experiment. Given that there were two different moments in the experience for every participant, the columns relative to their opinions on the same subjects in the two moments were

transferred to rows, resulting in two rows of answers per participant. Furthermore, the value labels of the item of the media richness construct "While shopping at the store, the conditions provided by the Shopping Assistant slowed down the decision-making process", and the scales used to assess participant's emotional responses, Pleasure and Arousal were reverted prior to any statistical analysis.

Finally, three columns were added to the data set: VERSION, a binary indicator to identify which version of the experiment was the participant exposed to (1, for the version with the avatar, 0 for the version without the avatar); MF, another binary indicator to identify what answer of each participant was related to the high brand-moment fit condition (coded as 1) and which was related to a low brand-moment fit condition (coded as 0); and ID to identify the answers of each individual participants, given the repeated measures situation – while having 170 rows on the file, there were 85 identified answers.

5.3. Structural Model Results

Proceeding with the analysis of the measurement model, PLS-SEM was used for such purpose (Ringle, Wende, & Becker, 2017). The partial least squares (PLS-SEM) approach is a form of structural equation modelling (SEM), which intends to "maximize the explained variance of the dependent latent constructs." (Hair, Ringle, & Sarstedt, 2011: 139). The PLS-SEM method is increasingly used in marketing practice (Kim and Yongho, 2016; Azad and Ahmadi, 2015; Hepple, 2018), as it allows to estimate complex cause-effect relationships with formative and reflective constructs at a relatively small sample size. PLS-SEM is particularly interesting for experimental studies because the number of potential participants is usually restricted by a complex and time-consuming study. In particular, when the objective is to identify key drivers of a construct it is suggested to choose the PLS-SEM method over the covariance-based SEM (Hair, Ringle, & Sarstedt, 2011). As for the minimum sample size for PLS-SEM path model estimation, it should at least meet the "10 times rule". This rule indicates that the minimum sample size should be ten times the maximum number of independent latent variables impacting on a dependent variable in the path model (Chin, 1998; Hair et al., 2014). According to this guideline, the minimum sample for our model would be 4 x 10 = 40, however, since the study contains a between-subjects comparison, and so it must be multiplied by two. While having a minimum limit of 80 people on this study's valid sample size, it was possible to collect 85 participants and questionnaires, meeting the necessary requirements.

Due to brand engagement being a second-order construct, it is not measured by means of manifest indicators, but by means of other first-order constructs. Extant approaches to estimate hierarchical constructs using PLS-SEM, such as the repeated indicators approach (Wold, 1982), or the two-stage approach (Ringle et al., 2012), were proven by Van Riel et al. (2017) to be less reliable (as they support the two approaches to yield inconsistent estimates and not include model fit tests, thus not providing empirical evidence for or against the existence of a hierarchical construct). Given the second-order brand engagement, a three-step approach was followed, presented by Van Riel et al. (2017) as it is considered the only consistent approach for modelling, estimating, and testing composite second-order constructs made up of reflectively measured first-order constructs. To estimate the model using Van Riel et al. (2017) approach, Brand Engagement was represented by its three first-order constructs: Cognitive Processing (CP), Affection (AF) and Activation (AC). The assessment of the overall model fit followed, ensuring the validity and reliability of the composing constructs. With all possible connections included, as suggested by Van Riel et al., the results reported a SRMR of 0.078 (see table 14 in annex 6), which is accepted by the most conservative (Hu and Bentler, 1999) criterion limits, avoiding a model misspecification.

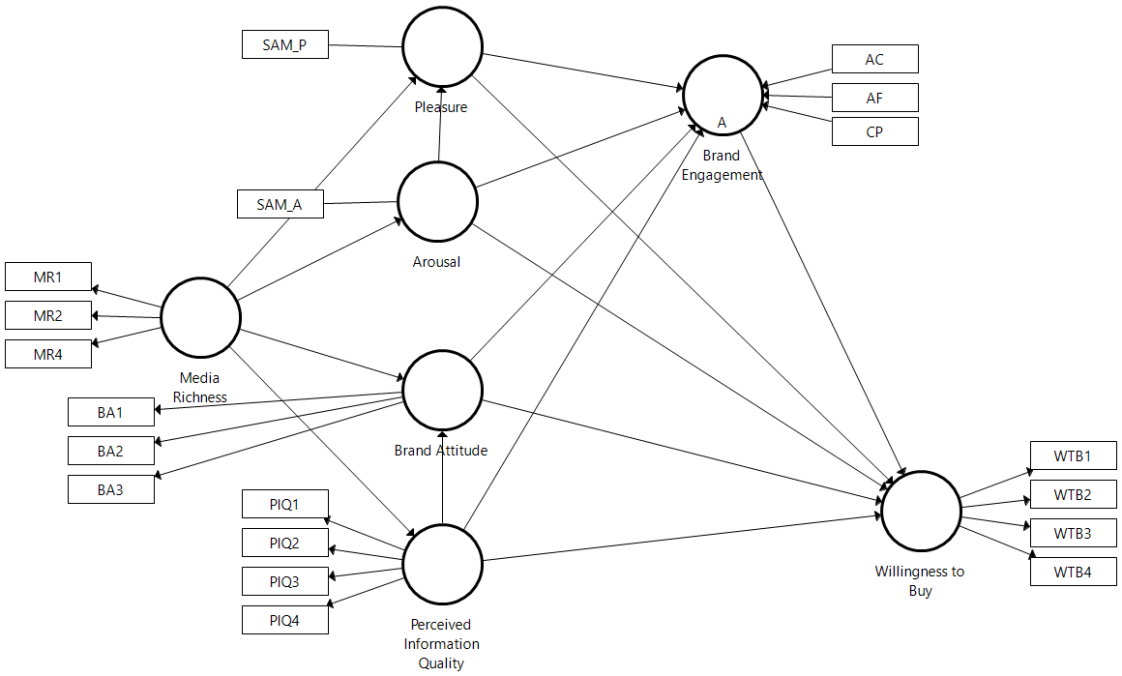


Figure 11 Overall model with the second-order construct

5.4. Outer Model Analysis

Looking firstly at the outer model, it is advised to look primarily to the measurement loadings, as the path loadings connecting the factors to the indicator variables (Hair et al., 2014). For the items to be significant, thus reliable, they must be superior to a loading of 0.50 (Hair et al., 2010) or even 0.70 (Hair et al. 2014; Hair, Ringle and Sarstedt, 2011; Hulland, 1999). Looking at the first results, the indicator MR3 was eliminated from the model, given that it had a negative loading, which was expected since it played as an attention check in the questionnaire given to the participants. As it can be noted in table 3, the indicator MR4 presented a loading inferior to 0.70. However, Hair et al. (2014: 103) suggest removing items with loadings between 0.40 and 0.70 only "when the indicator leads to an increase in the composite reliability". Given the deletion of MR4 does not increase the measure's Composite Reliability (CR), the indicator was kept.

In the present study, composite reliability is a preferred alternative to Cronbach's alpha as a test of convergent validity (Hair et al., 2014) since it is believed to lead to higher estimates of true reliability. As stated by Hair et al. (2014), in a model adequate for exploratory purposes, composite reliabilities should be greater than 0.70 for an adequate model for confirmatory purposes (Henseler, Ringle, & Sarstedt, 2012: 269); and equal to or greater than 0.80 is considered good for confirmatory research (Daskalakis & Mantas, 2008: 288). The present model follows through on all criteria, as it can be seen in table 3 below.

Table 3 Results of the reflective construct measurements

	Items	**Loadings**	**AVE**	**CR**	**ρA**	**Cronbach's α**
Media Richness	MR1	0.923	0.717	0.882	0.890	0.803
	MR2	0.926				
	MR4	0.665				
Brand Attitude	BA1	0.912	0.830	0.936	0.906	0.898
	BA2	0.923				
	BA3	0.898				
Perceived Information Quality	PIQ1	0.799	0.605	0.860	0.807	0.787
	PIQ2	0.734				
	PIQ3	0.815				
	PIQ4	0.762				
Willingness to Buy	WTB1	0.915	0.856	0.960	0.945	0.944
	WTB2	0.938				
	WTB3	0.908				
	WTB4	0.940				

The internal reliability for the media richness, pleasure, arousal, brand attitude, perceived information quality and willingness to buy constructs were established as both Dillon-Goldstein's rho (Composite Reliability) and Cronbach's alpha values were above the lower limit of 0.70 (Bagozzi and Yi, 1988). For the Convergent Validity test, all the construct's loadings concerning the AVE were superior to the advised 0.50, as supported by Hair et al. (2010) and Bagozzi and Yi (1988).

Finally, all constructs exhibited discriminant validity, as the confidence intervals for the Heterotrait-Monotrait ratio (HTMT) of the correlations between the reflective constructs were lower than 0.85, and the HTMT confidence intervals did not include 1 (Hair et al., 2014). For a further analysis on the values obtained, the results are presented in table 4.

Table 4 Heterotrait-Monotrait Ratio (HTMT)

	Arousal	Brand Attitude	Media Richness	Pleasure	Perceived Information Quality	Willingness to Buy
Arousal						
Brand Attitude	0.229					
Media Richness	0.343	0.316				
Pleasure	0.488	0.044	0.374			
Perceived Information Quality	0.230	0.333	0.764	0.198		
Willingness to Buy	0.306	0.574	0.669	0.263	0.536	

Additionally, looking at the Fornell-Larcker criterion results, and cross-loadings, discriminant validity in all constructs was confirmed. Through table 15, from Annex 6, it is possible to conclude that each construct's AVE is higher than its squared correlation with any other construct (Fornell and Larcker, 1981). From table 16 (in Annex 6), it is possible to note there's not a higher loading between indicators than the one each is intended to measure (Chin, 1998; Grégoire and Fisher, 2006).

5.5. Second-order construct Brand Engagement

Brand Engagement, as a second-order construct, was re-adjusted in the model so that it became first-order. Explanative constructs functioned as its indicators in the final model, and so, its reliability and validity measurements, had to be addressed differently.

Looking firstly at its indicator weights, using "Mode A" as suggested by Van Riel (2017), the results are presented in table 5. Since the Inner VIF of all the indicators that compose brand engagement are below 5, there is no collinearity problems between them (Kock and Lynn, 2012). Also, normally it would be possible to confirm each indicator's validity only by looking at their significant outer weights and loadings (as proposed by Hair et al., 2014). But since brand engagement is led as a composite construct, Van Biel et al. (2017: 466) support that "neither the inter-term correlations nor the loadings are informative about the amount of measurement error".

Table 5 Results of the formative construct assessment

Latent Construct	Indicator	VIF	Outer Weight	Lower Bound (95%)	Upper Bound (95%)	Outer loading	Lower Bound (95%)	Upper Bound (95%)
Brand Engagement	Cognitive Processing	3.327	0.325	0.292	0.350	0.911	0.882	0.933
	Brand Affection	3.013	0.385	0.360	0.410	0.905	0.874	0.929
	Brand Activation	1.883	0.409	0.372	0.464	0.868	0.832	0.897

Providing an alternative reliability estimation method of this specific construct, Van Biel et al. (2017) suggests the application of a simplified version of Mosier's (1943) equation for determining the reliability of a weighted composite (ρ_S):

$$\rho_S = w'S^*w \quad (1)$$

where w is a column vector containing the indicator weights of the second-order composite and S* is the consistent correlation matrix of the second-order composite's indicators, with the respective reliabilities (ρA) on the diagonal. Following the suggested approach (1), it is possible to reach a reliability estimate of the brand engagement construct of 0.9613, confirming its reliability as a composite construct.

5.6. Inner Model Analysis

To analyse the structural model and estimate how well it supports the theorized connections between the different latent variables, several further steps needed to be conducted. First, it was observed that there were no collinearity issues among the predictor constructs, as all VIF values were below 5 (Hair et al., 2014), as it is shown in table 6.

Table 6 Outer VIF results

	Arousal	Brand Attitude	Brand Engagement	Media Richness	Pleasure	Perceived Information Quality	Willingness to Buy
Arousal			1.398		1.124		1.400
Brand Attitude			1.135				1.789
Brand Engagement							1.804
Media Richness	1.000	1.794			1.124	1.000	
Pleasure			1.340				1.359
Perceived Information Quality		1.794	1.135				1.175
Willingness to Buy							

Presented in figure 12 below, the results for the path coefficients represent the hypothesized relationships between two constructs. As stated in Hair et al. (2014) research, the path coefficients vary between −1 and +1, whereas values close to +1 indicate a strong positive connection between two constructs and vice versa for values close to −1.

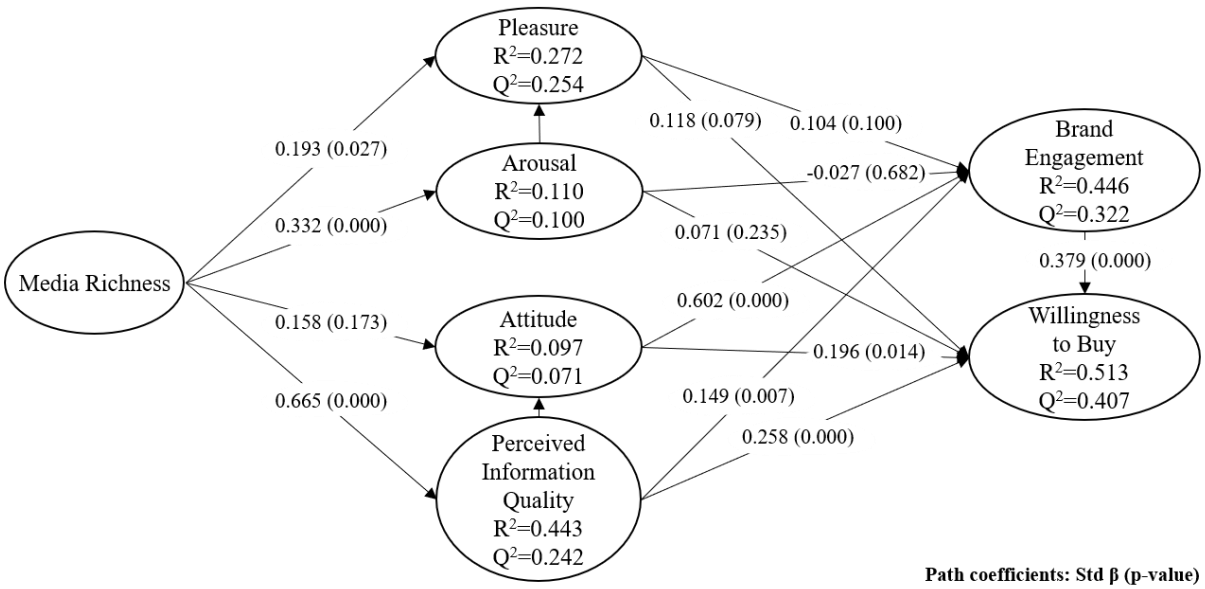


Figure 12 Overall model with pls-algorithm and bootstrapping results

While looking at the results of the SEM analysis of the complete data, it should also be added that the Standardized Root Mean Square Residual (SRMR) of the model is 0.078, indicating a good fit for the model (Hu and Bentler, 1999) (see table 14 of Annex 6). The evaluation of the structural model examines the R^2 estimates, Stone-Geisser's Q^2 value, standardized path coefficients (β), and p-values. The proposed media richness construct as a predictor, results in a 11% (R^2) variance in the level of arousal that indicates a weak prediction (Sarstedt et al., 2014; Hair et al, 2011). Media richness predicts 27.2% variance in the level of pleasure, and 44.3% in perceived information quality, indicating a fairly moderate prediction power (Sarstedt et al., 2014; Hair et al, 2011). Finally, the model explains 44.6% (R^2) variance in the level of brand engagement and 51.3% in willingness to buy representing a moderate to a strong prediction power (Sarstedt et al., 2014; Hair et al, 2011). Only the R^2 of explained variance of brand attitude by media richness goes below the cut-off value of 0.10, with 9.7%, meaning that even if the path coefficient between these two latent variables is significant, the relationship can be seen as meaningless (Falk & Miller, 1992). For that reason, it was evaluated the effects of perceived information quality as a mediator between media richness and brand attitude, following research done by Hayes and Preacher (2004). As suggested by Hair et al. (2014), it was first evaluated the direct effect between media richness and brand attitude, without the mediator perceived information quality. By evaluating the results (see Table 23 on Annex 6), this condition is supported as the path coefficient between the two constructs presents a p-value below 0.05, meaning the direct effect is in fact significant. However, as the mediator is inserted back in the model, by assessing the indirect effect, it can be concluded through table 7 below, the level of mediation of PIQ partially explains the relationship between MR and BA. The next step, according to Hair et al. (2014), was to evaluate how much the mediator variable absorbed from the direct effect. By calculating the VAF (Variance Accounted For) (2), it was possible to determine the extent to which the variance of the construct brand attitude was explained by the indirect relationship via the perceived information quality variable (Hair et al., 2014).

$$\text{VAF} = \frac{p_{12} \cdot p_{23}}{(p_{12} \cdot p_{23}) + p_{13}} \quad (2)$$

With p_{12} being the path coefficient between MR and PIQ, p_{23} the path coefficient between PIQ and BA (when the mediator is included in the model), and p_{13} being the value of the path coefficient between MR and BA (when PIQ is not included in the model). As VAF equals 0.304 (30.4%), according to Hair et al. (2014) it is possible to conclude that perceived information quality partially mediates the relationship between media richness and brand attitude.

Table 7 Mediation results

Relationship	Std β	Std Dev	p-value	CI LL 95%	CI UL 95%	Level of Mediation
MR -> PIQ -> BA	0.119	0.061	0.047	0.024	0.221	Partial mediation

Proceeding with the analysis of the inner model, the predictive relevance of the path model needed to be assessed with the so-called Stone-Geisser criterion (Q^2), which refers to the model's capability to predict the observed indicators of an endogenous latent variable (Henseler, Ringle, & Sinkovics, 2009). In other words, the Stone-Geisser criterion shows how "well-observed values are reconstructed by the model and its parameter estimates" (Chin, 1998: 318). To obtain these values for the endogenous constructs, a blindfolding procedure was processed, as an iterative process based on a sample reuse technique. If the resulting Q^2 values are greater than zero, it can be said that the model shows predictive relevance for a certain endogenous variable (Chin, 1998; Hair et al., 2014). In this study, all endogenous constructs show a positive Q^2 value therefore further confirms the model's predictive validity (Henseler, Ringle, & Sinkovics, 2009).

When looking at the path coefficients as presented in figure 12, it becomes clear that most paths show convincing positive values, with the exception of the connection between the constructs arousal and brand engagement which shows to be quite weak with the small negative value of -0.027. However, it is still necessary to ascertain if all the other relationships are significant (Hair et al., 2014). Therefore, a complete bootstrapping approach (1000 re-sampling at the 95% level using bias-corrected intervals) was applied to assess if the path coefficients are significantly different from zero and the proposed hypotheses can be supported or not (Fornell & Larcker, 1981; Chin, 1998).

The results of the bootstrapping procedure indicated that most of the path coefficients are significant at the 0.05, 0.01 or 0.001 level. Looking at the specific non-significant path coefficients, relationships between media richness and brand attitude (results that were now expected after the R^2 analysis), pleasure and brand engagement, arousal and brand engagement, pleasure and willingness to buy, and arousal and willingness to buy, presented a p-value above 0.05. On the other end, the overall strongest effect in the structural model can be found for the relationship between media richness and the construct perceived information quality with a path coefficient value of 0.669. Nevertheless, the strong relationship between brand attitude and

brand engagement is worth to mention (with β = 0.606), as well as the relationship between brand engagement and willingness to buy (with β= 0.379).

Table 8 Bootstrapping results

Hyp	Relationship	Std β	Std Error	p-value	Decision	f^2	q^2	95%CI LL	95%CI UL
H1a	MR -> P	0.196	0.087	0.027*	Supported	0.045	0.042	0.043	0.327
H1b	MR -> A	0.333	0.078	0.000***	Supported	0.124		0.212	0.472
H2a	MR -> BA	0.158	0.116	0.173	Not Supported	0.015	0.010	-0.034	0.348
H2b	MR -> PIQ	0.669	0.054	0.000***	Supported	0.794		0.543	0.734
H3a	P -> BE	0.108	0.063	0.100	Not Supported	0.014	0.007	0.000	0.211
H3b	A -> BE	-0.031	0.066	0.682	Not Supported	0.001	0.000	-0.125	0.087
H4a	BA -> BE	0.606	0.050	0.000***	Supported	0.576	0.341	0.507	0.674
H4b	PIQ -> BE	0.150	0.056	0.007**	Supported	0.035	0.019	0.059	0.246
H5a	P -> WTB	0.119	0.067	0.079	Not Supported	0.021	0.012	0.015	0.240
H5b	A -> WTB	0.069	0.060	0.235	Not Supported	0.007	0.003	-0.019	0.173
	A -> P	0.417	0.090	0.000***	Supported	0.220	0.198	0.248	0.551
H6a	BA -> WTB	0.193	0.080	0.014*	Supported	0.044	0.030	0.063	0.324
H6b	PIQ -> WTB	0.258	0.063	0.000***	Supported	0.116	0.074	0.155	0.356
	PIQ -> BA	0.185	0.093	0.050*	Supported	0.021	0.013	0.027	0.328
H7	BE -> WTB	0.379	0.076	0.000***	Supported	0.163	0.106	0.257	0.508

***p<0.001 **p<0.01 *p<0.05

Through the inner model analysis, and the presented results in table 8, it is possible to verify that all hypothesis are accepted, with exception of the hypothesis H2a, H3 and H5.

For the analysis on the effect sizes, it is possible to identify on table 8 the relationships that present the strongest, moderate, or weakest effects. As its path coefficient led on, the connection between media richness and perceived information quality presents the strongest effect size (f^2=0.794). Along with the relationship between brand attitude and brand engagement (f^2=0.572), both make it above the cut-off limit for it to be considered a strong effect of 0.35, set by Cohen (1992). The relationship between brand engagement and willingness to buy is the only hypothesized relationship within the limits that points towards the presence of a moderate effect (between 0.15 and 0.35, following Cohen, 1992). The connection between media richness and pleasure; media richness and arousal; pleasure and willingness to buy; brand attitude and willingness to buy; perceived information quality and brand engagement; and perceived information quality and willingness to buy set the group of relationships with a weak but existent effect on one another. Every other path that was not mentioned previously, in the overall model, seem to show no effect.

Concerning the q^2 results, fewer relationships reveal noteworthy results in the overall model. The relationship between brand attitude and brand engagement, with a q^2 of 0.341, shows a moderate degree of predictive relevance (Chin, 1998; Henseler et al., 2009). Equally so, the path coefficient between arousal and pleasure presents a q^2 of 0.198, although it does not belong to any of the hypothesis being analysed. The relationships between media richness and pleasure (q^2=0.042), brand attitude and willingness to buy (q^2=0.030), perceived information quality and willingness to buy (q^2=0.074), and brand engagement and willingness to buy (q^2=0.106), show a weak degree of predictive relevance (Chin, 1998).

5.7. Multi-group Analysis

This study uses a permutation test for a multi-group analysis (MGA) to detect the potential differences between the participants that experienced the "Shopping Assistant" as an avatar, and the participants who experienced it without one (H8 to H13). Also, as a repeated measures approach was used in this study, the MGA was also used to analyse the effects between two moments in all of the participants' augmented reality experience: a high-brand moment fit moment, and a low brand-moment fit situation (H14 to H18).

The structural model was cross-validated across the four groups using multi-group permutation tests (Henseler et al., 2009). Further evaluation on the results obtained come next in this section. Firstly, comes the analysis on the results obtained in the PLS-MGA between the groups that were exposed to the experiment with the avatar, and the group without it. In second, the same comparison was made between the sample groups when they were exposed to two conditions within the same experience, with a high brand-moment fit and a low brand-moment fit situation.

5.7.1. Between subjects: The Avatar

Table 9 PLS-MGA: With and Without Avatar

		Path Coefficients (Effect size - f^2)		p-value				
Hyp	Relationship	With Avatar	Without Avatar	With Avatar	Without Avatar	Path coefficient differences	p-value	Moderator Hyp.
H1a	MR -> P	0.291(0.092)	0.104(0.014)	0.049*	0.44	0.192	0.158	H8a
H1b	MR -> A	0.405(0.199)	0.288(0.090)	0.001***	0.009**	0.120	0.231	H8a
H2a	MR -> BA	0.024(-0.003)	0.299(0.057)	0.914	0.037*	0.280	0.896	H8b
H2b	MR -> PIQ	0.685(0.851)	0.664(0.755)	0.000***	0.000***	0.022	0.443	H8b
H3a	P -> BE	0.051(0.002)	0.197(0.048)	0.641	0.040*	0.155	0.885	H9a
H3b	A -> BE	0.044(0.006)	-0.126(0.020)	0.497	0.212	0.183	0.076	H9b
H4a	BA -> BE	0.656(0.704)	0.521(0.414)	0.000***	0.000***	0.124	0.121	H10a
H4b	PIQ -> BE	0.058(0.008)	0.263(0.094)	0.415	0.003***	0.196	0.957**	H10b
H5a	P -> WTB	0.032(0.000)	0.226(0.071)	0.751	0.061	0.191	0.898	H11a
H5b	A -> WTB	0.048(0.002)	0.043(0.005)	0.527	0.658	0.000	0.507	H11b
	A -> P	0.295(0.093)	0.563(0.452)	0.097	0.000***	0.272	0.924	
H6a	BA -> WTB	0.006(-0.002)	0.360(0.187)	0.931	0.000***	0.352	0.987**	H12a
H6b	PIQ -> WTB	0.255(0.117)	0.286(0.138)	0.003**	0.012*	0.027	0.579	H12b
	PIQ -> BA	0.197(0.024)	0.179(0.020)	0.213	0.059	0.016	0.463	
H7	BE -> WTB	0.591(0.362)	0.163(0.037)	0.000***	0.091	0.411	0.002***	H13

***p<0.001 **p<0.01 *p<0.05

Table 9 summarizes the results for both cases of the Shopping Assistant with avatar and without avatar, and also points to some significant differences. Results indicate that the majority of the estimated paths, representing the formulated hypotheses, are significant with $p<0.001$, $p<0.01$ or $p<0.05$. For both With and Without Avatar experiments, hypotheses H1b, H2b, H4a and H6b are supported (see table 9). In both cases the relationships between media richness and perceived information quality (H2b) as well as brand attitude and brand engagement (H4a) were significant, each demonstrating a strong effect size (f^2) larger than 0.35 (Cohen, 1992). The effect of perceived information quality on willingness to buy (H6b) was weak in both samples, but there's confirmation of a presence of the effect, as the relationship also proves to be significant (p-value < 0.05). The last relationship that showed to be significant in both groups, between media richness and arousal, presented a weak effect for the sample without the avatar (f^2=0.09) and a moderate effect for the other group (f^2=0.199). Looking to the other connections in the structural model, media richness to pleasure, revealed to be significant for the sample with the avatar, but with a weak effect size (f^2=0.092). And, on the other hand, the connection between media richness and brand attitude; pleasure and brand engagement; perceived information quality and brand engagement; and brand attitude and willingness to buy, all were

significant for the sample with no avatar in the experiment. However, apart from the relationship between brand attitude and willingness to buy (which has a moderate effect f^2=0.187). All the previously announced hypotheses presented weak effects (with f^2 between 0.02 and 0.15, Cohen, 1992).

Looking at the relationships between the "organisms" of the model, the emotional and cognitive reactions, and its behavioural responses, a few sets of conclusions can be drawn from the obtained results. As the emotional responses (pleasure and arousal), have almost no influence on brand engagement nor willingness to buy, in neither of the groups, the cognitive responses prove to have a different behaviour. As noted before, brand attitude has a strong influence on brand engagement, and a moderate effect on the level of willingness to buy, with the group without avatar. As for perceived information quality, it has an effect especially on willingness to buy, even if weak. It also has a weak effect on brand engagement for the second group. The relationship between brand engagement and willingness to buy proved to be rather strong, for the group with the avatar as their shopping assistant ($f^2_{w/avatar}$= 0.362).

These results confirm the influences that having, or not, an avatar in an augmented reality experience can produce. When assessing the MGA results, they leave evidence that the use of the avatar in the experiment leads to significant changes in the relationship between brand engagement and willingness to buy, in a positive way. However, it also interestingly indicates that the avatar may weaken the connections and effects that brand attitude has on willingness to buy, and perceived information quality on willingness to buy. Through the analysis of the results, the differences between the group with the avatar and the group without it, are significant when it comes to the relationships between the level of perceived information quality and the consumers' brand engagement. The same is verified in the connection between brand attitude and willingness to buy. However, contrary to what was verifiable on the effect of brand engagement on willingness to buy, the differences between groups behave in the opposite way of what was expected. From what was gathered, in the experience where there was no avatar the relationship between perceived information quality and brand engagement (H10b) was stronger, to the point that it showed only to be significant with the group with 2D images and textual information. The same is concluded for brand attitude's effect on willingness to buy (H12a): There is a significant difference between the two groups, as the evidence indicates that only in the experiment without the avatar the relationship is significant. Overall, looking at these results, it is then possible to conclude that only H13 is fully supported. And although

H10b and H12a are rejected, interesting conclusions can be drawn from the results, which will be further analysed in the next chapters. Simultaneously, H8, H9, H10a, H11 and H12b are not true for p-values lower than 0.05.

5.7.2. Within subjects: Brand-Moment Fit

Table 10 PLS-MGA: High and Low Brand-moment Fit

		Path Coefficients (Effect size - f^2)		p-value		Path coefficient differences	p-value	Moderator Hyp.
Hyp	Relationship	High BMF	Low BMF	High BMF	Low BMF			
H1a	MR -> P	0.191(0.047)	0.194(0.045)	0.121	0.122	0.001	0.496	
H1b	MR -> A	0.332(0.124)	0.335(0.125)	0.002**	0.003**	0.001	0.500	
H2a	MR -> BA	0.009(-0.005)	0.293(0.060)	0.979	0.032*	0.300	0.894	
H2b	MR -> PIQ	0.667(0.792)	0.671(0.795)	0.000***	0.000***	0.001	0.500	
H3a	P -> BE	0.077(0.006)	0.119(0.015)	0.405	0.257	0.043	0.630	H14a
H3b	A -> BE	0.032(0.002)	-0.105(0.012)	0.653	0.310	0.137	0.151	H14b
H4a	BA -> BE	0.592(0.565)	0.588(0.466)	0.000***	0.000***	0.009	0.465	H15a
H4b	PIQ -> BE	0.167(0.044)	0.155(0.032)	0.033*	0.075	0.012	0.458	H15b
H5a	P -> WTB	0.149(0.027)	0.101(0.018)	0.214	0.271	0.041	0.395	H16a
H5b	A -> WTB	0.081(0.011)	0.071(0.009)	0.370	0.344	0.024	0.426	H16b
	A -> P	0.429(0.220)	0.424(0.219)	0.001***	0.001***	0.000	0.497	
H6a	BA -> WTB	0.15(0.031)	0.165(0.039)	0.232	0.135	0.031	0.578	H17a
H6b	PIQ -> WTB	0.228(0.079)	0.306(0.168)	0.033*	0.001***	0.080	0.719	H17b
	PIQ -> BA	0.242(0.036)	0.161(0.017)	0.127	0.223	0.092	0.319	
H7	BE -> WTB	0.343(0.112)	0.411(0.231)	0.001***	0.000***	0.067	0.676	H18

***p<0.001 **p<0.01 *p<0.05

When dividing the whole sample according to the two different levels of brand-moment fit in the experience, it is possible to see some differences between them. The bootstrapping results between the groups, and the permutation tests results are presented in table 10. Looking firstly at the relationships between media richness and the emotional and cognitive responses, it is clear that arousal and perceived information quality are well predicted by the model's independent variable, with a moderate and a strong effect size, respectively. On the other hand, pleasure and brand attitude have very weak effects coming from media richness, and their path coefficients are statistically irrelevant.

As for the relationships between the emotional responses and brand engagement and willingness to buy, again there are no significant connections from arousal nor pleasure. When

looking at how cognitive responses influence the same constructs, as brand attitude to brand engagement reveals to have a significant connection, in both groups, it presents a strong connection ($f^2_{high\ bmf}$=0.565 and $f^2_{low\ bmf}$=0.466). For perceived information quality, although it has a significant relationship with brand engagement, for when there was a high brand-moment fit (with a weak effect, since $f^2 < 0.15$, Cohen, 1992), the same is not verified for the low brand--moment fit condition. However, when analysing the connection between perceived information quality and willingness to buy, it presents a significant relationship in both conditions. Analysing the effects of this same relationship, it is proved that perceived information quality has a moderate effect when there is a low brand-moment fit, and a weak effect when the level of brand-moment fit is high. The relationship between brand engagement and willingness to buy is significant and has a weak to moderate effect, in the group where the high brand-moment fit is being studied, and the low brand-moment fit, respectively.

It is noticeable that the amount of accepted hypothesis is smaller when comparing the previous multigroup analysis, which it might be explained through the fact that the variances in the level of brand-moment fit were not noticeable for the participants. This may have led to a null effect in their final impressions when answering the questionnaire. Further explanation in how to solve this problem is discussed in the last chapter of this study. Nevertheless, a PLS-MGA was conducted to assess if the differences between the two groups were significant. As it can be seen in Table 10, the variances of the level of brand-moment fit were not significant, from the sample collected, not influencing any of the responses to the given stimuli, meaning that the hypothesis between H14 and H18 must be rejected.

6. Discussion

In a more general perspective, the objective of this study was threefold: (1) to study the consumers behaviour when shopping in a supermarket store with AR technology, (2) to unravel further the effects of an avatar, in this case, in an augmented reality experience, and (3) investigate the impact that changes in the level of brand-moment fit can have in the overall consumer behaviour. As this dissertation approaches the largely unexplored subject of AR on marketing and discusses the consumer responses that this technology can potentially elicit, it does so by studying salient media characteristics of this technology, applying it to the retail space, aiding consumers along their purchase process, from beginning to end.

Based on previous research discoveries as to how, when there are more visual cues, communication becomes more effective (Lu et al., 2014; Sundar, 2000), the present study applies the same logic to an augmented reality experience, placing an avatar within the space of a supermarket store. While Kim and Johnson (2016) studied a similar group of emotional, cognitive, and behavioural responses for user generated content online, the present study uses a similar model to assess consumer's reactions to an augmented reality experience. Similarly, Lee, Ha and Widdows (2011) researched about consumer responses to high-technology products and, as it is done in the present study, a S-O-R model was applied. In their model, Lee Ha and Widdows (2011), included not only emotional responses, but also the consumer's attitudes towards the product, as a cognitive response. The results obtained in this study then represent support for the previously mentioned studies. As it was proven in those cases, here it is proven that, also when under an augmented reality experience, information quality plays a part as a stimulus for higher levels of willingness to buy, and higher levels of brand engagement. Additionally, as Algharabat et al. (2018) proved to be truth in an online environment, it was verified that the level of engagement of the user positively influences his willingness to buy in an AR retail experience.

Overall, when analysing the results gathered from the questionnaire given to participants after the AR experience, consumers seemed to respond well to the given stimuli, as it evoked emotional responses. The participants' cognitive responses have, however, a bigger influence on consumer behaviour. As the cognitive responses are also influenced by the media-rich channel of AR, these end up playing a big part on how the consumer behaves, and what purchase decisions are made.

The consumers' decisions, being mostly based on the amount of information that each scenario delivers and their performance, were analysed, in order to offer further understanding of Sundar's (2007) discoveries about the effects of different levels of media richness. In his study, he suggests that the degree to which a given modality enhances presentation vividness and user feelings of presence in a mediated environment, enables the modality to affect people's information processing and perception of the presented contents, and in turn, their actions. For this reason, this research succeeded in uncovering a broader perspective on how the media-rich AR technology can influence consumer's level of brand engagement and willingness to buy.

First of all, the results seem to indicate that media richness is in fact a driver for all the proposed organisms proposed in the model (considering that the relationship between media richness and brand attitude is partially mediated by perceived information quality). As proposed by previous research studies, the level of media richness often predicts the behaviour of emotional responses (Aljukhadar and Senecal, 2017; Moes and Vliet, 2017), as of cognitive (Chen and Chang, 2018; Lu et al., 2014; Lee, Ha and Widdows, 2011; Liu, Liao, and Pratt, 2008). Looking more closely to the specific connections that media richness is involved in, **hypothesis 1a** was accepted (MR → P: β=0.196 and p-value<0.05) in the overall model. For the group with the avatar in their experiment, there's indication that as the level of media richness rises, so does its implication on the level of pleasure consumers take from an AR experiment. From the gathered data it would also seem the effect is a weak one, but it is possible to confirm the significant connection.

While assessing the effect of media richness in the levels of arousal, as Aljukhadar and Senecal (2017) proved to be an important relationship in the context of online information, the results of the present study confirm that the relationship is not only significant in the overall model (MR → A: β=0.333 and p-value<0.001), accepting **hypothesis 1b,** as it is so for every other group studied (with or without the avatar, in high brand-moment and low brand-moment fit scenarios). With this information it is possible to conclude the higher the level of media richness perceived by consumers, the higher is their level of arousal, independently of the scenario: as it registered for media richness to always have an influence on this emotional response. Interestingly, the effect is higher where there was an avatar (f^2>0.15), encouraging the author's theory that a higher level of media richness leads to heightened levels of arousal.

Research done by Lu et al. (2014) about using media richness and interactivity as stimuli, in a web design context, proved that consumers' attitudes mediated the relationship between media richness and their behavioural intentions. Lee, Ha and Widdows (2011) showed that attitude was influenced by consumers' perceptions of technology attributes. In that sense, this study intended to prove how attitude (as one of the cognitive responses) was also influenced by the levels of the perceived media richness of an AR experience. Although **hypothesis 2a** was rejected in the overall model, this may be due to the fact that the relationship between media richness and brand attitude, is partially mediated by perceived information quality (see table 7 in Chapter 5). Adding to this, the connection between perceived information quality and brand attitude, was also proven by Hartog (2015). However, looking at different perspective on how to position the concept of "attitude" in a S-O-R model, researchers such as Eroglu et al. (2003), although consider it to belong to the Organism part of the model, they posturize that it is influenced only by the emotional responses of pleasure and attitude (instead of the original stimulus). On a different perspective, in other works, it is possible to find the construct of attitude in the "Responses" part of the model. This could also be an explanation as to why attitude has a weak connection to the stimulus, and a rather strong connection to the "Organism" element of perceived information quality. The results show that media richness also leads to a higher level of perceived information quality and, as such, it can be expected that greater levels of consumers' brand attitudes will be registered, given the mediating effect of PIQ. With that in mind, looking at the obtained results, **hypothesis 2b** is supported (MR → PIQ: β=0.669 and p-value < 0.001), being the strongest relationship present in the whole model. Looking at the results obtained in every other group, the strong connection between the two constructs remains through all of them, with a strong effect for every case ($f^2 > 0.35$, Cohen, 1992). These results come to support previous research studies from Lu et al. (2014), Hartog (2015), Kim and Johnson (2016), and Kim and Niehm (2009), which reach similar conclusions in the fields of web designing, online communication, and social media content. Examples of studies concerning the relationships between these dimensions applied for an AR experience are scarce, and not known to the author, given the yet unexplored AR applications in a marketing research reality.

Moving forward in the model, the results obtained on the effects of emotional responses on the behavioural responses are rather inconclusive. Firstly, when assessing the impact of pleasure and arousal on brand engagement, there is no significant impact in either cases assuming p-values < 0.05. Thus, it is not possible to accept **hypothesis 3a**. Looking at the results within

the groups created, only for the group without the avatar is it possible to find a value which helps to explain the relationship between pleasure and brand engagement, having a weak effect on the latter construct ($0.02 < f^2 < 0.15$, Cohen, 1992). Contrary to the results obtained by Kim and Johnson (2016) and Lee, Ha and Widdows (2011), in the present study no support was found for **hypothesis 3b**.

Furthermore, when it comes to the relationship between pleasure or arousal, and willingness to buy, the results do not distance themselves from what was gathered when looking at the effects on brand engagement. In the overall model, P → WTB is not significant for a p-value < 0.05. So, not enough proof is gathered for it to be possible to accept **hypothesis 5a**. It is of note, nonetheless, that the p-value of this relationship, although not significant, does not go beyond 0.10 (p-value = 0.079). It could mean that there is a possibility for the two constructs to have a connection, although the obtained results from this experience could not prove it. Although the research done by Moes and Vliet (2017), Aljukhadar and Senecal (2017), and others (Lee, Ha and Widdows, 2011; Eroglu, Machleit and Davis, 2003) sustain that arousal leads to positive behavioural responses, when it comes to the results gathered for this relationship in the developed AR experiment, no significant results are found, meaning **hypothesis 5b** must also be rejected.

Focusing on the effects that cognitive responses may have in the consumers' buying behaviour, and level of brand engagement, some of the final results seem to be interesting. Brand attitude has a highly significant and strong effect on brand engagement (BA → BE: $\beta = 0.606$, p-value < 0.001 and $f^2 > 0.35$). Bearing in mind that brand attitude is explained by media richness, with perceived information quality as a mediator, the strong predictive effect could be important to analyse and reflect on. As **hypothesis 4a** is accepted, other researchers support this discovery with similar scenarios, testing the connection between consumers' attitudes and behavioural responses, such as use/visit intention, recommendation, approach/avoidance behaviour, all related to the components of brand engagement (Lee, Ha and Widdows, 2011; Moon et al., 2013; Lu et al., 2014; Pantano, Rese and Baier, 2017). Applied to areas such as the food industry (Wu et al., 2016), or online retail sales (Lu et al., 2014; Algharabat et al., 2017; Eroglu, Machleit and Davis, 2003), these studies support the acceptance of a real connection between brand attitude and the consumer's level of engagement, being such conclusion of high importance for the present study. Looking at the results between groups, it is revealed that brand attitude maintains a significant connection with brand engagement,

throughout all the formed and tested groups. It is also important to point that it has a strong causal effect on brand engagement, in the overall model ($f^2 > 0.35$, Cohen, 1992), and a moderate predictive effect ($q^2 > 0.35$, Chin, 1998).

As brand attitude demonstrates a strong connection with brand engagement, perceived information quality shows a different behaviour on the same construct. Although in this study it is proved that that the two constructs have a significant relationship (PIQ → BE: $\beta = 0.15$ and p-value < 0.01) the effect that perceived information quality has on brand engagement is weak ($0.02 < f^2 < 0.15$, Cohen, 1992), as it can be confirmed in table 8 (presented in Chapter 5). According to Kim and Johnson (2016) perceived information quality significantly influenced several behavioural responses, including brand engagement, but also intention for information pass-along, impulse buying, and future purchase intention. As such, support is found for **hypothesis 4b**, in both the results obtained and previous research. **Hypothesis 6b**¸which suggested that perceived information quality influenced willingness to buy, is also accepted with enough evidence from the same sources. Adding to this, although PIQ → WTB demonstrates to be a significant relationship (p-value < 0.001), perceived information quality has a somewhat weak effect on willingness to buy. Nonetheless, looking at the groups with and without avatar, and relatively to high and low brand-moment fit conditions, the same conclusions can be drawn for all of them, with a small difference in the effect size in the low brand-moment fit group of results, where perceived information quality has a moderate effect on willingness to buy. Additionally, brand attitude shows a similar effect on willingness to buy, where, as **hypothesis 6a** is supported by the results, it presents a lower effect size compared to the one provided by perceived information quality, as it proves to have a weak effect on the behavioural response. Both brand attitude and perceived information quality reveal a small predictive effect ($0.02 < q^2 < 0.15$, Chin, 1998) for willingness to buy, providing enough support for future research purposes.

Finally, the relationship between brand engagement and willingness to buy shows promising results. For the overall model it presents a significant and strong path coefficient (BE → WTB: $\beta = 0.379$ and p-value < 0.001), as well as a moderate effect size, thus giving support to the proposed **hypothesis 7**. Adding to this, it shows to possess a small predictive quality ($q^2 > 0.02$, Chin, 1998), turning this relationship to one of the most important of the model, given the managerial implications that it may conceive. Looking at the results between groups, its significance is maintained, having a strong effect size on the group with the avatar, and a

moderate effect in the group of results where there is a low brand-moment fit. This implies two possible explanations: when there is a low brand-moment fit, the connection between brand engagement and the consumer's willingness to buy is strengthened. However other factors that could influence a person's buying choices (such as emotional reactions) are less heightened, given that the suggestion was made at the "wrong" place, or at the "wrong" time. This would most likely mean that it is especially important for the consumer to present high levels of brand engagement in order to more strongly, and more positively, influence his/her levels of willingness to buy. Parallelly, in a richer experiment, or even where there is a higher sense of personal contact, the relationship between the two constructs seems to be strengthened, no matter the level of brand-moment fit. It is then important to understand if this connection is in fact stronger in the group with an avatar than in the group without it. For that, the multigroup analysis is further evaluated.

So, lastly, as it was partially explained in the previous paragraphs, the conducted multigroup analysis allowed the author to reach to interesting conclusions concerning the differences in the consumer responses when there is the presence or absence of the avatar (H8 to H13) in the AR shopping experience. It was also analysed the effects caused by the changes in the level of the brand-moment fit (H14 to H18). The obtained results suggest that only the relationship between brand engagement and willingness to buy is significantly stronger in the experiment with the avatar present (**hypothesis 13** is supported by the results with p-value < 0.05). Representing an important discovery for this study, future research may focus on assessing what are the right triggers to guide the shopping experience of consumers and, more conveniently, drive sales to a rise. Interestingly, there are other significant differences between these two groups: concerning the connections between brand attitude and willingness to buy, and perceived information quality and brand engagement. What distinguishes the behaviour of these two relationships from the one previously explained is that they are stronger on the group of participants that did not have an avatar in the experiment they underwent. Moreover, it is possible to see that these relationships are not even significant in the group with the avatar. The same is not verified in the group without the avatar, where the connections are significant for p-values under 0.01. In more practical terms, these results imply that where there is not a personal contact allusion, consumers seem to give more importance to the quality of the information they receive, consequently having a significant effect on their level of engagement. Finally, the level of brand attitude of a consumer will better explain their willingness to buy when there is no avatar, which is probably justified by the fact that, since there is no avatar to

conduct the decision of the user, it will rely more in the relationship and brand idea that the consumer initially had, prior to the experience, and not so much the service he/she was introduced to.

Lastly, looking to the group differences between the results gathered from the answers relative to the moments with high and low brand-moment fit, there were no significant differences between them, relatively to any of the relationships in the model. Although, as seen before, the results are not the same between the two groups, and the connections behave sometimes differently from one group of answers to the other, it would seem that these differences are not significant. Given these results, **hypothesis 14** to **hypothesis 18** were rejected. Further explanation on the causes of these results are explained in the "Limitations and implications in future research" chapter of the present study.

7. Conclusion

This dissertation is one of the few existent experimental studies on a real retail environment to examine the issue of consumer behaviour with AR technology, real-time marketing strategy and multimedia product presentation. Building on what was found by Mahdjoubbi, Hao Koh and Moobela (2014) in virtual reality, or Kim and Johnson (2016) in online consumer behaviour, or even the work of Moon et al. (2013) for avatar-based virtual shopping, the evidence found in the present study's statistical analysis, contributes with new information on all of these matters, and paves the way for further innovation-driven research on AR technology applications. After analysing the results in the previous section, the following managerial implications can be derived, which might help to guide the development of future AR uses, considering the key-points that trigger the wanted reactions from consumers:

- *Be media rich, always.*

The richer the information given to consumers, the more emotionally connected to the experience they feel. Whether directly influencing levels of arousal, or directly and indirectly (through arousal) influencing pleasure, it is indicated that the perceived level of media richness has a positive relationship with the studied emotional responses. Although in this study it is not proven that they act as mediators between media richness and the suggested behavioural responses (brand engagement and willingness to buy), customer satisfaction is a goal that every business, no matter the industry it is inserted in, should be concerned to meet. In more practical terms, this means that the managers and companies who are considering developing new AR experiences, can find in this study the assurance that these advanced and tech-driven shopping experiences have an interesting and important influence on consumers. Paving the way to a change on how consumers buy and interact with different brands and businesses, AR experiences do have an impact, emotionally speaking, on consumers.

Alternatively, as consumers perceive a higher level of media richness, so will they perceive the information's quality. As such, it is important to be not only media-rich but also content rich. As seen before, perceived information quality performs as a mediator between media richness and brand attitude, which can be interpreted as being the main driver of consumers' idea of a brand (how good or high quality a brand is rated in the consumer's mind). That being said, since media richness plays as a strong influence of perceived information quality, it can be concluded that being content and media-rich is key to improve the quality of relationships between brands

and costumers. Managers should then carefully plan their communication content through AR devices.

- *Understand when are avatars welcomed and when they are not.*

The current findings show that, within the group that was exposed to the experiment where there was an avatar, the relationship between brand engagement and willingness to buy is strengthened by the avatar. This would mean that the use of an avatar may actually affect their buying actions, thus becoming a very interesting, and key discovery.

Contrary to this, there are connections which present the opposite behaviour when comparing the groups with and without the avatar. It was verified that the emotional responses have almost no influence in the consumers' behavioural responses in both groups. However, the relationships between cognitive responses and the consumer's behaviours in the experiment that had no avatar are interesting enough for a more profound analysis. Brand attitude will more strongly influence the consumers' willingness to buy, as perceived information quality will have a stronger effect on brand engagement when product suggestions are presented with only the product's image and name. This means the cognitive thinking of consumers plays a bigger part where the avatar does not exist.

This allows businesses to understand and reflect, depending on the product or the industry, on what do they value when advertising to consumers: if the cognitive part or emotional senses to take effect when the consumer is making purchase decisions. From this decision, can then they evaluate how to best design their AR experience.

- *Consumers respond to social interaction, but you should want it to be meaningful.*

Much as a corollary of the previous topic, this one serves to underline the effects of the avatar in a relative way. As it was exposed before, the avatar has a considerable influence on a consumer's buying behaviours and engagement to a brand. However, evidence suggests that the experience which resorts to the avatar affects mostly the consumers' cognitive responses (special attention has been given to the levels and influence of perceived information quality). As such, although social presence elements reveal themselves to be important to improve an AR experience, it is usually within a business' interest to take advantage of the moment where they have captured the consumer attention to transfer high quality information. What are the

brand's goals when developing their own AR experience should dictate how to design it, and what to include in it.

- *Changes in Brand-moment fit have consequences but there's room for error.*

The idea of applying the concept of brand-moment fit given the consumers' location does not seem to influence much of their emotional nor cognitive reactions. This does not mean that having a high or low brand-moment fit will not alter the consumer's reaction, but it is not possible to point what exactly triggers each one of those reactions. For managers creating augmented reality experiences, this implies that, at this point in time, the experience does not necessarily need to concern about having messages that are communicated in the right place, since the level of richness of the content, through an avatar, or not, is perceived to have more importance. This may be due to the novelty of the technology and services that can be used through it, as the emotional, cognitive, and behavioural responses are clearly influenced by a rich AR experience.

- *Brand Engagement can be mostly about information.*

The concept of brand engagement is usually taken into great account by managers, given all that it implies, not only emotionally but also behaviourally. In the augmented reality world, however, it is especially important to keep an eye out for what kind of information highly influences the consumer's overall attitude and behaviour towards a brand. As one could think that the bond is stronger due to emotional connections that can exist between brands and consumers, only the cognitive responses seem to have a significant influence in the levels of brand engagement and willingness to buy. As a practical implication that can come from this is the fact that brand attitude and perceived information quality are two examples of what managers should try to call out to since it – especially brand attitude – will certainly influence a consumer's level of brand engagement.

The amount and the quality of the information that is shared with consumers impacts their cognitive reactions and the brand image they hold in their minds. As such, it is important to carefully assess the content, time, and place where communication with consumers happens. When it comes to augmented reality experiences, the amount of information that can be shared per minute could become limitless. So, it is imperative that brands learn to put boundaries, restraints, and filters in what is shared with their customers. While improving the relationships consumers have with brands, this could create a ripple effect in the adoption of AR technology.

Keeping this in mind, when developing an AR experience, marketing managers should watch out for the type of relationship they want to build with their customers. The emotions and values brands choose to stand behind, as well as the communication approach adopted, can have an impact on the consumer's mind. This can make the difference between destroying or creating new relationships with consumers.

In short, to create impactful augmented reality experiences, the technology can be used to improve consumer's shopping experiences, introducing social interaction where it is considered useful for consumers, while being less intruding and more entertaining. Allying positive emotions, to the usefulness of a service or technology, an augmented reality service in a retail space can come as highly beneficial for both the brand and its customers. No matter the form or platform chosen, an AR shopping experience brings several benefits and creates an impact near consumers, if well planned and timely introduced.

8. Limitations and implications for future research

First, due to the time restrictions to elaborate a prototype of an augmented reality app, it was not possible to make the experience as interactive as initially planned. The prototype is sensitive to the location of the user inside the store and displays the intended content according to the area that the user is passing by. However, this level of interactivity does not necessarily come from choices the user intentionally makes (depending only on the areas of the store the consumer chooses to go through). It is the author's opinion that a more interactive experience would have allowed for a better understanding of the effects that an AR experience has on the consumer's emotional and cognitive responses. Thus, whether working on the same concept showcased in this study (the Shopping Assistant), or another retail service, developing a more interactive augmented reality experience could add important conclusions to the ones already reached from this experiment. Additionally, the time constraint influenced not only the extent to which it was possible to develop the prototype but also how detailed the statistical analysis became. Even though it was not possible to conduct a thorough analysis of every connection present on the proposed conceptual model, it is believed that the reached conclusions represent an important contribution to the research around AR experiences. It should also be added that even though the concept and the technology around augmented reality are not recent, the expertise on how to model and develop applications specifically for HoloLens was hard to find.

Another limitation originated from this study's short time window was the adopted design of the experiment. Including a within-subjects approach to reach the minimum acceptable number of samples, a mixed design was chosen to test the levels of brand-moment fit, and the effects of having an avatar, or not, inside of the experience. In this sense, future research studies may conduct a full between-subjects experiment design, to more specifically evaluate every variance implemented in the prototype. This could, ultimately, allow the study of the true effects of having different levels brand-moment fit, when communicating with consumers. As real-time marketing becomes key in any company's strategy, its influence in the AR experiences is important to be assessed.

Finally, the process of studying the impact of augmented reality experiences from a marketing perspective is still in its early stages. The fact that the adoption of this technology by the overall population is still occurring, collecting existing research focused in such a way revealed to be quite limiting. Given that the current AR technological devices are not yet directed for the

masses, it is only natural that researchers feel more reluctant to focus on studying how consumers react to certain stimuli while wearing this technology, rather than their reactions to the technology itself. However, it is considered very important to have an early understanding of what are the practical implications of adopting such technological devices in consumers' day--to-day activities. It is also within the hopes of the author that the present study brings further understanding and clearness on how AR could eventually reach the everyday consumer, and how could managers adapt and transform such rich experiences into beneficial projects for them and their customers.

9. References

Adams, L., Burkholder, E., & Hamilton, K. 2015. Micro-Moments: Your Guide to Winning the Shift to Mobile. ***Think with Google***. Retrieved January 21 from https://think.storage.googleapis.com/images/micromoments-guide-to-winning-shift-to-mobile-download.pdf.

Adelaar, T., Chang, S., Lancendorfer, K. M., Lee, B., & Morimoto, M. 2003. Effects of media formats on emotions and impulse buying intent. ***Journal of Information Technology***, 18 (4): 247-266.

Algharabat, R., Alalwan, A. A., Rana, N. P., & Dwivedi, Y. K. 2017. Three dimensional product presentation quality antecedents and their consequences for online retailers: The moderating role of virtual product experience. ***Journal of Retailing and Consumer Services***, 36(February): 203-217. https://doi.org/10.1016/j.jretconser.2017.02.007.

Algharabat, R. S. 2018. The Role of Telepresence and User Engagement in Co-Creation Value and Purchase Intention: Online Retail Context. ***Journal of Internet Commerce***, 17(1): 1-25. https://doi.org/10.1080/15332861.2017.1422667.

Aljukhadar, M., & Senecal, S. 2017. Communicating online information via streaming video: The role of user goal. ***Online Information Review***, 41(3): 378-397. https://doi.org/10.1108/OIR-06-2016-0152

Allen, C. T., Fournier, S., & Miller, F. 2008. Brands and their marketing makers. In C. P. Haughtvedt, P. M. Herr, & F. R. Kardes (Eds.), ***Handbook of consumer psychology***: 781-821. New York, NY: Psychology Press.

Azad, N., & Ahmadi, F. 2015. The customer relationship management process: its measurement and impact on performance. ***Uncertain Supply Chain Management***, 3(1): 43-50. https://doi.org/10.5267/j.uscm.2014.9.002

Bagozzi, R. P., & Yi, Y. 1988. On the evaluation of structural equation models. ***Journal of the Academy of Marketing Science***, 16(1): 74-94. https://doi.org/10.1007/BF02723327

Baker, J., Levy, M., & Grewal, D. 1992. An experimental approach to making retail store environmental decisions. ***Journal of Retailing,*** 68: 445-60.

Barthel, R., Hudson-Smith, A., & de Jode, M. 2015. Drivers For Change. ***Future retail environments and the internet of things (IoT)***: 4. UCL: London Global University.

Becker-Olsen, K. L., & Hill, R. P. 2006. The Impact of Sponsor Fit on Brand Equity: The Case of Non-profit Service Providers. ***Journal of Service Research***, 9(1): 73-83.

Bercovici, J. 2017. In the Blip of the Eye. ***Inc.***, 42-95.

Billinghurst, M., Clark, A., & Lee, G. 2015. A Survey of Augmented Reality. ***Foundations and Trends® in Human-Computer Interaction***. 8(2-3): 73-272.

Bimber, O., & Raskar, R. 2005. A Brief Introduction to Augmented Reality. In A. K. Peters, Ltd. (Eds.), ***Spatial Augmented Reality: Merging Real and Virtual Worlds***: 1-12. Wellesley, MA.

Biocca, F., Harm, C., and Burgoon, J. K. 2003. Toward a More Robust Theory and Measure of Social Presence: Review and Suggested Criteria. Presence: ***Teleoperators and Virtual Environments***, 12 (5): 456-480.

Blasco-Arcas, L., B. Hernandez-Ortega, & J. Jimenez-Martinez. 2016. Engagement platforms the role of emotions in fostering customer engagement and brand image in interactive media. ***Journal of Service Theory and Practice***, 26(5): 559-89.

Blázquez, M. 2014. Fashion shopping in multichannel retail: the role of technology in enhancing customer experience. ***International Journal of Electronic Commerce***. 18 (4): 97–116.

Breen, P. 2009. ***Shaping retail: The use of virtual store simulations in marketing research and beyond***. White paper, In-Store Marketing Institute, Chicago, IL.

Chang, S. J., van Witteloostuijn, A., & Eden, L. 2018. ***Common-Method Variance in International Business Research***, Letter from the Editors.

Chen, C. C., & Chang, Y. C. 2018. What drives purchase intention on Airbnb? Perspectives of consumer reviews, information quality, and media richness. ***Telematics and Informatics***, 35(5): 1512-23. https://doi.org/10.1016/j.tele.2018.03.019.

Chin, W. W. 1998. The Partial Least Squares Approach for Structural Equation Modeling. In GA Marcoulides (Ed.), ***Modern Methods for Business Research***, 295-336. Lawrence Erlbaum Associates, London.

Cohen, J. 1992. A power primer. ***Psychological Bulletin***, 112(1): 155-159.

Commerce, M. 2012. Wearable Augmented Reality Google Glasses and Beyond (1st ed.). Mind Commerce (Ed.), *Academic Collection Trial*. Mind Commerce.

Cook, E. W., Melamed, B. G., Cuthbert, B. N., McNeil, D. W., & Lang, P. J. 1988. Emotional imagery and the differential diagnosis of anxiety. ***Journal of Consulting and Clinical Psychology***, 56(5): 734-740.

Dacko, S. G. 2017. Enabling smart retail settings via mobile augmented reality shopping apps. ***Technological Forecasting and Social Change***, 124: 243-256.

Daft, R. L., & Lengel, R. H. 1984. Information richness: A new approach to manager information processing and organization design. In B. Staw & L. L. Cummings (Eds.), ***Research in organizational behavior***. Greenwich, Conn: JAI Press.

Dames, A. 2017. Stepping Into the World of Virtual Reality. *LinkedIn.* Retrieved November 26, 2017, from LinkedIn: https://www.linkedin.com/pulse/stepping-world-virtual-reality-anesca-dames.

Daskalakis, S., & Mantas, J. 2008. Evaluating the impact of a service-oriented framework for healthcare interoperability. ***Studies in Health Technology and Informatics***, 136(May 2014): 285–290. https://doi.org/10.3233/978-1-58603-864-9-285

Davis, F. D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. ***MIS Quarterly***, 13: 319-340.

Dennis, C., Brakus, J., Gupta, S., & Alamanos, E. 2014. The effect of digital signage on shoppers' behavior: the role of evoked experience. ***Journal of Business Research***, 67(11): 2250-2257.

Dibble, A. (2014, September 16). *Brainberry Global*. Retrieved December 2017, from http://brainberryglobal.com/12-promising-augmented-reality-devices-state-ar-hardware/

Domina, T., Lee, S. E., & MacGillivray, M. 2012. Understanding factors affecting consumer intention to shop in a virtual world. ***Journal of Retailing and Consumer Services***, 19(6): 613-620. https://doi.org/10.1016/j.jretconser.2012.08.001

Ducoffe, Robert H. 1996. Advertising Value and Advertising on the Web. ***Journal of Advertising Research***, 36(5): 21-35.

Durlach, N., & Slater, M. 2000. Presence in Shared Virtual Environments and Virtual Togetherness. ***Presence: Teleoperators and Virtual Environments,*** 9 (2): 214-17.

Dyakovskaya, A. (October 9, 2017). How Augmented Reality (AR) Is Shaping Content Marketing Experiences. NewsCred. Retrieved November 2017, from NewsCred Insights: https://insights.newscred.com/augmented-reality-content-marketing/.

Epple, H. 2018. ***Virtual Reality Tools in the Tourism Industry and their Influence on Booking Behaviour***. Unpublished master's dissertation, Technical University of Munich, Munich.

Eroglu, S. A., Machleit, K. A., & Davis, L. M. 2001. Atmospheric qualities of online retailing: a conceptual model and implications. ***Journal of Business Research***, 54(5):177-84.

Eroglu, S. A., Machleit, K. A., & Davis, L. M. 2003. Empirical Testing of a Model of Online Store Atmospherics and Shopper Responses. ***Psychology and Marketing***, *20*(2): 139-150. https://doi.org/10.1002/mar.10064

Falk, R. F., & Miller, N. B. 1992. ***A primer for soft modeling***. In R. F. Falk (Ed.) (1st Edit). Akron, Ohio: The University of Akron.

Fan, L., Liu, X., Wang, B., & Wang, L. 2017. Interactivity, engagement, and technology dependence: understanding users' technology utilisation behaviour. ***Behaviour & Information Technology***, 36(2): 113-124.

Faust, F., Roepke, G., Catecati, T., Araujo, F., Ferreira, M. G. G, & Albertazzi, D. 2012. Use of Augmented Reality in the Usability Evaluation of Products. ***Work***, 41(1): 1164-7.

Fisher, M., & Raman, A. 2010. The new science of retailing: How analytics are transforming the supply chain and improving performance. ***Harvard Business Review Press***, Boston, MA.

Fornell, C., & Larcker, D. F. 1981. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. ***Journal of Marketing Research***, 18(1): 39-50.

Foroudi, P., Gupta, S., Sivarajah, U., & Broderick, A. 2018. Investigating the effects of smart technology on customer dynamics and customer experience. ***Computers in Human Behavior***, 80: 271–282. https://doi.org/10.1016/j.chb.2017.11.014.

Fraj, E., Matute, J., & Melero, I. 2015. Environmental strategies and organizational competitiveness in the hotel industry: The role of learning and innovation as determinants of environmental success. ***Tourism Management***, 46: 30-42.

Gabisch, J. A. 2011. Impact of Virtual Brand Experience on Purchase Intentions: The Role of Multichannel Congruence. ***Journal of Electronic Commerce Research***, 12(4): 302-320.

Gaudiosi, J. (2015, April 25). How augmented reality and virtual reality will generate $150 billion in revenue by 2020. *Fortune*. Retrieved December 14, 2017, from Fortune: http://fortune.com/2015/04/25/ augmented-reality-virtual-reality/.

Glockner, H., Jannek, K., Mahn, J., & Björn, T. 2014. Augmented Reality. ***Virtual Reality Technology and Applications***, 195-204.

Goerner, P. 2016. Augmented Reality. What's Next? The Learning potential of AR - Pokémon Go is only the beginning. ***School Library Journal***, (September): 19-21.

Goldsmith, R. E. 2012. Brand engagement and brand loyalty. In A. Kapoor, & C. Kulshrestha (Eds.), ***Branding and sustainable competitive advantage: Building virtual presence***: 121-135.

Gregoire, Y., & Fisher, R. J. 2006. The Effects of Relationship Quality on Customer Retaliation. ***Marketing Letters***, 17: 31-46. https://doi.org/10.1007/s11002-006-3796-4

Guerreiro, J., Rita, P., & Trigueiros, D. 2015. Attention, emotions and cause-related marketing effectiveness. ***European Journal of Marketing***, 49(11/12): 1728-1750.

Hair, J., Black, W., Babin, B., & Anderson, R. 2010. ***Multivariate data analysis***. Prentice Hall (Ed.). London.

Hair, F. J., Hult, G. T. M., Ringle, C. M., & Sarstedt, J. M. 2014. A primer on partial least squares structural equation modeling (PLS-SEM*)*. ***SAGE Publications***, 26(2): 1-307. https://doi.org/10.1080/1743727X.2015.1005806

Hair, F. J., Ringle, C. M., & Sarstedt, M. 2011. PLS-SEM: Indeed a silver bullet. ***Journal of Marketing Theory and Practice***, 19: 139-152.

Harman, H. H. 1967. Modern factor analysis. Chicago: University of Chicago Press.

Hartog, M. 2015. ***The influence of social presence and bi-directionality within email-newsletters on consumer attitudes and continuous use intention.*** Unpublished master dissertation, Universiteit Twente, Netherlands.

Hayes, A. F., & Preacher, K. J. 2014. Statistical mediation analysis with a multicategorical independent variable. ***British Journal of Mathematical and Statistical Psychology***, 67(3): 451–470. https://doi.org/10.1111/bmsp.12028

Henseler, J., Ringle, C. M., & Sarstedt, M. 2012. Using partial least squares path modeling in advertising research: basic concepts and recent issues. In S. Okazaki (Ed.), ***Handbook of research on international advertising***. Edward Elgar, 252-276.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. 2009. The use of partial least squares path modeling in international marketing. ***Advances in International Marketing***, 20(2009): 277–319. https://doi.org/10.1108/S1474-7979(2009)0000020014.

Hoeffler, S., & Keller, K. L. 2002. Building Brand Equity Through Corporate Societal Marketing. ***Journal of Public Policy & Marketing,*** 21(2): 78-79.

Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. 2014. Consumer brand engagement in social media: Conceptualization, scale development and validation. ***Journal of Interactive Marketing***, 28(2): 149-165. https://doi.org/10.1016/j.intmar.2013.12.002.

Holzwarth, M., Janiszewski, C., & Neumann, M. M. 2006. The Influence of Avatars on Online Consumer Shopping Behavior. ***Journal of Marketing***, 70(4): 19-36.

Hsiao, M. H. 2009. Shopping mode choice: Physical store shopping versus e-shopping. ***Transportation Research Part E: Logistics and Transportation Review***, *45*(1): 86-95.

Hu, L. T., & Bentler, P. M. 1999. Cutoff criteria for fit indices in covariance structure analysis: conventional versus new alternatives. ***Structural Equation Modeling***, 6(1): 1-55.

Hulland, J. 1999. Use Of Partial Least Squares (PLS) In Strategic Management Research: A Review Of Four Recent Studies. ***Strategic Management Journal***, 20: 195-204. https://doi.org/10.1038/aps.2012.31

Hyun, M. Y., & O'Keefe, R. M. 2012. Virtual destination image: Testing a telepresence model. ***Journal of Business Research***, 65(1): 29-35.

Jang S., & Namkung Y. 2009. Perceived quality, emotions, and behavioral intentions: applications of an extended Mehrabian–Russell model to restaurants. ***Journal of Business Research***, 62(4): 451-60.

Javornik, A. 2016. Augmented reality: Research agenda for studying the impact of its media characteristics on consumer behaviour. ***Journal of Retailing and Consumer Services***, 30: 252–261. https://doi.org/10.1016/j.jretconser.2016.02.004

Johnson L. (July 25, 2017). Why Brands Like L'Oréal and Acura Are Betting Big on Augmented Reality. ***Adweek***. Retrieved November 26, 2017, from Adweek: http://www.adweek.com/digital/why-brands-like-loreal-and-acura-are-betting-big-on-augmented-reality/.

Kannan, P. K., & Li, H. 2017. Digital marketing: A framework, review and research agenda. ***International Journal of Research in Marketing***, 34(1): 22-45. https://doi.org/10.1016/j.ijresmar.2016.11.006.

Keller, K.L. 1993. Conceptualizing, Measuring, and Managing Customer-Based Brand Equity. ***Journal of Marketing***, 57: 1-22.

Keller, K. L. 2001. Building customer based brand equity: A blueprint for creating strong brands. ***MSI Report***, 1-107.

Keller, K. L. 2003. Brand Synthesis: The Multidimensionality of Brand Knowledge. ***Journal of Consumer Research,*** 29: 595-600.

Kim, A. J., & Johnson, K. K. P. 2016. Power of consumers using social media: Examining the influences of brand-related user-generated content on Facebook. ***Computers in Human Behavior***, 58: 98-108.

Kim, H., & Niehm, L. S. 2009. The Impact of Website Quality on Information Quality, Value, and Loyalty Intentions in Apparel Retailing. ***Journal of Interactive Marketing***, 23(3): 221-233. https://doi.org/10.1016/j.intmar.2009.04.009.

Kim, A. E., Nonnemaker, J. M., Loomis, B. R., Shafer, P. R., Shaikh, A., & Hill, E. 2014. Influence of point-of-sale tobacco displays and graphic health warning signs on adults: Evidence from a virtual store experimental study. ***American Journal of Public Health***, 104(5): 888-895.

Kim, H., & Yongho, M. 2016. Computers in Human Behavior Predicting the use of smartphone-based Augmented Reality (AR): Does telepresence really help? ***Computers in Human Behavior***, 59(2016): 28–38. https://doi.org/10.1016/j.chb.2016.01.001

Klein, L. R. 2003. Creating virtual product experiences: The role of telepresence. ***Journal of Interactive Marketing,*** 17(1): 41-55.

Kock, N., & Lynn, G. S. 2012. Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. ***Journal of the Association for Information Systems***, 13(7): 546-580.

Kourouthanassis, P., Boletsis, C., & Bardaki, C. 2014. Tourists responses to mobile augmented reality travel guides: The role of emotions on adoption behavior. ***Pervasive and Mobile Computing,*** 18: 71-87.

Kumar, V., Aksoy, L., Donkers, B., Venkatesan, R., Wiesel, T., & Tillmanns, S. 2010. Undervalued or overvalued customers: Capturing total customer engagement value. ***Journal of Service Research***, 13(3): 297–310.

Lang, P. J. 1980. Behavioral treatment and bio-behavioral assessment: Computer applications. In J. B. Sidowski, J. H. Johnson, & T. A. Williams (Eds.), ***Technology in mental health care delivery systems***, 119-137. Norwood: Ablex.

Laroche, M., Kim, C., & Zhou, L. 1996. Brand familiarity and confidence as determinants of purchase intention: An empirical test in a multiple brand context. ***Journal of Business Research***, 37(2): 115-120.

Lee, S., Ha, S., & Widdows, R. 2011. Consumer responses to high-technology products: Product attributes, cognition, and emotions. ***Journal of Business Research***, 64(11): 1195-1200.

Li, H., Daugherty, T., & Biocca, F. 2002. Impact of 3-D Advertising on Product Knowledge, Brand Attitude, and Purchase Intention: The Mediating Role of Presence. ***Journal of Advertising***, *31*(3): 43–57. https://doi.org/10.1080/00913367.2002.10673675.

Liu, S. H., Liao, H. L., & Pratt, J. A. 2009. Impact of media richness and flow on e-learning technology acceptance. ***Computers and Education***, 52(3): 599-607. https://doi.org/10.1016/j.compedu.2008.11.002.

Lu, Y., Kim, Y., Dou, X., & Kumar, S. 2014. Promote physical activity among college students: Using media richness and interactivity in web design. ***Computers in Human Behavior***, 41: 40-50. https://doi.org/10.1016/j.chb.2014.08.012

Lundvall, B. A. 2009. Innovation as an Interactive Process: User-Producer Interaction to the National System of Innovation. ***African Journal of Science, Technology, Innovation and Development,*** 1(2-3): 10-34.

Mahdjoubi, L., Hao Koh, J., & Moobela, C. 2014. Effects of interactive real-time simulations and humanoid avatars on consumers' responses in online house products marketing. ***Computer-Aided Civil and Infrastructure Engineering***, *29*(1): 31-46. https://doi.org/10.1111/j.1467-8667.2012.00775.

Maity, M., Dass, M., & Kumar, P. 2018. The impact of media richness on consumer information search and choice. ***Journal of Business Research***, 87(February): 36-45. https://doi.org/10.1016/j.jbusres.2018.02.003

Massara, F., Liu, S. S., & Melara, R. D. 2010. Adapting to a retail environment: Modeling consumer-environment interactions. ***Journal of Business Research***, 63(7): 673-681.

Mazaheri E., Richard M., & Laroche M. 2010. Investigating the moderating impact of hedonism on online consumer behavior. ***Journal of the Academy of Marketing Science***, 20(2): 123-134.

McKenna, R. 1995. Real-Time Marketing. ***Harvard Business Review***, 73(4): 87-95.

Mehrabian, A. 1995. Relationships among three general approaches to personality description. ***The Journal of Psychology***, 129(5): 565-581.

Mehrabian, A., & Russell, J.A. 1974. ***An Approach to Environmental Psychology***. Cambridge, MA: MIT Press.

Milgram, P., & Kishino, F. 1994. A taxonomy of mixed reality virtual displays. ***Institute of Electronics, Information, and Communication Engineers Transactions on Information and Systems***, E77-D (9): 1321-1329.

Milgram, P., Takemura, H., Mtsumi, A., & Kishino, F. 1994. Augmented Reality: A Class of Displays on the Reality–Virtuality Continuum. ***Telemanipulator and Telepresence Technologies***. 2351: 282-92.

Mitchell, A. A., & Olson, J. C. 1981. Are Product Attribute Beliefs the Only Mediator of Advertising Effects on Brand Attitude? ***Journal of Marketing Research***, 18(3): 318-332. https://doi.org/https://doi.org/10.1509/jmkg.66.1.38.18451

Moes, A., & Vliet, H. van. 2017. The online appeal of the physical shop: How a physical store can benefit from a virtual representation. ***Heliyon***, *3*(6): e00336.

Mokhtarian, P.L., 2004. A conceptual analysis of the transportation impacts of B2C e-commerce. ***Transportation***, 31: 257–284.

Mollen, A., & Wilson, H. 2010. Engagement, Telepresence and Interactivity in Online Consumer Experience: Reconciling Scholastic and Managerial Perspectives. ***Journal of Business Research.*** 63(9-10): 919-925.

Moon, J. H., Kim, E., Choi, S. M., & Sung, Y. 2013. Keep the Social in Social Media: The Role of Social Interaction in Avatar-Based Virtual Shopping. ***Journal of Interactive Advertising***, *13*(May 2014): 14-26. https://doi.org/10.1080/15252019.2013.768051.

Morris, J. D. 1995. Observations: SAM: the self-assessment manikin", ***Journal of Advertising Research***, 35(6): 63-68.

Morris, J. D. & Boone, M. A. 1998. The effects of music on emotional response, brand attitude, and purchase intent in an emotional advertising condition. ***Advances in Consumer Research***, 25(1): 518-526.

Mosier, C. I. 1943. On the reliability of a weighted composite. ***Psychometrika***, 8(3): 161-168.

Mou, S., Robb, D. J., & DeHoratius, N. 2018. Retail store operations: Literature review and research directions***. European Journal of Operational Research***, 265(2): 399–422.

Newberry, B. 2001. ***Raising student social presence in online classes***. Proceedings of the world conference on the WWW and Internet: 905-910, Orland, FL.

Pantano, E. 2014. Innovation drivers in retail industry. ***International Journal of Information Management***, 34: 344-350. 10.1016/j.ijinfomgt.2014.03.002.

Pantano, E. 2016. Benefits and risks associated with time choice of innovating in retail settings. ***International Journal of Retail and Distribution Management***. 44 (1): 58–70.

Pantano, E., Rese, A., & Baier, D. 2017. Enhancing the online decision-making process by using augmented reality: A two country comparison of youth markets. ***Journal of Retailing and Consumer Services***, 38(April): 81–95.

Papadopoulou, P. 2007. Applying Virtual Reality for Trust-Building E-Commerce Environments. ***Virtual Reality***, 11(2): 107-27.

Papagiannidis, S., Pantano, E., See-To, E., & Bourlakis, M. 2013. Modelling the determinants of a simulated experience in a virtual retail store and users' product purchasing intentions. ***Journal of Marketing Management***, 29(13/14):1462-92.

Papagiannidis, S., Pantano, E., See-To, E. W. K., Dennis, C., & Bourlakis, M. 2017. To immerse or not? Experimenting with two virtual retail environments. ***Information Technology and People***, 30(1): 163–188. https://doi.org/10.1108/ITP-03-2015-0069.

Papagiannidis, S., See-to, E., & Bourlakis, M., 2014. Virtual test-driving: the impact of simulated products on purchase intention. ***Journal of Retailing and Consumer Services***, 21(5): 877–887.

Parise, S., Guinan, P. J., Kafka, R., College, B., Hall, B., Park, B, Area, B. 2016. Solving the crisis of immediacy: How digital technology can transform the customer experience. ***Business Horizons***, 59(4): 411-420.

Penke, A. K. 2017. ***Building online content on offline moments – Opportunities for brands in social media***. Unpublished master dissertation, ISCTE Business School, Lisbon.

Pereira, R. E. 2000. Optimizing human-computer interaction for the electronic commerce environment. ***Journal of Electronic Commerce Research***, 1(1): 23–44. Retrieved from https://pdfs.semanticscholar.org/dcac/50f9154991dcf3941fa911361f8bc04f13a3.pdf

Pham, M. T. 2013. The seven sins of consumer psychology. ***Journal of Consumer Psychology***, 23(4): 411-423.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. 2003. Common method biases in behavioral research: A critical review of the literature and recommended remedies. ***Journal of Applied Psychology***, 88(5): 879-903.

Porter, M. E., & Heppelmann, J. E. 2017. Why Every Organization Needs an Augmented Reality Strategy. ***Harvard Business Review***, December: 46-58.

Poushneh, A. 2018. Augmented reality in retail: A trade-off between user's control of access to personal information and augmentation quality. ***Journal of Retailing and Consumer Services***, 41(December 2017): 169-176.

Poushneh, A., & Vasquez-Parraga, A. Z. 2016. Discernible impact of augmented reality on retail customer's experience, satisfaction and willingness to buy. ***Journal of Retailing and Consumer Services,*** 34(September 2016): 229-234.

PwC (October 2017). Total Retail 2015: Retailers and the Age of Disruption. Retrieved November 2017, from: http://www.pwc.com/gx/en/industries/retail-consumer/ global-multi- channel- consumer- survey.html.

Ringle, C. M., Sarstedt, M. and Straub, D. W. 2012. Editor's comments: a critical look at the use of PLS-SEM in MIS quarterly. ***MIS Quarterly***, 36(1): iii-xiv.

Ringle, C. M., Wende, S., & Becker, J. M. 2017. ***Smart PLS (v.3.2.6)***. Boenningstedt: SmartPLS GmbH. Retrieved from: http://www.smartpls.com

Rönkko, Rodriguez-Vila, O., Bharadwaj, S., & Chae, M. 2016. Engaging in Real Time: Understanding the Effect of "Real-Time" Social Media Messages on Consumer Engagement. ISB Insight. Retrieved October 18, 2017, from ISB Insight: http://isbinsight.isb.edu/engaging-in-real-time-understanding-the-effect-of-real-time-social-media-messages-on-consumer-engagement/.

Roe, S. 2016. How to Succeed in Real-Time Marketing. ***Customer Relationship Management Magazine***, (May): 22-25.

Sarstedt, M., Ringle, C. M., Henseler, J., & Hair, J. F. 2014. On the Emancipation of PLS-SEM: A Commentary on Rigdon (2012). ***Long Range Planning***, 47(3): 154-160. https://doi.org/10.1016/j.lrp.2014.02.007

Scholz, J., & Smith, A. N. 2016. Augmented reality: Designing immersive experiences that maximize consumer engagement. ***Business Horizons,*** *59*(2): 149-161.

Sekhavat, Y. A. 2017. Privacy Preserving Cloth Try-On Using Mobile Augmented Reality. ***IEEE Transactions on Multimedia***, 19(5): 1041–1049.

Sha, D. Y., Perng, D. B., & Lai, G. L. 2013. Study of using smart digital content technology in retail store. ***Applied Mechanics and Materials***, 411–414: 2161–2166.

Shankar, V., Inman, J. J., Mantrala, M., Kelley, E., & Rizley, R. 2011. Innovations in shopper marketing: Current insights and future research issues. ***Journal of Retailing***, 87S(1): S29-S42.

Slama, M. E., Tashchian A. 1987. Validating the S–O–R paradigm for consumer involvement with a convenience good. ***Journal of the Academy of Marketing Science***, 15(1): 36-45.

Statista (March 2017). Smart augmented reality glasses revenue worldwide from 2016 to 2022 (in million U.S. dollars). Statista. Retrieved October 15, 2018 from Statista: https://www.statista.com/statistics/610532/smart-ar-glasses-revenue-worldwide/

Steuer, J. 1992. Defining Virtual Reality: Dimensions of Determining Telepresence. ***Journal of Communication***, 42(4): 73-93.

Suh, K. S. 1999. Impact of Communication Medium on Task Performance and Satisfaction: An Examination of Media Richness Theory. ***Information & Management***, 35(5): 295-312.

Suh, K., Chang, S. 2006. User interfaces and consumer perceptions of online stores: the role of telepresence. ***Behaviour & Information Technology***, 25(2): 99-113.

Suh, K. S., & Lee, Y. E. 2005. The effects of virtual reality on consumer learning: An empirical investigation. ***MIS Quarterly***, 29(4): 673-697.

Sundar, S. S. 2000. Multimedia effects on processing and perception of online news: A study of picture, audio, and video downloads. ***Journalism & Mass Communication Quarterly***, 77(3): 480-499.

Sundar, S. S. 2007. Social psychology of interactivity in human–website interaction. In A. Joinson (Ed.), ***Oxford handbook of Internet Psychology*** (p. 89–102). Oxford, UK: Oxford University Press.

Swan, J. E., & Gabbard, J. L. 2005. ***Survey of user-based experimentation in augmented reality***. In Proceedings of the 1st International Conference on Virtual Reality.

Trainor, K. J., Rapp, A., Beitelspacher, L. S., & Schillewaert, N. 2011. Integrating information technology and marketing: An examination of the drivers and outcomes of e-Marketing capability. ***Industrial Marketing Management***, 40(1): 162–174.

TVTY - The moment marketing company. 2016. ***Matering moment marketing – an analysis of moment marketing adoption and best practice strategy***. TVTY.

van Doorn, J., Lemon, K. N., Mittal, V., Nass, S., Peck, D., Pirner, P., & Verhoef, P.C. 2010. Customer Engagement Behavior: Theoretical Foundations and Research Directions. ***Journal of Service Research***, 13(3): 253-66.

van Herpen, E., van den Broek, E., van Trijp, H. C. M., & Yu, T. 2016. Can a virtual supermarket bring realism into the lab? Comparing shopping behavior using virtual and pictorial store representations to behavior in a physical store. ***Appetite***, 107: 196–207. https://doi.org/10.1016/j.appet.2016.07.033

Van Riel, A. C. R., Henseler, J., Kemény, I., & Sasovova, Z. 2017. Estimating hierarchical constructs using consistent partial least squares: The case of second-order composites of common factors. ***Industrial Management and Data Systems***, 117(3): 459-477.

Verhagen, T., Vonkeman, C., Feldberg, F. & Verhagen, P. 2014. Present It Like It Is Here: Creating Local Presence to Improve Online Product Experiences. ***Computers in Human Behavior***, 39(C): 270-80.

Vieira, V.A. 2013. Stimuli-organism-response framework: a meta-analytic review in the store environment. ***Journal of Business Research***, 66(9): 1420-1426.

Vivek, S., Beatty, S. E., & Morgan, R. 2012. Customer Engagement: Exploring Customer Relationships beyond Purchase. ***Journal of Marketing Theory & Practice***, 20(2): 122-46.

Waterlander, W., Mhurchu, C. N., & Steenhuis, I. 2012. The use of virtual reality in studying complex interventions in our every-day food environment. In T. Xinxing (Ed.), ***Virtual reality and Human computer interaction***. INTECH. http://dx.doi.org/10.5772/46410

Waterlander, W. E., Mhurchu, C. N., & Steenhuis, I. H. M. 2014. Effects of a price increase on purchases of sugar sweetened beverages. Results from a randomized controlled trial. ***Appetite***, 78: 32-39.

Waterlander, W., Scarpa, M., Lentz, D., & Steenhuis, I. 2011. The virtual super- market: An innovative research tool to study consumer food purchasing behaviour. ***BMC public health***, 11(1): 589-599.

Wibisurya, I. 2018. The Effect of Digital Marketing Implementation through Location Based Advertising on Customer's Purchase Intention. ***Binus Business Review***, 9(2): 153-161. https://doi.org/10.21512/bbr.v9i2.4618.

Wold, H. 1982. Soft modelling - The basic design and some extensions. In ***Systems Under Indirect Observation II***, K. Joreskog and H. Wold, (Eds). Amsterdam, the Netherlands: North-Holland Press, 1-53.

Wu, K., Raab, C., Chang, W., & Krishen, A. 2016. Understanding Chinese tourists' food consumption in the United States. ***Journal of Business Research***, 69(10): 4706-4713. https://doi.org/10.1016/j.jbusres.2016.04.018.

Yang, Z., Cai, S., Zhou, Z., & Zhou, N. 2005. Development and validation of an instrument to measure user perceived service quality of information presenting Web portals. ***Information and Management***, 42(4): 575-589. https://doi.org/10.1016/j.im.2004.03.001

Yim, M. Y. C., Chu, S. C., & Sauer, P. L. 2017. Is Augmented Reality Technology an Effective Tool for E-commerce? An Interactivity and Vividness Perspective. ***Journal of Interactive Marketing***, 39: 89-103.

Zhang, H., Lu, Y., Gupta, S., & Zhao, L. 2014. What motivates customers to participate in social commerce? The impact of technological environments and virtual customer experiences. ***Information and Management***, 51(8): 1017-1030.

10. Annex

APP Protocol

1. Summary

The experiment and the used methodology evaluated participants' cognitive and emotional reactions on the Augmented Reality (AR) app prototype. Developed to assist consumers in a supermarket, to find more information about the products they are about to purchase, and also suggest different meal recipes, the "Shopping Assistant" was created to aid consumers in their retail shopping experience.

The different ways this information may be presented in, helps us understand what triggers the consumers' levels of engagement and willingness to buy, when inserted in a normal retail environment, going further on the studies that exist about consumer behaviour in retail.

2. Goals

The goal of this experiment is, firstly, to study the cognitive and emotional responses of consumers after an AR experience, and explore their buying intentions after the experiment. As a third goal, the moderating effects of a moment marketing strategy and social presence elements, are tested. Finally, it is also important to analyse the drivers of engagement with brands that use AR technology.

3. Methodology

3.1. Place and Time

The experiment of augmented reality in a food retail environment will occur in Avenida Duque D'Ávila, Saldanha, in the city of Lisbon, during July of 2018.

3.2. Sample

The sample of participants is represented by any individual who frequently goes to the store to purchase goods that will be used to cook meals at their home environment, whether the person in question is the one who cooks, or others in the household. This will allow to get a perspective of the usability and usefulness of such service, as well as a deeper knowledge on how consumers respond, emotionally and cognitively, to different levels of media rich communication.

3.3. Process

The test was composed by three different phases: 1) Presentation, Consent and Explanation, 2) Test and 3) Answering of a questionnaire.

In the first part of the experiment, the sample of people collected through the authors personal and professional contacts, and ramifications from those, was given a brief explanation on the context and main objectives of the experiment and the study it is part of [Annex 1], as it was handed a "Consent Form" [Annex 2] which the participant should read carefully and sign, if in agreement with the described terms. Only to the participants who signed this document, was it possible for them to partake on the following phase.

In the second phase, the technology of the Microsoft HoloLens device was presented, and it was explained to the participant how it worked, and the steps that would follow [Annex 3]. With the HoloLens connected and mounted, the prototype of the app being ready to be tested, it was asked for the participants to go around the store through a specific path, calling their attention on the three existing "interaction points".

In the third moment it was handed out a final questionnaire [Annex 4] to the participants, to analyse the results concerning the participants' user general experience, cognitive responses (perceived information quality and brand attitude) and emotional responses (pleasure and arousal). This ultimately allowed to study what were the user's level of brand engagement and advocacy and their future purchase intention. If able to collect sufficient and pertinent data, the goal was to be able to understand how does the AR experience, and corresponding contents, influence consumers' behaviour.

Annex 1

This script should be verbalised by the investigator to the participants in phase one, prior to the delivery of the "Consent Form". It can be read, or memorized, as long as all the information is passed to the people that are going to do the test.

"Em primeiro lugar, gostaria de lhe agradecer pela sua disponibilidade em participar neste estudo, uma vez que a sua opinião é uma parte extremamente importante para o trabalho que foi desenvolvido no âmbito da minha tese do Mestrado de Marketing. Para este projeto foi desenvolvido um protótipo de um serviço digital, que funciona com um dispositivo de realidade aumentada, os óculos HoloLens, em que o seu principal propósito é o de ajudar as pessoas nas suas compras de supermercado, e toda a experiência de compra. Este serviço pode ser visto como o seu Assistente de Compras pessoal, que o pode ajudar não só com as compras normais do dia-a-dia, mas também ajudá-lo a descobrir o que preparar na próxima refeição que o/a senhor/a, ou outra pessoa, tiver de confecionar em sua casa.

Esta experiência tem três momentos importantes: Em primeiro irei pedir-lhe que leia atentamente e assine um "Termo de Consentimento", em que o seu principal propósito é o de nos certificarmos que a experiência foi feita voluntariamente.

A seguir, iremos colocar-lhe os óculos HoloLens, e terá a oportunidade de dar uma volta pela loja e descobrir como funcionaria o Assistente de Compras.

No final da experiência irá então responder a um questionário que incidirá sobre como se sente e as suas impressões da experiência em que participou.

[Hand and sign the Consent Form]

Pedia então que lesse o termo de consentimento, no qual terá também uma ideia mais clara de toda a informação pertinente relativa a este estudo e quais os seus principais objetivos. Se estiver de acordo com todo o conteúdo deste documento, seguiremos para a fase seguinte.

Annex 2

TERMO DE CONSENTIMENTO

OBJETIVOS DO ESTUDO

O objetivo deste teste é avaliar o comportamento do consumidor a uma experiência de realidade aumentada num ambiente de retalho. Pretende-se perceber se, na sua opinião, esta aplicação é útil, intuitiva e fácil de usar, e perceber quais os efeitos emocionais e cognitivos são despoletados em si por esta experiência.

CONDIÇÕES DO ESTUDO

O tempo previsto de duração da experiência é de cerca de 20 minutos. A sua participação representa um importante contributo, não só para o estudo em curso, mas também para o desenvolvimento do conhecimento na área de Marketing e a relação próxima que este pode ter com a tecnologia. Ao participar, terá a oportunidade de experimentar equipamentos e tecnologias associadas à Realidade Aumentada. A utilização deste tipo de equipamento é bastante fácil e não coloca qualquer problema para a sua saúde.

VOLUNTARIADO

Este sistema tem um caráter voluntário. O participante tem a possibilidade, por motivos éticos ou de saúde negar a participação ou de se retirar do teste, a qualquer momento, sempre que assim o entender.

CONFIDENCIALIDADE, PRIVACIDADE E ANONIMATO

De acordo com as normas da Comissão de Proteção de Dados, os dados recolhidos são anónimos e a sua eventual publicação só poderá ter lugar em revistas da especialidade.

CAPTURA DE IMAGENS

Durante a experimentação permite que sejam tiradas fotografias que poderão ser utilizadas apenas em publicações científicas e do ISCTE-IUL.

Tendo tomado conhecimento sobre a informação disponível para o teste, declaro aceitar participar.

___/___/2018 _____

Annex 3

Before being handed the device to the participant, the researcher must give the following instructions:

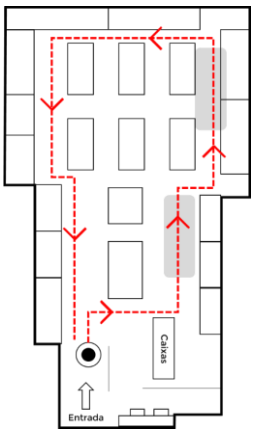
"Este é um protótipo de uma aplicação mais abrangente, o que significa que foi apenas desenvolvido um exemplo de algumas das suas funcionalidades inicialmente idealizadas. Peço-lhe que se concentre no que lhe será apresentado de seguida, e que faça a sua avaliação com base no protótipo como está atualmente.

[Turn on HoloLens, choose one of the two available versions, and place it on the participant's head]
[Ligar HoloLens, escolher uma das duas versões disponíveis para os participantes]

Vamos começar por testar os óculos, ao entrar na loja [Acompanhar a pessoa até à entrada da loja]. Neste momento está possivelmente a ver alguma mensagem/pessoa a cumprimentá-lo, correto? Olhe em volta, se ainda não estiver a ver a imagem. Vê agora? Pronto, uma vez à entrada do supermercado esta é a primeira funcionalidade deste serviço, fazer a receção do consumidor à loja.

A partir daqui, eis o que terá de fazer:

1) Circular pela loja com calma, seguindo sempre pelo corredor mais à sua direita, como demonstrado neste pequeno mapa da loja;



2) Tome atenção às informações que são apresentadas nos vários pontos de interação, evitando colocar as mãos em frente aos óculos. Durante este pequeno percurso, estará uma pessoa a acompanhá-lo para o caso para o caso de ser necessário, em última instância, algum apoio com os óculos. E é tudo, alguma questão?

[Once the participant has completed the experience, the final questionnaire should be handed to given, and be filled in private.]

Annex 4

Final Questionnaire

(Write down the number of the participant before handing the questionnaire)

Assistente de Compras MyAuchan

Olá! Muito obrigada por ter participado nesta experiência de Realidade Aumentada! Peço-lhe agora que preencha o seguinte questionário, que terá uma duração máxima de apenas 6 minutos. Todos os dados aqui recolhidos serão considerados anónimos e apenas usados para análise de dados do presente estudo.

*Obrigatório

Dados Gerais

1. **Idade** *
   Marcar apenas uma oval.
   - ◯ 0-20
   - ◯ 21-30
   - ◯ 31-40
   - ◯ 41-50
   - ◯ 51-60
   - ◯ 60+

2. **Género** *
   Marcar apenas uma oval.
   - ◯ Feminino
   - ◯ Masculino

3. **Nível de escolaridade** *
   A completar ou terminada
   Marcar apenas uma oval.
   - ◯ Até 9º Ano
   - ◯ Até 12º Ano
   - ◯ Licenciatura ou Bacharelato
   - ◯ Mestrado
   - ◯ Doutoramento
   - ◯ Outro

4. **Com que frequência confecciona as suas refeições ou do seu agregado familiar?** *
   Marcar apenas uma oval.
   - ◯ Diariamente
   - ◯ Pelo menos, uma vez por semana
   - ◯ Pelo menos, uma vez por mês
   - ◯ Uma ou duas vezes por ano
   - ◯ Nunca

5. **Quem, no seu agregado familiar, é normalmente responsável pela aquisição da comida utilizada para confeccionar as suas refeições?** *
   Marcar apenas uma oval.

   - ◯ Eu
   - ◯ Marido/Esposa
   - ◯ Outro membro da família
   - ◯ Outra: _____

6. **Como avalia a sua experiência normal de compras em supermercado?** *
   Marcar apenas uma oval.

	1	2	3	4	5	
Muito má	◯	◯	◯	◯	◯	Muito boa

Assistente de Compras MyAuchan

Para responder às perguntas seguintes, pense agora na experiência de Realidade Aumentada que acabou de vivenciar, nesta loja e, em primeiro lugar, foque-se no momento e local em que a marca de cada produto sugerido apareceu. Depois de pensar nos vários momentos, avalie entre 1 (Discordo Totalmente) e 7 (Concordo Totalmente) as seguintes afirmações:

7. **Havia uma ligação lógica entre o momento em que o produto apareceu e a marca sugerida.** *
   Marcar apenas uma oval por linha.

	1 - Discordo Totalmente	2	3	4	5	6	7 - Concordo Totalmente
Esparguete Nacional	◯	◯	◯	◯	◯	◯	◯
Polpa de tomate Guloso	◯	◯	◯	◯	◯	◯	◯
Azeite Extra Virgem Oliveira da Serra	◯	◯	◯	◯	◯	◯	◯
Filetes de Peixe Panados Pescanova	◯	◯	◯	◯	◯	◯	◯

8. **Para mim, faz sentido que a marca se ligue ao momento em que o produto me foi sugerido.** *
   Marcar apenas uma oval por linha.

	1 - Discordo Totalmente	2	3	4	5	6	7 - Concordo Totalmente
Esparguete Nacional	◯	◯	◯	◯	◯	◯	◯
Polpa de tomate Guloso	◯	◯	◯	◯	◯	◯	◯
Azeite Extra Virgem Oliveira da Serra	◯	◯	◯	◯	◯	◯	◯
Filetes de Peixe Panados Pescanova	◯	◯	◯	◯	◯	◯	◯

Avalie agora o quanto concorda com as seguintes afirmações, entre 1 (Discordo Totalmente) e 7 (Concordo Totalmente):

9. **Enquanto estava na loja... ***
Marcar apenas uma oval por linha.

	1 - Discordo Totalmente	2	3	4	5	6	7 - Concordo Totalmente
...o Assistente de Compras ajudou-me a tomar uma boa decisão.	◯	◯	◯	◯	◯	◯	◯
...o Assistente de Compras facilitou a minha tomada de decisão.	◯	◯	◯	◯	◯	◯	◯
... as condições providenciadas pelo Assistente de Compras atrasaram o meu processo de tomada de decisão.	◯	◯	◯	◯	◯	◯	◯
... consegui perceber as coisas facilmente.	◯	◯	◯	◯	◯	◯	◯

10. **Até que ponto sentiu que estava a interagir com uma pessoa? ***
Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Nada	◯	◯	◯	◯	◯	◯	◯	Muito

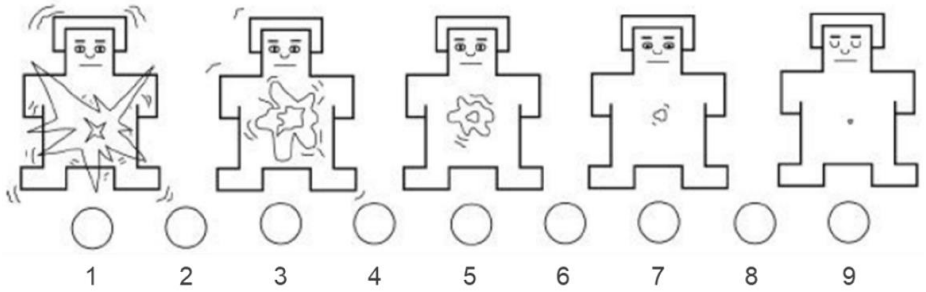
11. **Até que ponto sentiu que o Assistente de Compras estava consigo na loja? ***
Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Muito como se estivesse comigo na loja	◯	◯	◯	◯	◯	◯	◯	Nada como se estivesse comigo na loja

12. **Até que ponto sentiu que este foi como um encontro cara-a-cara? ***
Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Muito como se fosse cara-a-cara	◯	◯	◯	◯	◯	◯	◯	Nada como se fosse cara-a-cara

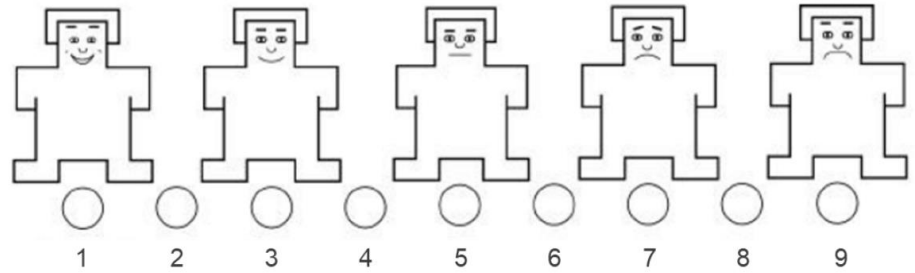
13. **Qual o seu nível de entusiasmo em relação à experiência com o Assistente de Compras?** *



Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	
Excitado	◯	◯	◯	◯	◯	◯	◯	◯	◯	Calmo

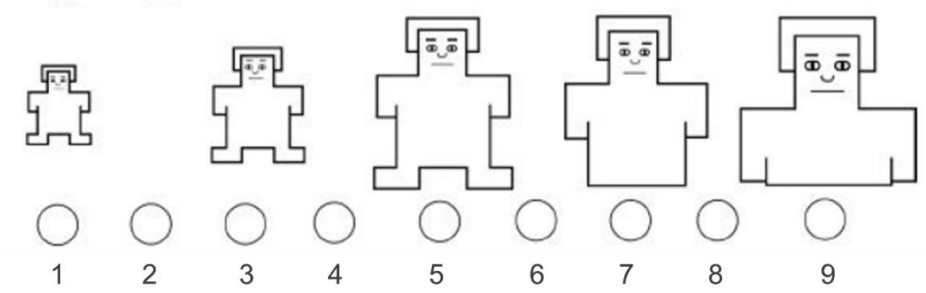
14. **Qual o seu nível de prazer em relação à experiência com o Assistente de Compras?** *



Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	
Prazer	◯	◯	◯	◯	◯	◯	◯	◯	◯	Desprazer

15. **Quão dominante se sentiu em relação à experiência com o Assistente de Compras?** *



Marcar apenas uma oval.

	1	2	3	4	5	6	7	8	9	
Dominado pela situação	◯	◯	◯	◯	◯	◯	◯	◯	◯	Domínio da situação

16. **Quão provável seria que optasse por usar este sistema de interação como forma de persuadir terceiros?** *
Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Muito provável	◯	◯	◯	◯	◯	◯	◯	Nada provável

Refletindo nos produtos e marcas apresentados na camada aumentada, por favor responda ao seguinte conjunto de perguntas.

17. **Como avalia as seguintes marcas entre 1 (Má) e 5 (Boa)?** *
Marcar apenas uma oval por linha.

	1 - Má	2	3	4	5 - Boa
Nacional	◯	◯	◯	◯	◯
Guloso	◯	◯	◯	◯	◯
Oliveira da Serra	◯	◯	◯	◯	◯
Pescanova	◯	◯	◯	◯	◯

18. **Como avalia as seguintes marcas entre 1 (Não gosto nada) e 5 (Gosto muito)?** *
Marcar apenas uma oval por linha.

	1 - Não gosto nada	2	3	4	5 - Gosto muito
Nacional	◯	◯	◯	◯	◯
Guloso	◯	◯	◯	◯	◯
Oliveira da Serra	◯	◯	◯	◯	◯
Pescanova	◯	◯	◯	◯	◯

19. **Como avalia as seguintes marcas entre 1 (Má qualidade) e 5 (Alta qualidade)?** *
Marcar apenas uma oval por linha.

	1 - Má qualidade	2	3	4	5 - Alta qualidade
Nacional	◯	◯	◯	◯	◯
Guloso	◯	◯	◯	◯	◯
Oliveira da Serra	◯	◯	◯	◯	◯
Pescanova	◯	◯	◯	◯	◯

Pense agora na informação que lhe foi dada pelo Assistente de Compras MyAuchan.

20. **Avalie entre 1 (Discordo Totalmente) e 5 (Concordo Totalmente) as seguintes afirmações:** *

Marcar apenas uma oval por linha.

	1 - Discordo Totalmente	2	3	4	5 - Concordo Totalmente
A informação dada pelo Assistente de Compras era relevante para mim.	◯	◯	◯	◯	◯
A informação dada pelo Assistente de Compras era customizada.	◯	◯	◯	◯	◯
A informação dada pelo Assistente de Compras tinha dicas valiosas sobre os produtos e/ou marcas apresentadas.	◯	◯	◯	◯	◯
A informação dada pelo Assistente de Compras é única.	◯	◯	◯	◯	◯

Avalie ainda entre 1 (Discordo Totalmente) e 7 (Concordo Totalmente) também as seguintes afirmações:

21. **Usar a marca _____ faz-me pensar nela.** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional	◯	◯	◯	◯	◯	◯	◯
Oliveira da Serra	◯	◯	◯	◯	◯	◯	◯
Guloso	◯	◯	◯	◯	◯	◯	◯
Pescanova	◯	◯	◯	◯	◯	◯	◯

22. **Eu penso muito na marca _____ quando a estou a usar.** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional	◯	◯	◯	◯	◯	◯	◯
Oliveira da Serra	◯	◯	◯	◯	◯	◯	◯
Guloso	◯	◯	◯	◯	◯	◯	◯
Pescanova	◯	◯	◯	◯	◯	◯	◯

23. **Usar a marca _____ estimula o meu interesse em aprender mais sobre ela.** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional	◯	◯	◯	◯	◯	◯	◯
Oliveira da Serra	◯	◯	◯	◯	◯	◯	◯
Guloso	◯	◯	◯	◯	◯	◯	◯
Pescanova	◯	◯	◯	◯	◯	◯	◯

24. **A minha disponibilidade para comprar os produtos sugeridos pelo Assistente de Compras é alta.** *

Marcar apenas uma oval por linha.

	1 - Discordo Totalmente	2	3	4	5	6	7 - Concordo Totalmente
Esparguete							
Polpa de tomate							
Azeite Extra Virgem Oliveira da Serra							
Filetes de Peixe Panados Pescanova							

25. **Sinto-me muito positivo quando uso a marca _____ .** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional							
Oliveira da Serra							
Guloso							
Pescanova							

26. **Usar a marca _____ faz-me feliz.** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional							
Oliveira da Serra							
Guloso							
Pescanova							

27. **Eu sinto-me bem quando uso a marca _____ .** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional							
Oliveira da Serra							
Guloso							
Pescanova							

28. **Eu sinto-me orgulhoso por usar a marca _____ .** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional							
Oliveira da Serra							
Guloso							
Pescanova							

29. **Eu passo muito tempo a usar a marca _____ comparando com outras marcas da mesma categoria de produtos.** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional							
Oliveira da Serra							
Guloso							
Pescanova							

30. **Quando compro esta categoria de produtos, normalmente escolho a marca _____ .** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional							
Oliveira da Serra							
Guloso							
Pescanova							

31. **Eu consideraria comprar os produtos sugeridos pelo Assistente de Compras.** *

Marcar apenas uma oval por linha.

	1 - Discordo Totalmente	2	3	4	5	6	7 - Concordo Totalmente
Esparguete							
Polpa de tomate							
Azeite Extra Virgem Clássico							
Filetes de Peixe Panados							

32. **Eu gostaria de usar novos produtos da marca _____ .** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional							
Oliveira da Serra							
Guloso							
Pescanova							

33. **Eu falo bem sobre a marca _____ aos meus amigos e família.** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional							
Oliveira da Serra							
Guloso							
Pescanova							

34. **Se a marca _____ fizer algo de que não gosto, estou disposto/a a dar-lhe uma segunda oportunidade.** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional							
Oliveira da Serra							
Guloso							
Pescanova							

35. **A marca _____ é uma das marcas que mais uso para esta categoria de produtos.** *

Marcar apenas uma oval por linha.

	1 - Discordo totalmente	2	3	4	5	6	7 - Concordo totalmente
Nacional							
Oliveira da Serra							
Guloso							
Pescanova							

36. **A probabilidade de eu comprar os produtos sugeridos pelo Assistente de Compras é alta.** *

Marcar apenas uma oval por linha.

	1 - Discordo Totalmente	2	3	4	5	6	7 - Concordo Totalmente
Esparguete							
Polpa de tomate							
Azeite Extra Virgem							
Filetes de Peixe Panados							

37. **A probabilidade de eu considerar comprar os produtos das marcas sugeridas pelo Assistente de Compras é alta.** *

Marcar apenas uma oval por linha.

	1 - Discordo Totalmente	2	3	4	5	6	7 - Concordo Totalmente
Esparguete Nacional							
Polpa de tomate Guloso							
Azeite Extra Virgem Oliveira da Serra							
Filetes de Peixe Panados Pescanova							

Annex 5

Table 11 Harman's Single Factor Test

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.2133	38.3887	38.3887	8.9413	**37.2553**	37.2553
2	2.8826	12.0106	50.3994	2.5418	10.5906	47.8459
3	1.6595	6.9146	57.3140	1.1201	4.6671	52.5130
4	1.4529	6.0539	63.3679	1.0357	4.3153	56.8283
5	1.2459	5.1912	68.5591	0.9077	3.7820	60.6102
6	1.0440	4.3498	72.9089	0.7058	2.9407	63.5510
7	0.9967	4.1531	77.0620			
8	0.7545	3.1439	80.2059			
9	0.5495	2.2894	82.4953			
10	0.5320	2.2167	84.7120			
11	0.4763	1.9847	86.6966			
12	0.4234	1.7641	88.4607			
13	0.4190	1.7457	90.2065			
14	0.3745	1.5605	91.7670			
15	0.3296	1.3733	93.1403			
16	0.2878	1.1991	94.3395			
17	0.2401	1.0005	95.3400			
18	0.2378	0.9910	96.3310			
19	0.2216	0.9232	97.2542			
20	0.1885	0.7853	98.0395			
21	0.1655	0.6895	98.7289			
22	0.1180	0.4918	99.2207			
23	0.1049	0.4371	99.6578			
24	0.0821	0.3422	100			

Extraction Method: Principal Axis Factoring.

Annex 6

Table 12 Outer Measurement Model

	Items	Loadings	AVE	CR	ρA	Cronbach's α
Media Richness	MR1	0.923	0.717	0.882	0.89	0.803
	MR2	0.926				
	MR4	0.665				
Pleasure	SAM_P\	1.000	1.000	1.000	1.000	1.000
Arousal	SAM_A	1.000	1.000	1.000	1.000	1.000
Dominance	SAM_D	1.000	1.000	1.000	1.000	1.000
Brand Attitude	BA1	0.912	0.830	0.936	0.906	0.898
	BA2	0.923				
	BA3	0.898				
Perceived Information Quality	PIQ1	0.799	0.605	0.86	0.807	0.787
	PIQ2	0.734				
	PIQ3	0.815				
	PIQ4	0.762				
Brand Engagement	CP	0.868	0.801	0.923	0.882	0.876
	AF	0.905				
	AC	0.911				
Willingness to Buy	WTB1	0.915	0.856	0.96	0.945	0.944
	WTB2	0.938				
	WTB3	0.908				
	WTB4	0.940				

Table 13 Model Fit results for the original model (without the second-order construct)

	Saturated Model	Estimated Model
SRMR	0.054	0.064
Chi-Square	746.844	847.985
NFI	0.803	0.776

Table 14 Model Fit results for the final model (with the second-order construct)

	Saturated Model	Estimated Model
SRMR	0.065	0.078
Chi-Square	460.67	501.434
NFI	0.805	0.788

Table 15 Fornell-Larcker test results

	Arousal	Brand Attitude	Brand Engagement	Media Richness	Pleasure	Perceived Information Quality	Willingness to Buy
Arousal	1						
Brand Attitude	0.216	0.911					
Brand Engagement	0.186	0.642					
Media Richness	0.332	0.279	0.322	0.847			
Pleasure	0.488	0.031	0.136	0.334	1		
Perceived Information Quality	0.216	0.288	0.335	0.665	0.178	0.778	
Willingness to Buy	0.297	0.532	0.62	0.588	0.256	0.477	0.925

Table 16 Item Cross Loadings

	MR	P	A	BA	PIQ	BE	WTB
MR1	**0.923**	0.301	0.280	0.245	0.640	0.288	0.551
MR2	**0.926**	0.303	0.383	0.294	0.657	0.301	0.537
MR4	**0.665**	0.247	0.118	0.138	0.310	0.227	0.390
SAM_P	0.334	**1.000**	0.488	0.031	0.178	0.136	0.256
SAM_A	0.332	0.488	**1.000**	0.216	0.216	0.186	0.297
BA1	0.304	0.087	0.186	**0.912**	0.267	0.553	0.497
BA2	0.208	0.012	0.200	**0.923**	0.259	0.663	0.526
BA3	0.257	-0.016	0.206	**0.898**	0.261	0.529	0.423
PIQ1	0.674	0.116	0.258	0.273	**0.799**	0.293	0.439
PIQ2	0.424	0.065	0.083	0.176	**0.734**	0.180	0.265
PIQ3	0.501	0.203	0.125	0.228	**0.815**	0.296	0.410
PIQ4	0.407	0.163	0.171	0.196	**0.762**	0.250	0.331
CP	0.220	0.118	0.132	0.498	0.258	**0.911**	0.473
AF	0.368	0.167	0.270	0.561	0.366	**0.905**	0.575
AC	0.266	0.081	0.096	0.646	0.269	**0.868**	0.597
WTB1	0.521	0.220	0.280	0.512	0.421	0.607	**0.915**
WTB2	0.551	0.263	0.239	0.496	0.517	0.563	**0.938**
WTB3	0.545	0.223	0.273	0.461	0.398	0.546	**0.908**
WTB4	0.560	0.241	0.308	0.499	0.426	0.578	**0.940**

Table 17 Outer VIF results

	Arousal	Brand Attitude	Brand Engagement	Media Richness	Pleasure	Perceived Information Quality	Willingness to Buy
Arousal			1.398		1.124		1.4
Brand Attitude			1.135				1.789
Brand Engagement							1.804
Media Richness	1	1.794			1.124	1	
Pleasure			1.34				1.359
Perceived Information Quality		1.794	1.135				1.175
Willingness to Buy							

Table 18 Reliability of a composite by means

Indicators	Weights	Consistent Correlations, Reliabilities in Diagonal			Reliability
CP	0.325	0.837	0.814	0.668	0.96127
AF	0.385	0.814	0.93	0.626	
AC	0.409	0.668	0.626	0.936	

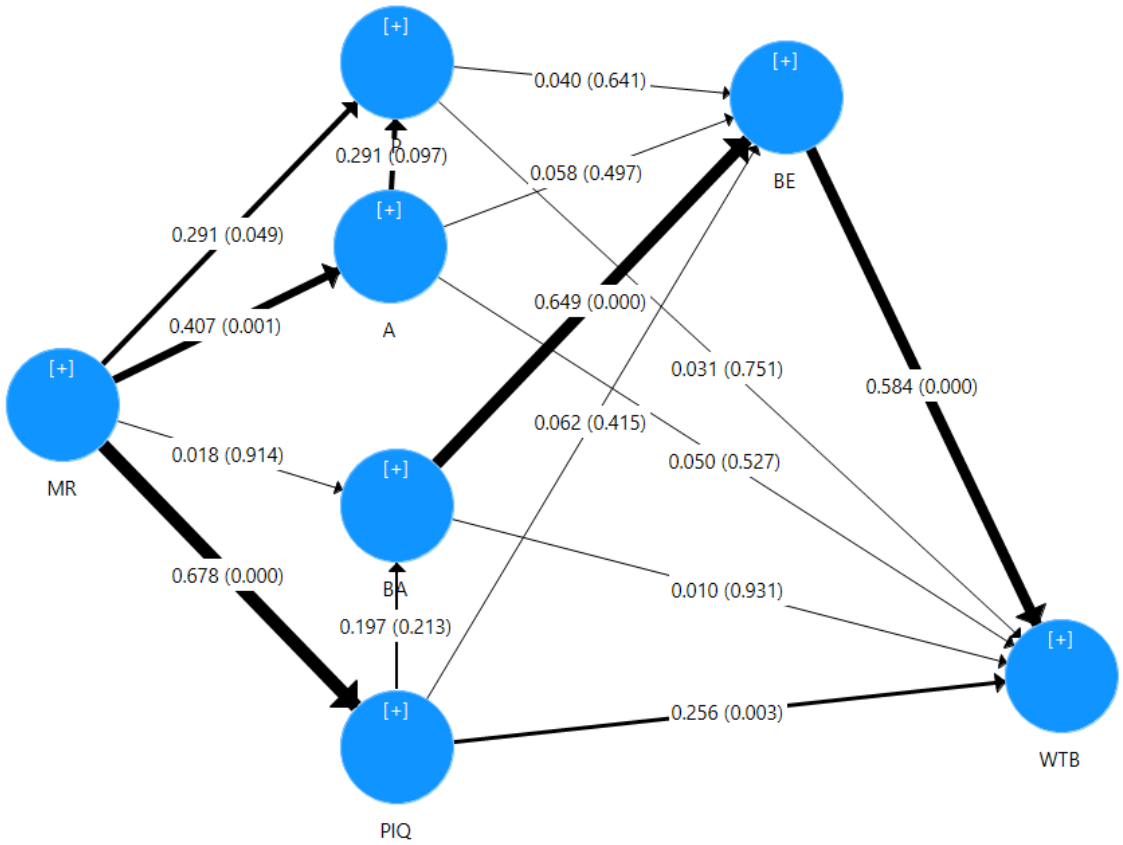


Figure 13 Bootstrapping results for the group with the avatar

Table 19 Bootstrapping results for the group with the avatar

Hyp	Relationship	Std β	Std Error	p-value	f^2	q^2	95% CI LL	95% CI UL
H1a	Media Richness -> Pleasure	0.291	0.148	0.049**	0.093	0.089	0.030	0.512
H1b	Media Richness -> Arousal	0.405	0.127	0.001***	0.199		0.194	0.608
H2a	Media Richness -> Brand Attitude	0.024	0.165	0.914	0.000	-0.004	-0.263	0.279
H2b	Media Richness -> Perceived Information Quality	0.685	0.053	0.000***	0.851		0.570	0.750
H3a	Pleasure -> Brand Engagement	0.051	0.086	0.641	0.002	-0.008	-0.102	0.171
H5a	Pleasure -> Willingness to Buy	0.032	0.096	0.751	0.002	-0.005	-0.130	0.183
	Arousal -> Pleasure	0.295	0.175	0.097*	0.093	0.050	0.024	0.597
H3b	Arousal -> Brand Engagement	0.044	0.085	0.497	0.005	0.002	-0.090	0.171
H5b	Arousal -> Willingness to Buy	0.048	0.079	0.527	0.004	-0.003	-0.072	0.177
H4a	Brand Attitude -> Brand Engagement	0.656	0.069	0.000***	0.703	0.453	0.518	0.749
H6a	Brand Attitude -> Willingness to Buy	0.006	0.119	0.931	0.000	-0.006	-0.172	0.220
	Perceived Information Quality -> Brand Attitude	0.197	0.158	0.213	0.022	0.016	-0.080	0.433
H4b	Perceived Information Quality -> Brand Engagement	0.058	0.076	0.415	0.007	0.000	-0.050	0.200
H6b	Perceived Information Quality -> Willingness to Buy	0.255	0.086	0.003***	0.120	0.067	0.110	0.389
H7	Brand Engagement -> Willingness to Buy	0.591	0.096	0.000***	0.370	0.214	0.401	0.709

***p<0.01 **p<0.05 *p<0.10

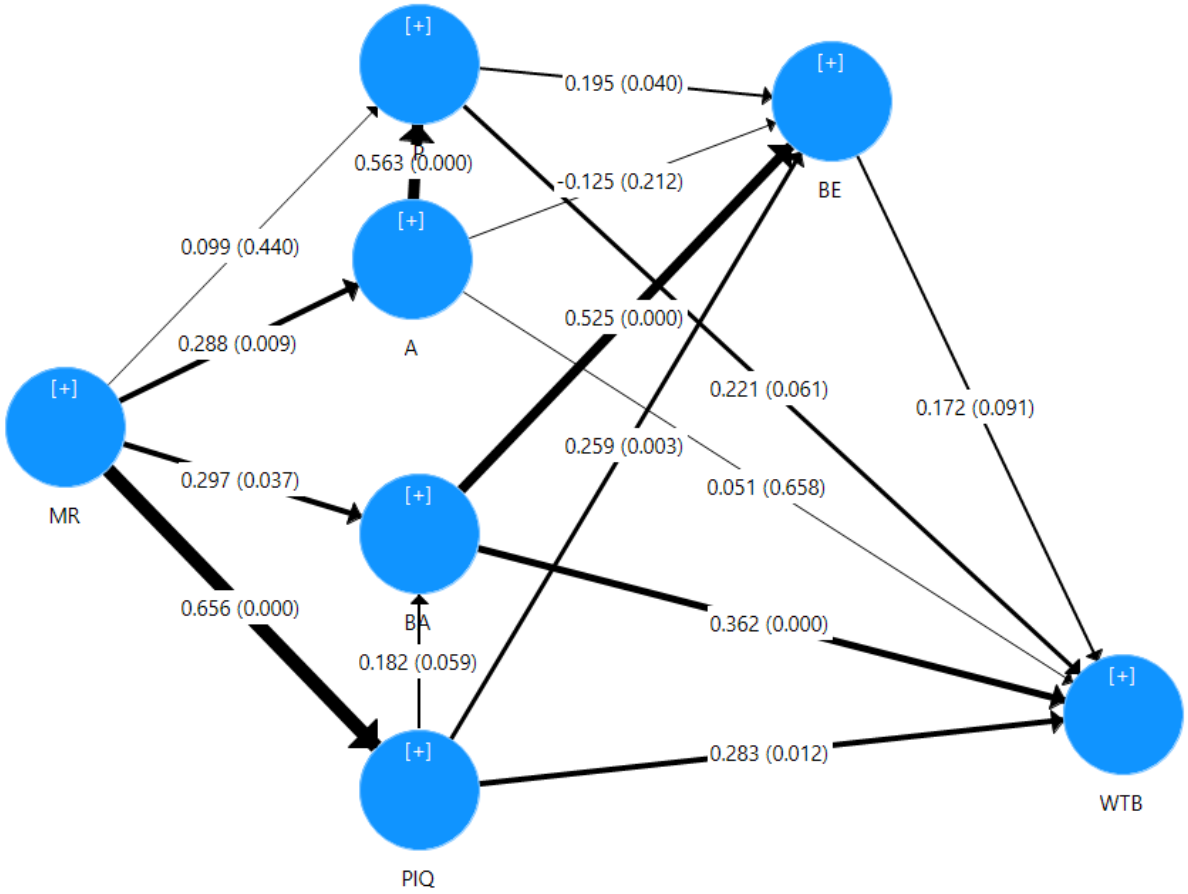


Figure 14 Bootstrapping results for the group without the avatar

Table 20 Bootstrapping results for the group with the avatar

Hyp	Relationship	Std β	Std Error	p-value	f^2	q^2	95%CI LL	95%CI UL
H1a	Media Richness -> Pleasure	0.104	0.128	0.440	0.014	0.009	-0.173	0.274
H1b	Media Richness -> Arousal	0.288	0.109	0.009***	0.090		0.096	0.456
H2a	Media Richness -> Brand Attitude	0.299	0.142	0.037**	0.062	0.034	0.042	0.517
H2b	Media Richness -> Perceived Information Quality	0.664	0.086	0.000***	0.755		0.488	0.776
H3a	Pleasure -> Brand Engagement	0.197	0.095	0.040**	0.045	0.020	0.025	0.338
H5a	Pleasure -> Willingness to Buy	0.226	0.118	0.061*	0.070	0.041	0.039	0.434
	Arousal -> Pleasure	0.563	0.092	0.000***	0.455	0.423	0.386	0.692
H3b	Arousal -> Brand Engagement	-0.126	0.100	0.212	0.018	0.007	-0.289	0.041
H5b	Arousal -> Willingness to Buy	0.043	0.114	0.658	0.004	-0.002	-0.151	0.226
H4a	Brand Attitude -> Brand Engagement	0.521	0.086	0.000***	0.428	0.217	0.372	0.653
H6a	Brand Attitude -> Willingness to Buy	0.360	0.095	0.000***	0.179	0.125	0.202	0.522
	Perceived Information Quality -> Brand Attitude	0.179	0.096	0.059*	0.023	0.014	0.002	0.327
H4b	Perceived Information Quality -> Brand Engagement	0.263	0.086	0.003***	0.102	0.049	0.119	0.4
H6b	Perceived Information Quality -> Willingness to Buy	0.286	0.112	0.012**	0.139	0.096	0.106	0.466
H7	Brand Engagement -> Willingness to Buy	0.163	0.102	0.091*	0.037	0.021	0.016	0.356

***p<0.01 **p<0.05 *p<0.10

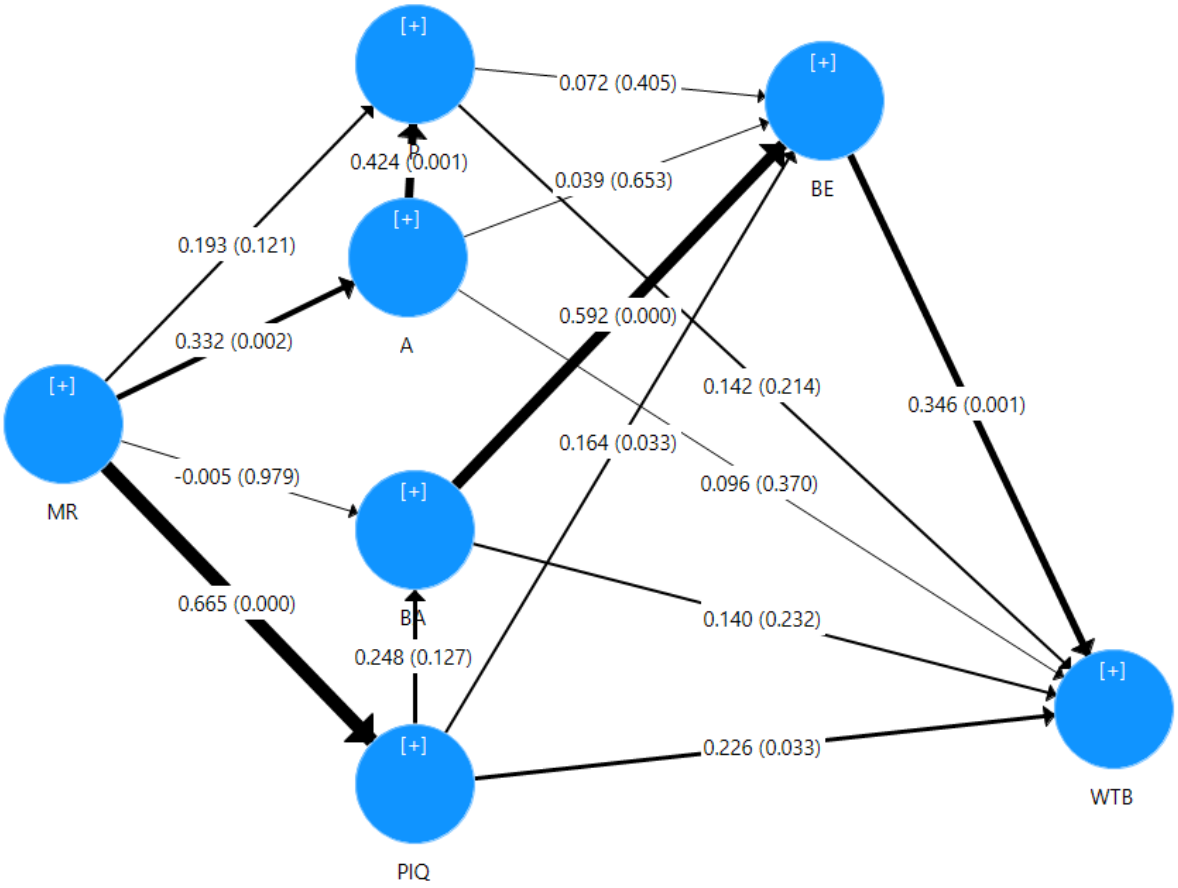


Figure 15 Bootstrapping results assuming high brand-moment fit

Table 21 Bootstrapping results assuming high brand-moment fit

Hyp	Relationship	Std β	Std Error	p-value	f^2	q^2	95%CI LL	95%CI UL
H1a	Media Richness -> Pleasure	0.191	0.124	0.121	0.047	0.031	-0.012	0.397
H1b	Media Richness -> Arousal	0.332	0.106	0.002**	0.124		0.145	0.497
H2a	Media Richness -> Brand Attitude	0.009	0.203	0.979	0.000	-0.007	-0.351	0.333
H2b	Media Richness -> Perceived Information Quality	0.667	0.076	0.000**	0.792		0.511	0.765
H3a	Pleasure -> Brand Engagement	0.077	0.086	0.405	0.007	-0.001	-0.069	0.209
H5a	Pleasure -> Willingness to Buy	0.149	0.114	0.214	0.027	0.011	-0.040	0.332
	Arousal -> Pleasure	0.429	0.125	0.001**	0.220	0.180	0.187	0.608
H3b	Arousal -> Brand Engagement	0.032	0.086	0.653	0.002	-0.003	-0.113	0.167
H5b	Arousal -> Willingness to Buy	0.081	0.107	0.370	0.012	0.005	-0.065	0.284
H4a	Brand Attitude -> Brand Engagement	0.592	0.064	0.000**	0.577	0.313	0.476	0.694
H6a	Brand Attitude -> Willingness to Buy	0.150	0.117	0.232	0.019	0.020	-0.063	0.335
	Perceived Information Quality -> Brand Attitude	0.242	0.163	0.127	0.037	0.024	-0.052	0.505
H4b	Perceived Information Quality -> Brand Engagement	0.167	0.076	0.033*	0.046	0.016	0.038	0.289
H6b	Perceived Information Quality -> Willingness to Buy	0.228	0.106	0.033*	0.080	0.045	0.054	0.402
H7	Brand Engagement -> Willingness to Buy	0.343	0.103	0.001**	0.114	0.073	0.165	0.500

**p<0.01 *p<0.05

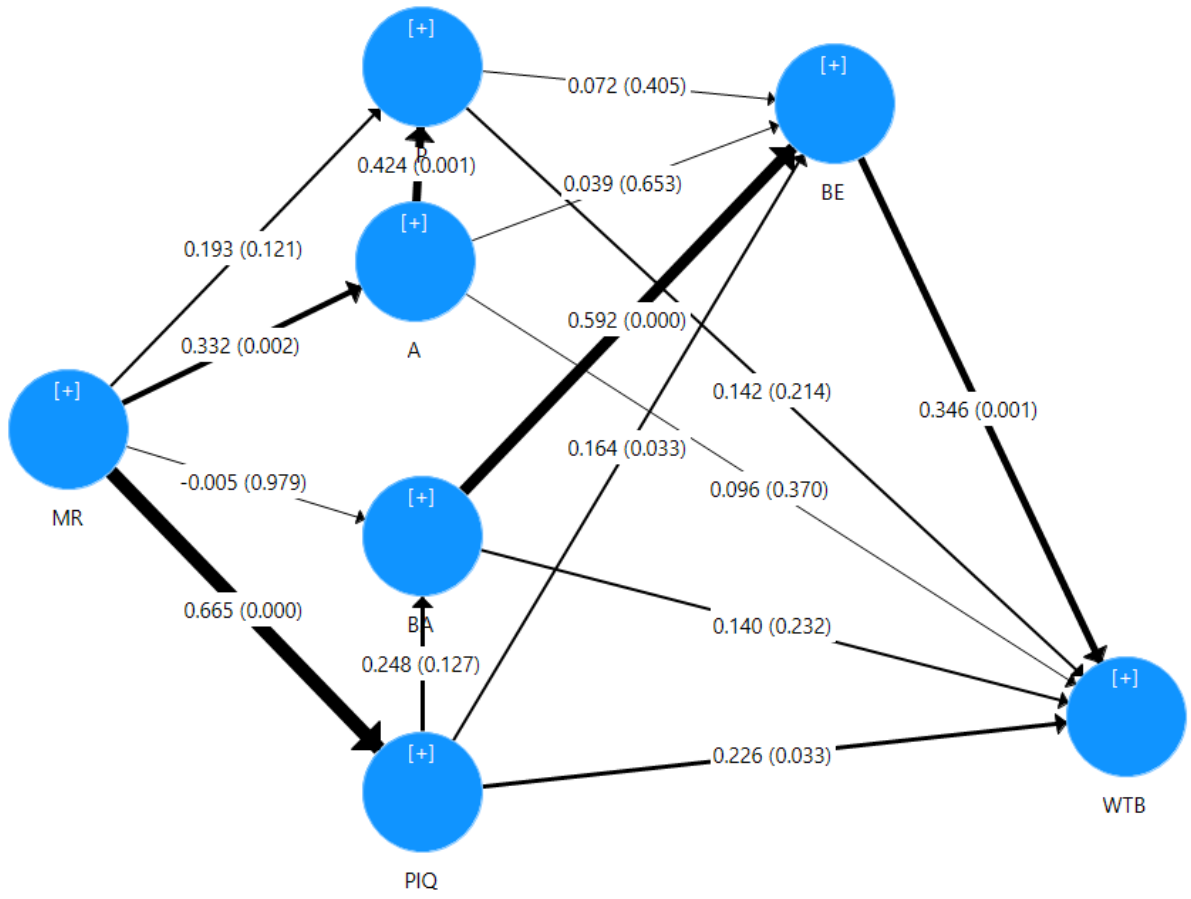


Figure 16 Bootstrapping results assuming low brand-moment fit

Table 22 Bootstrapping results assuming low brand-moment fit

Hyp	Relationship	Std β	Std Error	p-value	f^2	q^2	95%CI LL	95%CI UL
H1a	Media Richness -> Pleasure	0.194	0.124	0.122	0.045	0.031	-0.033	0.386
H1b	Media Richness -> Arousal	0.335	0.111	0.003***	0.125		0.12	0.487
H2a	Media Richness -> Brand Attitude	0.293	0.137	0.032**	0.059	0.029	0.079	0.519
H2b	Media Richness -> Perceived Information Quality	0.671	0.068	0.000***	0.795		0.536	0.766
H3a	Pleasure -> Brand Engagement	0.119	0.101	0.257	0.016	0.004	-0.058	0.277
H5a	Pleasure -> Willingness to Buy	0.101	0.092	0.271	0.016	0.007	-0.038	0.262
	Arousal -> Pleasure	0.424	0.124	0.001***	0.220	0.180	0.209	0.614
H3b	Arousal -> Brand Engagement	-0.105	0.096	0.310	0.012	0.000	-0.254	0.07
H5b	Arousal -> Willingness to Buy	0.071	0.076	0.344	0.008	0.004	-0.062	0.19
H4a	Brand Attitude -> Brand Engagement	0.588	0.083	0.000***	0.469	0.278	0.434	0.705
H6a	Brand Attitude -> Willingness to Buy	0.165	0.114	0.135	0.037	0.020	-0.017	0.358
	Perceived Information Quality -> Brand Attitude	0.161	0.128	0.223	0.016	0.007	-0.075	0.334
H4b	Perceived Information Quality -> Brand Engagement	0.155	0.085	0.075*	0.032	0.018	0.014	0.284
H6b	Perceived Information Quality -> Willingness to Buy	0.306	0.088	0.001***	0.170	0.105	0.166	0.446
H7	Brand Engagement -> Willingness to Buy	0.411	0.095	0.000***	0.230	0.139	0.274	0.582

***p<0.01 **p<0.05 *p<0.10

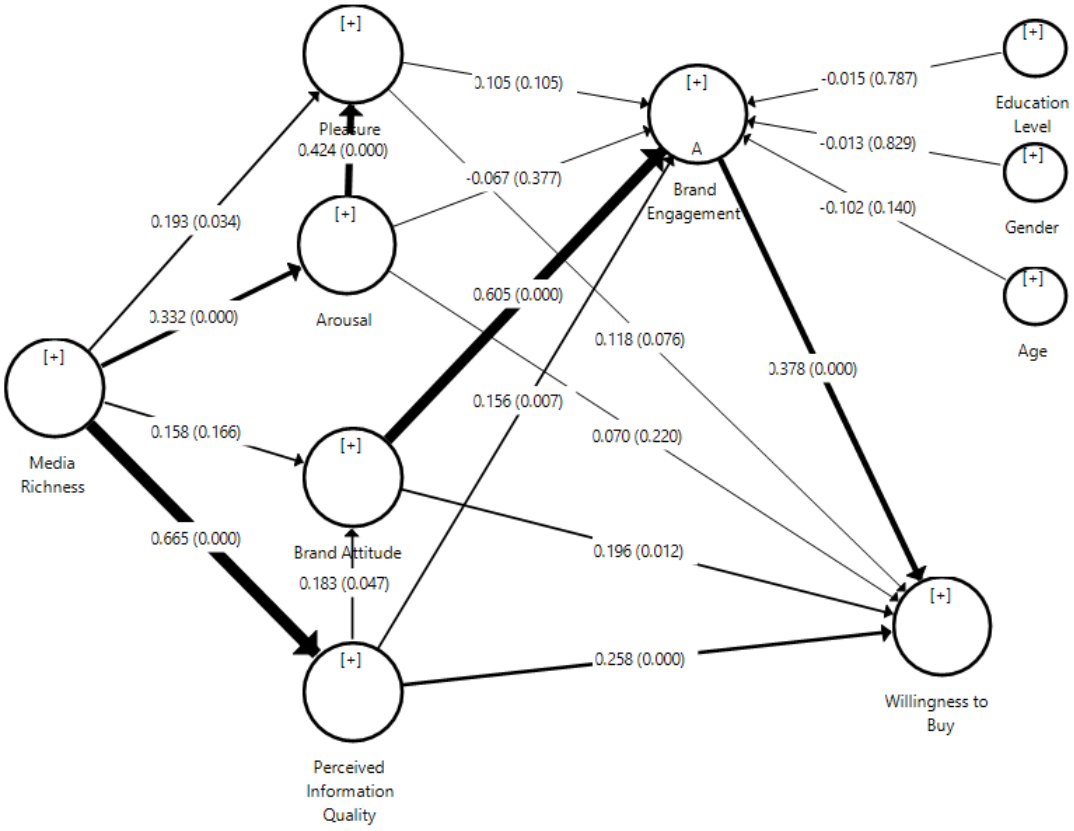


Figure 17 Control variables effects

Table 23 Path coefficients for mediation tests

	Std β	Std Dev	p-value
MR -> BA*	0.279	0.091	0.002
MR -> PIQ	0.665	0.051	0.000
PIQ -> BA	0.183	0.096	0.049
VAF	0.30371		

*(Without PIQ in the model)