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M. Claudia tom Dieck
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Augmented Reality and Virtual Reality

New Trends in Immersive Technology

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Preface

The sixth International Augmented and Virtual Reality conference was held online for the first time. For all of us, 2020 has been a challenging year with many unknowns and changes to the way we work, socialise and operate. "Online" has become the new normal for meetings and conferences, possibly and most likely changing our future behaviours towards a blended online and offline approach.

Immersive technologies will become more important and prominent, and this collection of papers highlights this trend, implications and future research directions. We hope it offers valuable insights and provides us with ideas and solutions for a future in health care, art, tourism, storytelling, marketing and retail, architecture, industrial settings and education.

Manchester, UK

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Immersive Technology in Business, Retail and Marketing

How to Design Effective AR Retail Apps

Liangchao Xue, Christopher J. Parker, and Cathryn A. Hart

Abstract Highly valued consumer experiences occur when emerging technology—such as Augmented Reality (AR)—is presented in an emotionally engaging format. Fashion retailers must understand how Augmented Reality can offer an exceptional retail experience to retain consumers in the store. By running two workshops and AR prototype experience tests, our results indicate that retailers can improve the customer experience by designing AR Apps to provide enjoyment features but focus more on helping shopping's functional tasks. Participants have a positive attitude towards AR shopping adoption, which will improve consumer satisfaction and boost purchase intention. We recommend the most effective form of AR app for fashion retail.

Keywords Augmented reality · User experience · Shopping experience · Retailing

1 Introduction

Consumers in the Millennial (born since 1982) and Generation Z (born since 1997) groups have grown up in a digital world with fundamentally different consumer behaviours from the previously dominant Generation X consumers (Kahn et al., 2018). These younger consumers seek smarter, digitally connected, shopping experiences that cross physical and digital domains (Verhoef et al., 2015). High-street—physical store—retailers are under pressure to reduce prices while delivering enhanced value to compete with electronic commerce (e-Commerce) giants such as ASOS and Amazon. With 2020s COVID-19 pandemic making e-commerce an essential part of life (Craven et al., 2020), retailers must evolve to survive. Advanced technology offers such lifelines.

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Fashion retailers are struggling to keep consumers in physical stores. Despite e-Commerce's growth, retailers still require physical stores to maintain brand value. High-street retailers must differentiate themselves in a crowded market through continued focus on experiential stores (Dover, 2019). Treadgold and Reynolds (2016) suggest that the physical store should achieve a competitive advantage on value, convenience, immediacy, problem-solving, and a superior experience.

Early AR retail applications include virtual try-on and interactive displays. These early AR systems give the consumer information on promotions, products, and locations (Bonetti et al., 2018). AR has, therefore, the potential to improve consumers' visualisation of products, increase engagement, and enhance the shopping experience. Capitalising on these traits enhances retailer and brand perceptions and influences consumer behaviour (Huang & Liao, 2015; McCormick et al., 2014). If designers can create valuable AR experiences, then retailers will buy into AR, helping to revive the high-street through enhanced consumer experiences.

However, designers struggle to apply AR physical retail environments in a meaningful, and lucrative, format (Xue et al., 2018, 2019). While existing AR applications Attract media hype, no retailers—and few consumers—are buying into the technology. The AR development industry, thus, faces a problem: designers' current approach to AR is ineffective. If we can design better AR apps, retailers may adopt the technology for in-store use and increase customer footfall.

This study aims to investigate the consumer value of AR within high-street retailers, evaluate current value (including magic mirror and scanning items), and explore how AR can offer consumers better in-store experiences. To address this aim, we need to know:

1. What value that consumers desire in a physical store environment? This knowledge will help retailers to meet the consumers' increasing, and diversified, demands and enhance competitiveness.
2. What kind of AR app will encourage consumers to engage in physical retail and accordingly, to help the development team understand the developing concept.
3. What is the impact of AR on consumer behaviour and the experience that it delivers? This knowledge will help marketers understand how AR can enhance the in-store experience.

Through two workshops—and AR prototype experience tests—we show retailers can improve the customer experience by designing AR Apps to help shopping's functional (utilitarian) tasks, more than providing enjoyment (hedonic) features; a key feature of e-commerce (Parker & Wang, 2016; Parker & Wenyu, 2019). Participants have a positive attitude towards AR shopping adoption, which will improve consumer satisfaction and boost purchase intention.

2 Methodology

To address the research aim, we undertook our research in three phases: Co-design workshops, prototype generation, and experience prototype experiments.

2.1 Phase One: Co-design Workshops

Phase one evaluated current shopping modes and discovered design opportunities. We used co-design methods by using the touch-point cards and related tools during the customer journey, based on previous literature (Gloppen, 2009; Italian Customer Intelligence, 2015; Lee et al., 2013). As Mitchell et al. (2016) prove, co-design is more likely to create innovative concepts than traditional expert-led ideation methods. The touch-point cards and related tools facilitates mapping, identifying, and analysing results for idea generation in a participatory design workshop.

We targeted 15 participants over three 90–120 min co-design workshops. Our sample comprised utilitarian and hedonic consumers aged 18–34. Previous research shows that 18–34 year-olds are AR's key user base (Mindshare, 2018; Moss, 2019; Parker et al., 2016). Although mainstream high street retailers target 16–45-year-olds, we focus on consumers aged 18–35. 18–35 is the targeted age group of leading high street retailers, for example: Zara 18–40; Topshop 16–30; River Island 18–30; H&M 15–30; and Next 25–35. We used purposive sampling to ensure a suitable spread of participants across each of these categories. We selected qualitative methods because the chosen subject required more in-depth investigation, which will provide multiple contexts for understanding the retail phenomenon under study.

During the workshop, we photographed events with an iPhone X and recorded discussions with a recording pen. We stored all files on a secure server in Loughborough University, under GDPR. We performed the first round of open-coding to capture all emerging themes by reviewing and comparing documentary evidence.

2.2 Phase Two: AR Prototype Design

Phase two used Loughborough University School of Design and Creative Arts's UX flow. We designed two AR prototypes in Adobe XD based on the consumer's pain points revealed from phase one, our primary design persona is a high-street fashion consumer who often shops with limited shopping time.

AR App: https://xd.adobe.com/view/063c9547-baf3-41e2-bfa8-4faafd9439b6-536f/

AR Mirror: https://xd.adobe.com/view/3cecb79d-0cdc-4a06-bf9f-0276137d7cbf-69bf/?fullscreen

Our secondary design persona is a high-street consumer with lacking in fashion sense and enjoys physical interaction with product and people. To compare the differences with established apps, we also built two prototypes of non-AR versions: non-AR App versus AR App and touch screen versus AR Mirror.

2.3 Phase Three: Experience Prototype Experiments

Phase three explored and evaluated the prototypes. We ran experience prototype experiments based in Loughborough University. Each experiment included one participant over 20–45 min.

We ran 42 experience prototype sessions: 11 in AR App, 11 in AR Mirror, 10 in non-AR app, and 10 in non-AR screen. This sample exceeds Nielsen's (2000) minimum requirement for five participants in a usability assessment. Usability is similar to TAM's ease of use, usefulness, and enjoyment components. These experiments targeted consumers aged between 18 and 34, matching Phase One's sample. We used Purposive sampling to ensure a suitable spread of participants across each of these categories.

To prepare for the workshop, we simulated the experience of our concept AR apps by using simple props—including stickers and videos played on an iPad—to role-play the experience of using the AR App and Magic Mirror. We conducted experience prototype sessions in a 'mock-shop' to simulate a high-street fashion shop, see Fig. 1. We asked participants to complete three tasks for each prototype to experience a consumer's entire shopping process—i.e. entering a store, browsing products, selecting products, trying-on and checkout.

Phase three used a mixed-method approach. To quantify the prototype's performance, we measured quantitative task success, task errors, and task time. To quantify satisfaction, we used the SUS Test (Brooke, 1996) with a 5-point semantic differential scales. To qualitatively explore the participant's beliefs, attitude, and intention,

Fig. 1 Experience prototype mock-shop

we asked the participants to complete an online questionnaire: using Kim et al.'s (2017) 7-point Likert scale descriptors and 7-point semantic differential scales.

2.4 Data Analysis

For statistical analysis, we conducted between groups comparisons through Mann–Whitney U Tests as each group's sample sizes are small (n = 22) and Likert scales break parametric statistics' assumption of normality.

To understand the participants' experience, we asked participants to 'think aloud' their prototype interactions—verbalise their actions and thoughts—while being videoed. Post-interaction interviews explored their reaction and behaviour through semi-structured interviews. We transcribed, documented, and coded the tests using NVivo 12 (QSR, 2019). Using NVivo for thematic analysis, we achieved a more in-depth insight into the data than otherwise possible. Through thematic analysis, we understood participants consumer's reactions to AR concept apps, their value perceptions, and the experience of AR concept apps. By comparing different AR (and non-AR) prototypes, we determined the most promising form of AR for high-street fashion retail.

3 Results

Phase one's workshops converged on three pain points of physical retail: queueing for changing and paying, wasting time trying-on unsuitable items, and limited product information. Phase two's designs aimed to bring an innovative consumption pattern and shopping mode, to help consumers to save time and efforts, provide useful information, and offer a seamless shopping process.

In phase three, we cross-compared the four prototypes. Figure 2 presents the means

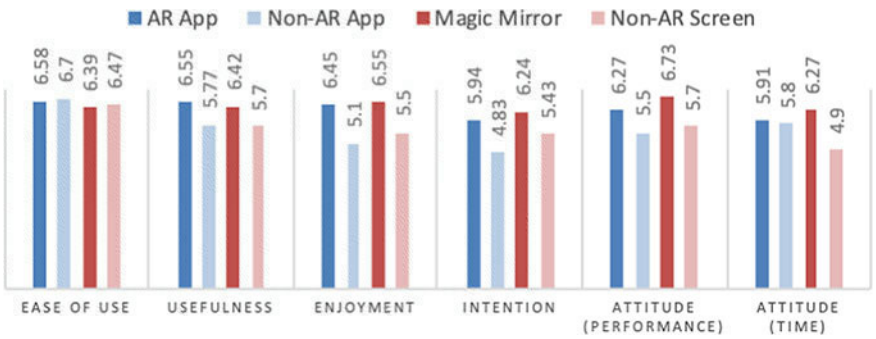

Fig. 2 Comparison between the means of AR prototypes and non-AR prototypes

Table 1 Compare significant level of Mann–Whitney U test between prototypes

Prototype	Ease of use	Usefulness	Enjoyment	Intention	Attitude-performance	Attitude-time
AR app versus Non-AR apps	P = 0.31	P = 0.28	**P = 0.03**	**P = 0.04**	P = 0.43	P = 1.00
AR mirror versus Non-AR screen	P = 0.51	P = 0.31	**P = 0.01**	P = 0.11	P = 0.28	P = 0.09

of four prototypes in different variables, the mean reflects the average response of one prototype, we can use it to compare different sets of data to see the differences between prototypes. The higher score leads to a more favourable result.

Table 1 compared the Man-Whitney U test' significant levels for the four prototype groups. We used the standard significance level of $\alpha = 0.05$. The result highlights that the enjoyment of both AR prototypes and intention of AR App have significant differences when comparing to non-AR prototypes.

3.1 AR App Versus Non-AR App (Quantitative)

Participants showed enthusiastic responses towards the AR Branded App compared to non-AR Branded App. The participants perceived that the AR app is straightforward to use, although the score is less than the non-AR App. The AR App should provide more utility than the non-AR App. There is a significant difference in enjoyment and intention between AR (M = 6.45) and non-AR app (M = 5.1). Most participants found that the design and application of AR is fascinating and enjoyable. Because the workshop is a simulation scenario, the participants need to imagine without any prior use or experience of the technology. The non-AR version is, therefore, more like an existing app consumer are using every day without any flashpoint.

3.2 Magic Mirror Versus Non-AR Screen (Quantitative)

All the scores of measurement items in AR Mirror are similarly inflated compared to non-AR screen. Figure 2 shows participants perceived ease-of-use of AR Magic Mirror (M = 6.39) equals the Non-AR touch screen (M = 6.47). The similarity in ease-of-use means participants can accept or learn to use the new function easily since both prototypes provide fundamental features, enabling participants to quickly

understand the prototype without the further help of technical assistants. Participants regard AR Magic Mirror as advantageous. They were happy to explore the AR Magic Mirror because it has some futuristic elements which they experience for the first time. Participants were also curious to explore the AR Magic Mirror. Non-AR touch screens, by contrast, are considered as an existing app that may not draw much attention when the smartphone is the ubiquitous tool? at the moment.

3.3 AR App Versus Magic Mirror (Qualitative)

The key themes derived from thematic analysis are presented within Table 2.

3.4 Beliefs (Ease of Use, Usefulness, Enjoyment)

Participants enjoyed exploring the AR prototypes because they were curious to play with futuristic elements which they have not experienced before. No participants thought entertainment would trigger their intention to use the AR App or AR Mirror. Entertainment's indifference is critical as enjoyment was the only significant differentiator between AR and Non-AR prototypes. AR's main strength may not increase the consumer's willingness to use the—expensive—technology. Seductive, evocative, and desirable design is, therefore necessary despite being insignificant to differentiate between AR and Non-AR Apps. Consumers may enjoy being in the store, but if the app did not give them what they want, they would leave the store. Developing high-tech elements to work with a customer's existing shopping patterns will provide more utility to high-street retail; such as product interactivity, AR/VR elements, and Artificial Intelligence (AI) assistant. In this way, the shopping activities will become smarter and more enjoyable at the same time.

3.4.1 Intention of Purchasing and Visiting

The study discovered many pain-points toward the branded app prototype. In order to filter the most suitable products for consumers, the app has designed many filter conditions for participants. 36% of the participants, however, stated that there are too many steps to fill in. Designers should create the app to be as simple as possible to reduce consumer effort. Another barrier is the app is unable to measure the accurate size for consumers. Three participants indicated they were still unsure about the size without trying. 81% of participants said they are more likely to visit an apparel shop that provides this AR app because the AR brings the online shopping advantage to in-store shopping. The AR app also brings a novelty effect generated by this innovative experience. The participants, however, have low trust of AR try-on through Magic Mirror. Physical stores will invest heavily in this technology, money and time

Table 2 Relevance characteristics of AR branded app and magic mirror in interview—coding reference

Theme	Category	Themes from Data	Branded App	Magic Mirror
Beliefs		Ease of use	2	5
		Enjoyment	0	0
		Usefulness	9	6
Attitude	Positive	Convenience	3	3
		Entertainment	2	7
		Helpful and useful	6	7
		New way shopping	5	9
		Save time and efforts	3	3
	Negative	Prefer human service	1	0
		Do not Trust the effect	0	1
Adoption Intention	Influential factors	AR effect vs real	3	4
		Availability of sales assistant	3	1
		Ease of use	7	5
		Interface design	3	2
		Knowledge of AR	0	1
		Comfortable to use	0	1
		No. of belonging	1	4
		No. of items to try-on	0	3
		Available shopping time	2	2
		Low response	4	4
		Need of use (function)	20	10
		Update information	5	2
		Popularisation	4	3
		Quality of information	2	2
		Queue and crowd	4	8
		Shop alone	2	0
		Store tidiness	2	1
	Pain-point	Inaccurate to direct/ simulate	2	3
		Limited function	1	0
		Privacy concern	1	4
		Too complex	4	4
		Shop without trying	3	3
		Crowd and queue	0	2
Purchase intention	Positive	Browse all product range	3	4
		Matching	7	8
		Better understand of a product	2	1
		Navigation	4	N/A
		Product filter	4	N/A
		Entertainment	0	4
	Negative	Unnecessary	1	1
Visit Intention	Positive	Combine online shopping	3	0
		Find product quicker	5	0
		Inspiration	2	3
		Novelty effect	2	8
		Fun and interesting	0	2
		Try-on	N/A	4
	Negative	Not as convenient as online	2	3
		Not enough attractive	1	0
Satisfaction	Positive	Convenient	22	13
		Fun and interesting	3	6
		More information	14	8
		Smart shopping	6	9

(input product). Researchers and retailers can hence, understand that participants may be negative about AR's performance in physical stores at this stage. Nevertheless, participants intend to use the Magic Mirror largely because of the novelty effect of this new in-store technology rather than its practicality.

3.4.2 Attitude and Satisfaction

Through a 'think aloud' process, participants felt like they were playing a mobile game. In this 'game-like' environment, the physical shopping activity is closer to the digital world. However, AR apps and Magic Mirrors also offer greater convenience (self-checkout, self-shopping, and navigation) and useful information (product information, style inspiration, and stock availability). Only one participant reacted negatively with the app, because they prefer human service sometimes in the store instead of a self-service app. In this case, we suggest integrating AI—or live human assistants—into the app to help consumers address the real-time issue. The attitude toward Magic Mirror is more positive than the branded app. All participants indicated they are looking forward to experiencing the Magic Mirror in the store. There is a higher probability that consumers will spend more because of the convenience and as more options become visible unwanted products are back on the consumer's radar.

4 Discussion

4.1 AR Versus Non-AR Versions

Participants showed enthusiastic responses toward the AR version compared to the non-AR version. The participants are familiar with the non-AR version, which is similar to the existing shopping apps they use every day. While our results show that participants can accept, or learn to use, the new AR function very easily. Fashion consumers should be able to adapt to the AR version over time. Both the AR and non-AR prototypes can achieve the same outcome but differ in AR technology. The features in the prototypes will help consumers in their shopping experience where participants perceived usefulness of AR prototypes is 1 score higher than non-AR prototypes.

The Mann–Whitney U Test shows a significant difference between 'AR prototype enjoyment' and 'the intention to use AR Apps'; when comparing to non-AR prototypes. This means participants enjoy exploring the AR prototypes the most since they were curious to play with futuristic elements for the first time. Hence, AR technology can be the value in entertainment or experience that enriches the shopping process, making the physical shopping more interesting. No participants, however, thought entertainment would trigger their intention to use the AR App or

AR Mirror. Entertainment's indifference is critical as enjoyment was the only significant differentiator between AR and Non-AR prototypes. AR's main strength may not increase the consumer's willingness to use the—expensive—technology. Seductive, evocative, and desirable design is, therefore, necessary despite being insignificant to differentiate between AR and Non-AR Apps.

4.2 AR APP Versus Magic Mirror

Of the three TAM variables, perceived usefulness is the most important factor for participants to use the AR branded App. The participants perceived ease of use will, however, influence their intention to use the Magic Mirror. These results, however, indicate that the physical and online retailers have different affected factors towards attitude on AR, as shown in the findings from previous studies (Childers et al., 2001; Lee et al., 2006) where perceived enjoyment had the strongest effect on attitude. Perceived enjoyment did not produce a significant direct effect on behavioural intentions toward the online retailer. However, there was a significant indirect effect of perceived enjoyment on behavioural intention mediated by attitude toward the physical retailer. We therefore recommend the apps should be user-friendly to all consumers, keeping functions clear and concise, avoiding garish or over-complicated details—in line with Nielsen's Heuristics for UI design (Nielsen, 1994).

Our prototypes offer convenience for utilitarian consumers who want to save time and effort, and approach a specific product. Increased utilitarian functions align with the research of Olsson et al. (2013) and Spreer and Kallweit (2014). As the use's benefit plays an important role for the usage intention, functional, and solution-oriented applications are rated more positively than enjoyment-oriented ones. The AR apps will not, however, save time for consumers who want to spend time in the store (adventure shopping and gratification shopping). These consumers, for example, plan to shop for certain hours, with or without AR. Consumers' shopping efficiency and purchase intention will be improved since AR can help them make decisions quicker.

Participants are more likely to use an AR branded app rather than a Magic Mirror. This is because most consumers have their own devices to access app stores, unlike the Magic Mirror, which has a limited number in the shop-floor. The consumer may also feel uncomfortable to use the mirror when other consumers are waiting for them. Although the Magic Mirror is enjoyable and useful but raises new concern of queuing, which need to be taken into account when applied in the store. Meanwhile, some participants are still relying on trying by themselves. As a Magic Mirror cannot completely replace a fitting room—but can reduce fitting room queuing- so that the main purpose of fitting rooms for consumers is to check if the size fits them.

4.3 Enjoyment

Consumers may enjoy being in the store more than online shopping, but if the app did not give them what they want, they would leave the store. Developing high-tech elements to work with a customer's existing shopping patterns will provide more utility to high-street retail such as product interactivity, AR/VR elements, and Artificial Intelligence (AI) assistant. In this way, the shopping activities will become smarter and more enjoyable at the same time. This is especially true for Magic Mirrors that involve interactive elements to offer consumers a more enjoyable shopping experience. When the consumer picks up an item and tries it on virtually, projecting the item onto oneself is more enjoyable than projecting it onto a model. Enjoying the shopping processes more will enhance consumers' engagement to see how the item looks on them and improves satisfaction. Interactivity entertains users and enables them to personalize information in a 3D virtual model (Fiore et al., 2005). Consumers enjoy interacting with virtual objects more than they do handling or looking at physical objects (Li et al., 2001).

The smart shopping process enables consumers to feel good and enjoy the shopping activities more than compared to current shopping mode. Furthermore, increased emotional experiences will lead to consumers spending more time on shopping, increasing brand likeability and shopping more often than before. Regarding the retail industry, the use of AR provides an opportunity to close the information gap at the point of sale and have a positive impact on customer satisfaction.

4.4 Intention

Participants are looking forward to experiencing the AR function, desiring something new to change their traditional instore shopping style. Participants, however, lack confidence in the outcome/performance that AR can offer now, which will prevent consumers from using it. AR try-on, for example, may not accurately simulate the product's size, prohibiting consumers from comparing two garments fully. Consequently, consumers must spend time to trying-on garments—as they currently do in-store. Furthermore, the shop's displays must be orderly so the app can identify specific items accurately. Store employees must, therefore, spend more time organising the store—a significant investment in labour. Shoes, for example, have their own characteristic, which demands big data and requires many details to present.

Table 3 Design solutions for in-store AR retail

Design aim	AR solutions	Impact
Offering convenience	Consumer can log in to their account. The account will save the their preference. According to the personal data, the app will suggest the size for consumers	• Enhance consumer loyalty • Keep existing consumer group
Improving accessibility	Keep the procedure simple, and avoid unnecessary steps and features	• Reduce acceptance barriers • Appeal new consumers
Up-to-date information	Show and update the number of items in stock, to avoid consumers reaching the store with an out of stock situation	• Increase consumer satisfaction
	Frequently update the navigation under store merchandising direction	• Increase consumer satisfaction
Improve modelling accuracy	Showing size differences when virtual trying-on	• Increase purchasing intention • Increase stakeholder value
Improve the content richness	Offering 'Buy for others' option enables consumers to select the most suitable item for others by uploading the photo	• Increase enjoyment level • Increase overall profit
Keep seamless shopping experience	AR functions should be consistent with the supporting facilities in the store	• Increase consumer base • Encourage consumer motivation
	Integrate with other high-tech equipment Self-check-out to reduce the queue and save time AI assistant to answer the question for consumers	• Increase consumer satisfaction

5 Conclusion

To enhance the in-store shopping experience, we should design AR apps to follow the factors in Table 3.Our results suggest that through these advanced AR experiences will encourage fashion-based business improvements.

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The Role of Mental Imagery as Driver to Purchase Intentions in a Virtual Supermarket

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Abstract This study aims to explore the role of mental imagery, product involvement and presence on emotions and purchase intentions. A quasi-experimental between-subjects design was implemented to test the proposed model. The quasi-experimental manipulation comprised a virtual grocery store, using VR. A quantitative approach was followed using a questionnaire to get data to test the model. The questionnaire was fulfilled after the 108 participants visualize the scenario through VR. The results reveal that all hypotheses are supported, expect H4. Product involvement is not associated to emotions.

Keywords Mental imagery · Product involvement · Presence · Virtual supermarket · Purchase intentions

1 Introduction

The new Marketing era became a huge challenge for retailers. The field of retailing suffered a lot of changes mainly due to technologies. Consequently, consumer behaviour is also different from past years (Grewal et al., 2017; Pizzi et al., 2019). Nowadays, consumers are more demanding and became more complex. Technologies are not the only driver of this change. According to Shankar et al. (2011), there are other three important drivers: economy, regulation, and globalization. On this research we will focus only on technology.

Retailing is shifting from traditional marketing to a modern in-store practises where the omnichannel is the key (Deng et al., 2019; Souidena & Ladharia, 2018).

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Thus, reaching this omnichannel model involves the use of multi-channels and, additionally, the increase of shopper touchpoints (Shankar et al., 2011). This multichannel environment is enhanced by some new technology development such as advanced mobile devices and interfaces, powerful search engines, online social networking (Shankar et al., 2011), physical in-store locations, mobile web (Souidena & Ladharia, 2018) and also virtual and augmented reality (Grewal et al., 2017). Slowly, retailers are trying to establish contact with their clients by converging offline and online channels.

The purpose behind this change is how it will impact consumer behaviour and their shopping experience. The use of these innovations intends to help customers make a good purchase decision, feel less time pressure, increase their satisfaction and pleasure, feel more engaged and make efficient and quick purchases (Grewal et al., 2017). Although this new experience approach brings a big opportunity for brands, it is also a field that is difficult to develop and needs a lot of study in the years ahead.

Virtual Reality (VR) has offered a large potential for a long time, but those opportunities are just beginning to come true, not only by the hands of retailers but also by the ones of shoppers. Though marketing experts see the evolution of VR with high hopes for companies, there are no clear guidelines as to how they should integrate it on their marketing mix (Tom Dieck et al., 2018). So, more research is needed to understand the potential of this tool. Virtual Reality is based on three key characteristics: immersion, interactivity mix (Tom Dieck et al., 2018). Firstly, when exposed to a virtual environment, the individual experiences the sense of immersion or presence within that environment. The user feels like being there and escaping or becoming isolated from the real world. Beside immersion, VR provides a very dynamic environment (Loureiro et al., 2019), which is important to create consumer involvement. Hence, the current study explores mental imagery as driver to emotions and purchase intentions in virtual supermarket.

2 Theoretical Background

2.1 Virtual Reality

In response to these new trends, companies have developed strategies to be relevant to customers and competitive in the market. Smart technology can enhance the quality of a shopping experience (Berg & Vance, 2017; Kerrebroeck et al., 2017). One of those key transformations uses VR.

VR has offered a large potential for a long time, but those opportunities are just beginning to come true, not only by the hands of retailers but also by the ones of shoppers. The new form of technology based on reality is a way to enhance sensory perceptions, if well used (Grewal et al., 2017). Though marketing experts see the

evolution of VR with high hopes for companies, there are no clear guidelines as to how they should integrate it on their marketing mix (Boyd & Koles, 2018).

The term "Virtual Reality" began early with the visionary Sutherland (1970), who believes VR is a model of real world in real-time, in which the user feels like it as a reality they can manipulate directly and realistically. After that, various authors came up with different definitions, complementing each other. However, a few years later, Steuer (1992) gave us a more scientific approach, defining Virtual Reality as a stimulated environment in which the individual experiences telepresence, that is, the person feels present in a virtual world. In VR, the user emerges in a computer-generated environment where it is possible to perceive, act and interact with a three-dimensional world (Borawskaa et al., 2018). Kerrebroeck et al. (2017) also contributed to this concept, referring to it as computer-based technology that engage with the human senses (vision, hearing, among others …) and consequently create the feeling of being there. Summing up, VR is a three-dimensional world with realistic sensations, which can stimulate a physical presence of environments that exist (Farshid et al., 2018).

VR is based on three key characteristics: immersion, interactivity (Boyd & Koles, 2018; Kerrebroeck et al., 2017; Meißner et al., 2017) and the ability to create real-time engagement (Boyd & Koles, 2018). Firstly, when exposed to a virtual environment, the individual experiences the sense of immersion or presence within that environment (Loomis & Blascovich, 1999). In other words, the user feels like being there and escaping or becoming isolated from the real world (Kerrebroeck et al., 2017). Beside immersion, VR provides a very dynamic environment (Boyd & Koles, 2018), which is important to create consumer involvement. According to Steuer (1992), the user can participate by modifying form and content of the environment in real time.

2.2 Virtual Reality as Marketing Tool

At first, VR was being used in areas like gaming and entertainment, but the tool quickly extended to other areas, such as education and tourism (Marasco et al., 2018). Eventually, it was also used in marketing. Professionals realised its impact in consumer engagement and especially in their shopping experience. As a result, companies have used that to make the purchase more entertaining and convenient. For example, one of the biggest retailers in the UK, Tesco, is testing the opportunity of having a virtual retailing environment (Meißner et al., 2017). The company believes that with this technology they can change consumer behaviour (Lemon & Verhoef, 2016).

Looking at the impact of VR in shopping experience more closely, retail atmosphere is changing to digital solutions which enhance the stimulus at the point of sales much more (Kerrebroeck et al., 2017). A study made by Marasco et al. (2018) concluded that by having a Virtual Reality Experience before choosing a country destination, users had a positive and noteworthy influence on their behavioural intentions.

Specifically, a Virtual Reality experience combines multiple sensory channels (Borawskaa et al., 2018), which leads to high engagement with shoppers and therefore has a positive impact on attitudes and approach behaviour (Kerrebroeck et al., 2017). Thus, it is possible to name specific benefits from this technology to influence consumer behaviour. This is the feeling of being there, creating value by having an enjoyable experience, inducing positive emotions, impacting brand perception, influencing purchase intention, and enhancing brand experience. Before that, Sands et al. (2015) have already concluded that there is a direct link between positive emotions and shopper behaviour. In fact, when the experience incites a positive emotion, people tend to stay longer inside the store, which generates more sales and increases the intention of returning.

3 Hypotheses Development

3.1 Purchase Intention

The purchasing process can be influenced by several factors. Marketing researchers need to study and identify those specific factors. To begin with, it is necessary to clarify the meaning of purchase intention. "Purchase intention is a kind of decision-making that studies the reason to buy a particular brand by consumer" (Mirabi et al., 2015, p. 268). Hsiao and Chen (2018) defined the concept as the likelihood of a customer to purchase a specific product, after evaluation (Younus et al., 2015). The definition seems to be simple. However, the process of customer decision is very complex and usually depends on the behavior, perceptions and attitudes of consumers. Moreover, before the final purchase intention, the customer goes through six strages: awareness, knowledge, interest, preference, persuasion and finally purchase (Mirabi et al., 2015).

Purchase intention is affected by several factors (Younus et al., 2015). *For example, one can find a positive correlation between purchase intention and factors such customer knowledge, celebrity endorsement, product packaging and perceived value. Price has a huge impact on the final purchase decision* (Lee et al., 2017). *Customer attitude through product branding is also particularly important* (Hsiao & Chen, 2018)*, because if the individual has a positive attitude, there is a higher probably that they will buy.*

To sum up, marketers need a clear strategy to understand the reasons that lead the customer to buy a specific product and leverage the purchase intention and VR become a potential effective marketing tool for that. A study conducted by Suh and Lee (2005) concluded that using VR can influence the purchase intention.