Augmented Reality: What Motivates late Millennials Towards Fashion Mobile Apps?

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ABSTRACT

Generation Z is expected to be a dominant demographic and economic group. Cyber-waviness, constant reliance on smart devices that allows them to be always connected are among some of their intrinsic characteristics. The combination of this reality with the ever-changing technological environment is compelling retailers to reshape their business strategies, to meet this group desires and expectations and to foster their engagement. Augmented reality (AR) is emerging as a technological solution that pleases both consumers and retailers. This paper aims to answer two main questions: (1) How does generation Z evaluate an AR experience? (2) Which attributes/benefits do they value or not during an AR experience? Drawing on a qualitative methodology – content analysis of 34 interviewees – we discuss six main dimensions the potential customer value of the relationship between them and AR experiences under retailer context.

Keywords: Generation Z; Augmented reality; Mobile apps; Mobile AR; Consumer-technology relationship

INTRODUCTION

The consumer society, as we know, is undergoing profound changes. Regarding its constitution, Generation Z is expected to assume a preponderant role as the generational group not only due to its size but also because of their purchasing power (Fromm 2018; IBM 2018).

This Gen Z comprises young adults born from 1995-7 onwards, who are cyber-savvy, digital natives, and have a distinctive buying pattern. This generation prefers to invest in products of high economic value rather than buying in large quantities. So, this group requires that brands relate to them in a particular way, through personalized communications and the development of unique content (Ernst & Young 2015). They also demand that brands connect with them through social networks in an interactive and real-time way, whereas these brands must be increasingly innovative and should incorporate new technologies into their marketing strategies (Pantano et al. 2017). Thus, Gen Z craves for interaction through new technologies such as augmented reality (AR), not only for its intrinsic hedonic and fun-related component but also for its functional feature. Some examples are apps from L'Óreal and Warby Parker that makes use of the latest AR technology in the decision-making process (Jaekel 2018).

Another aspect that is changing is the consumers' decision-making process. Consumers are becoming more demanding, requiring more straightforward, faster, more transparent and dematerialized processes, abandoning consumption exclusively in physical stores, thus turning to voice-activated shopping, virtual stores and multichannel (InternetRetailer 2018). Increasingly, we are witnessing the incorporation of the digital transformation into companies' strategies, especially in retail, both in physical stores, including RFID and Magic Mirrors, but

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especially at the level of e-commerce sites and, more recently, with the rise of mobile commerce applications (m-commerce) (eMarketer 2017). Thus, this article intends to understand this change by interviewing young adults.

This article structures as follows: Sect. 2 presents a review of the topics related to Gen Z and the increasing demand for the embeddedness of AR technology in the shopping experience. Sect. 3 introduces the qualitative methodology adopted; Sect. 4 presents the results and the discussion. Sect. 5 regards the limitations and venues for further research.

BACKGROUND

The Consumption of The Future: How Technology Is Reshaping Retail and Consumers

Every day people have access to novel and more advanced mobile technologies that, due to the advances in wireless technology, allows firms to create unique customer experiences, reshaping the retail industry (Pantano and Priporas 2016). Thus, retailers embed these technological advances into their business models aiming to facilitate the consumers' decision-making process, to drive engagement, consumption, and to collect and analyze data regarding their customer's characteristics and preferences (Grewal et al. 2017). These novel technologies may be present in a physical store, like interactive technologies in storefronts (Pantano 2016), but also or on mobile applications reinforcing the brand-consumer relationship (Scholz and Duffy 2018).

Younger generations are increasingly adopting new technologies. As surveys report, Gen Z is the group of people born after 1995, who are fashion and image-oriented, and addicted to their smartphones (GlobalWebIndex 2017). They like to engage their favorite brands on Social Media, and they are a mobile-first/mobile-only shoppers, using smartphones for browsing, comparing prices, looking for reviews, while giving high importance to the ability to order online (AdAge 2018; GlobalWebIndex 2017). Moreover, this group purchase is influenced by affect-rich negative reviews, products' attributes, and consumer ratings (von Helversenet et al. 2018). Furthermore, if they held a $44 billion purchasing power back in 2013, it is estimated that by 2020, they will account for $29 to $143 billion in direct purchases (Fromm 2018).

AR has risen as a versatile technology that tackles its users in a wide range of ways. Firstly, by creating interactive experiences, and by varying its degree of interactivity, AR it will positively affect users' experiences, promoting consumers' willingness to purchase and satisfaction (Poushneh and Vasquez-Parraga 2017). Secondly, AR impacts the effectiveness, preference, novelty, and informativeness positively for hypermedia print ads, when compared with traditional, and the QR hypermedia ones (Yaoyuneyong et al. 2016). This technology also impacts purchase intention positively (both online and offline) (Beck and Crié 2018), and the store's patronage intention (Poncin and Mimoun 2014). The cognitive, affective and behavioral responses of consumers towards AR are studied from a perspective of the media characteristics (MC) like interactivity, flow, augmentation, and presence (Hilken et al. 2017; Javornik 2016b). Also, some attention has been given to the connection between the sense of self and the nurture of consumer-brand relationships (Scholz and Duffy 2018).

Summing up, three main topics will drive the future of retail, that we can derive from increasing the importance of Gen Z (Ernst & Young 2015; IBM 2018; InternetRetailer 2018):

1) Gen Z is always connected through their smartphones, i.e., ubiquitous, and powerful computing machines;
2) Their purchasing power is expressive, with prospects of growth;
3) They expect retailers to engage with them through Social Media and personalized experiences, and that technology facilitates their relationships with brands.

Blending Technology in Shopping Platforms: An Augmented Reality Experience

Several aspects contribute to the creation of a compelling AR experience. Among them, there are the MC inherent to this technology. Past research aims to understand the impact of MC on consumer behavior, e.g., Javornik (2016a) summed up seven of the MC of interactive technologies: interactivity, hypertextuality, modality, connectivity, location-specificity, mobility, and virtuality. Others MC are (tele)presence (Steuer 1992), personalization (Blom 2000), agency (Sundar 2008), navigability (Sundar et al. 2012), and flow (Csikszentmihalyi 1990). Javornik (2016b) also studied the impact of augmentation and interactivity on consumers' behavioral responses.

The displays used in AR are also essential to an AR experience. Thus, Rauschnabel and colleagues studied the adoption of AR Smartglasses (ARSG) drawing on the Big Five Model, finding that people who score high on openness and extraversion are more prone to adopt ARSG, and a negative relationship was found for high neuroticism (Rauschnabel et al. 2015). Also, ARSG adoption was studied applying the Uses and Gratifications Theory, finding that AR addresses utilitarian, hedonic, sensual, social, and symbolic gratifications by fulfilling the desire of augmenting the reality by way of a device (Rauschnabel 2018). Regarding computer displays, researchers found that the incorporation of AR technology in a website facilitated the consumers' decision-making process, by the influence of this technology on the TAM variables, such as ease of use and usefulness (Pantano et al. 2017).

Regarding handheld devices that support mobile AR (MAR) experiences, they are becoming increasingly valuable for retailers (Chatzopoulos et al. 2017). Dacko (2017), demonstrated the importance of MAR shopping apps to smart retail settings, synthesizing the different kinds of experiential value these apps add. It explained how, why, and to what extent this value can be perceived; how users and retailers are influenced by these apps; the change in the consumer behavior caused by MAR apps; and analyzed the disadvantages and MAR apps users' concerns (Dacko 2017). Furthermore, MAR fosters the feelings of perceived ownership and has a positive impact on products attitudes and purchase intentions, when compared with laptop devices (Brengman et al. 2018).

Also tracking techniques (or interactions approaches) play an essential role in the development of an AR experience. Whereas in marker-based (MB) AR, relies on image recognition (fiducial marker), markerless (ML) creates a more interactive augmentation (Geroimenko 2012; Katiyar et al. 2015). Therefore, ML AR creates a more significant impact on consumers (Brito and Stoyanova 2018).

METHODS

This study is guided by the need to understand the following questions: 1) How does Gen Z evaluate an AR experience? Moreover, 2) Which attributes/benefits do they value or not during an AR experience?

To answer these questions, we conducted qualitative exploratory research, based on a phenomenological approach to study in depth a phenomenon, i.e., the experiences lived by the individuals (Saunders et al. 2016). There are two paths that a researcher may follow according to their orientation: the descriptive and the interpretive (Gill 2014). The descriptive one is based on Husserl's perspective of describing experiences, in which there is a "reduction" or a detachment from everyday life (Husserl 2001). The interpretive aspect focuses on Heidegger's view, where interpretation is seen as an integral part of the investigation, given that the human being is involved in an ever-changing environment that contextualizes the experience, so it has to be interpreted (Heidegger 1996).

To operationalize this study, we followed the descriptive approach to phenomenology. We conducted face-to-face interviews, to grasp the meaning that individuals attribute to things and the relationships between them and perceive their personal experiences (contrary to quantitative studies). Face-to-face interviews gave the respondents the freedom to speak freely, without being restricted by socially accepted and/or desired responses (Saunders et al. 2016). Among the type of interviews, we conducted semi-structured interviews, given the flexibility in the structure of the script and time that this instrument offers (Kvale 1996).

This methodological approach has been increasingly used in studies related to cloud computing adoption (Ghaffari and Lagzian 2018), and consumer experience (Sit et al. 2018).

Participants and Data Collection

Taking into account the research questions and the target audience this research involves, we applied a purposive sampling, where the inclusion criteria for individuals in the study were: 1) age (18-25 years), 2) have dematerialized purchase experience, and 3) have a smartphone and/or tablet (Bryman, 2012). Thus, we interviewed 34 university students (16 female; 2 MSc. and 32 BSc) aged between 19 and 23 years old. This sample size was deemed appropriate, as it did not compromise the validity and reliability of the study. We supported that on the fact that the most frequent number of interviews per research range 10 to 30 subjects, but also on the criterion of saturation of topics (when conducting an additional interview does not yield additional nor novel knowledge to the study) (Glaser and Strauss 1967; Kvale 1996).

The average duration of the interviews was 40 minutes until the saturation point of the topics was reached (Glaser and Strauss 1967), and because shorter-period interviews are appropriate for younger populations (Seidman 2013). We carried out the interviews in the space of two months, at the beginning of 2018, on the dates agreed with the participants and at the University of Porto facilities, as this was a common and neutral space for all the interviewees.

According to the guidelines for conducting semi-structured interviews as described in the literature, after the validation of a preliminary script, the interview script was developed to guarantee the data quality (Kvale 1996). The protocol defined that the interview begins with the interviewee giving the informed consent to the investigator, to allow the conduction and to audio-record the interview (Tracy 2013). Then, the followed script consisted of five central questions.

During the interviews, we followed the standard practices of this research method, and we conducted the interviews as follows (Tracy 2013): 1) Introductory questions; 2) Key issues,

follow-up, and elicitation questions to validate and clarify more complex aspects, and 3) Acknowledgement and reaffirmation of the confidentiality and anonymity of the participants.

After the initial questions, we asked the participants to interact with an AR app developed for this investigation. This app allows users to try different shoes, take a picture, share it, and eventually make a (fictitious) purchase. The user needs a mirror, a fiducial marker, and a tablet with the application installed. The AR experience begins when the user points the tablet camera towards the reflection of the marker in the mirror, and the environment is augmented with digital shoes.

Some examples of the questions included in the guide were, "*What do you think of virtual shopping?*"; "*What do you think of an app like Virtual Shoes? Would you use it to buy products?*"; "*What do you think is more relevant in the experience of this app? How does it influence your purchasing decision,"* and "*Who do you think is more prone to use m-commerce apps? How do you describe them?*"

Data Analysis

Two coders transcribed and manually coded all the interviews within a month of the interviews. The coding process regarded two stages: The first cycle of coding (open codification), where all we read the interviews transcripts and attributed codes (Saldaña 2012). In the second cycle of coding, we classified, prioritized, integrated, and conceptualized the codes generated by the first cycle (Saldaña 2012; Tracy 2013).

We conducted the coding solving potential discrepancies that might arise throughout the process (Krippendorff 2004). We computed the intercoder reliability for two coders for all 34 interviews using Krippendorff's alpha reliability measure (Hayes and Krippendorff 2007). The values ranged from 0.86 to 0.96. The mean value was 0.91, which was deemed acceptable.

RESULTS AND DISCUSSION

By analyzing the topics, its frequency, and the meaning the interviewees attributed to them, some topics were attributed more emphasis than the others. Therefore, it could be mapped the 'ingredients' that create a compelling AR experience from the perspective of the young adults that were interviewed (see Fig. 1). Table 1 provides excerpts of the interviews that consubstantiate the results.

Category	Topic	Citation
Tech-related	Tracking-Techniques	**Markerless AR:** "As a user, I don't think that the need to have a marker is useful…Wouldn't it be better if I pointed the camera and the shoe appeared?" | "It is a bit awkward to try out a shoe on a black and white floor… it doesn't have the same effect as if it was a wooden one."
	Displays	**Handheld Displays:** "We don't need many types of equipment, just a tablet, being in front of a mirror, and the marker." | "A great advantage of trying-out shoes this way is that it is portable so that we can do it anywhere."
	Media Characteristics	**Navigability:** "It could have some sort of text that appears on the screen to guide us, for instance when pointing the camera to the mirror; what should appear is some instructions telling me to move

		forward or backwards…"
	Image Resolution	"The image is neat; it has a high-definition… the shoe is a high-resolution image."
	Recognition & Fitting	"If would be amazing if we put our foot on the floor, we point the camera to the mirror, and then the shoe fitted our foot, and when we add it to the cart, the size would already be filled, meaning that the app recognized our real size by the reflection." | "Regarding sizes and details, it would be great to point the camera, and we could see the shoe immediately fitting our foot and have the information about the size of the shoe we see on the app and its corresponding in real life."
Product	Category	"Buying shoes is not that complicated, it easier than buying clothes, because the shoe size is more consistent."
	Price	"For me, shoes are a more expensive product, so I'd need to try them on physically… it would be easier for me to buy cheaper products such as clothes, or makeup using an app such as this"
Brand	Previous Experience	"With well-known brands allow, consumers already have **some experience** with their models, their sizes … some are even loyal customers, so that **trust** comes to the surface. Therefore, there are fewer **risks** associated with the purchase."
	Trust	
	Risk	
Social	Validation	"In a real-life scenario, I'd like to be able to share this picture with my mother to seek her advice." | "It would be nice to able to share this photo. I'm not saying on Social Networks, but sending an SMS or a WhatsApp to my mother or my friend would help me to decide whether or not to buy"
	Influence	"One thing that I value a lot is having [in the shopping platform] the feedback of other people that have bought the product, what did they think of the experience, how did it fit…?" | "Besides reviews, we could have the rating of the products, as Amazon does."
Characteristics	Intuitiveness	"It is intuitive; you can change colors and sizes easily. It's objective and only has the features that are needed, nothing more, and nothing less." | "It is very intuitive how you should use the app. We have fewer than half a dozen commands, and we can try the shoe."
	Convenience	"It contributes to the purchase decision because it is a confirmation of what we are buying." | "[The app] saves times in every aspect of it."
	Realism	"The shoe is a high-resolution image… that makes the experience more real." | "About the experience, it looks authentic. I can see myself with the shoe on."
Profile	Users	"There are two types of people who could use this app. One is those who are either lazy or busy, so they buy online. Other is the type of person that use virtual platforms because usually, in physical stores, there are fewer sizes than online and because when we order clothes and shoes online, we know that they weren't displayed in the store and that the odds of someone trying them are close to none." | "The average user would be someone practical, that is a skilled time manager, with shopping habits more or less established, and probably more girls."
	Providers	"I think of brands that are more internationalized could have an app

		like this" | "I think Nike could provide this app; they are innovative enough for that, they have the innovation on themselves" | "Perhaps companies that are already established in the market, with relatively high brand awareness."

Table 1. Interviews excerpts organized by topic and category

Regarding the tech-related category, the ideal AR experience would be a markerless one. ML AR is more interactive than MB, and the need for a fiducial marker interrupts the flow of the experience (Carmigniani et al. 2011). Interviewees that attribute great importance to automatic recognition of the foot/marker further confirmed the ML preference, and that this recognition should involve a sophisticated mechanism that allows the device to match the size of the image captured through the camera with the actual foot size. The display should be mobile, in line with what has been the most researched AR displays. These displays that allow consumers to have the experience always with them (e.g., smartphone), despite the inherent limitations (Chatzopoulos et al. 2017). Since 2012, academics focused their efforts on the study of interactivity, augmentation as the most salient MC (Javornik 2016b). However, we found that navigability (i.e., how the user moves in a mediated environment) is an MC whose influence is felt by consumers, namely those who regard intuitiveness highly. Image resolution was also an emphasized topic, especially when users think about an experience that feels authentic, like the visualization of the shoe in the real world.

The analysis of the interviews showed that participants feel that the new technologies that emerge should fulfil the pre-requisite of convenience. Thus, AR must be employed by companies and brands to facilitate consumers decision-making process, avoid spending unnecessary time, enabling the creation of a personalized experience, thus accomplishing a utilitarian value (Roxo and Brito 2018).

Product category was one theme that emerged from the analysis that was also connected to the product price. On the one side, the purchase intention for some categories is more easily affected than for others. For instance, shoes are seen as more standardized products than clothes, which makes people more willing to buy them. Moreover, the price of the product category influences this decision to purchase because product categories perceived as less expensive (like clothes and fashion accessories from fast-fashion brands) are more prone to be bought.

The theme of the brand has some connection with the product topic. As it was denoted, well-known, and well-established brands were a decisive factor for the outcome of a successful AR experience. Companies with high brand awareness, with whom customers have past experiences, are perceived as more trustworthy and less risky than others. With the implementation of AR, brands will be able to foster consumer-brand relationships, leveraging customer engagement (Scholz and Duffy 2018).

A MAR app can also fulfil a social-related need. If on the one hand, the presence of rating and reviews influence customers' perceptions (von Helversen et al. 2018), young consumers still face the need for validation, not only their parents but also their close friends.

Regarding the profile topic, we found, to a certain extent, a match between interviewees' perceptions of MAR apps users and providers. Both AR users and providers are seen as innovators, future-oriented, practical, and e-commerce experienced. Whereas the average target

of the apps is mostly made of young adults who are tech-lovers, busy, practical and open-minded, the companies that provide these apps have a strong market position, high brand awareness, like Nike and Adidas.

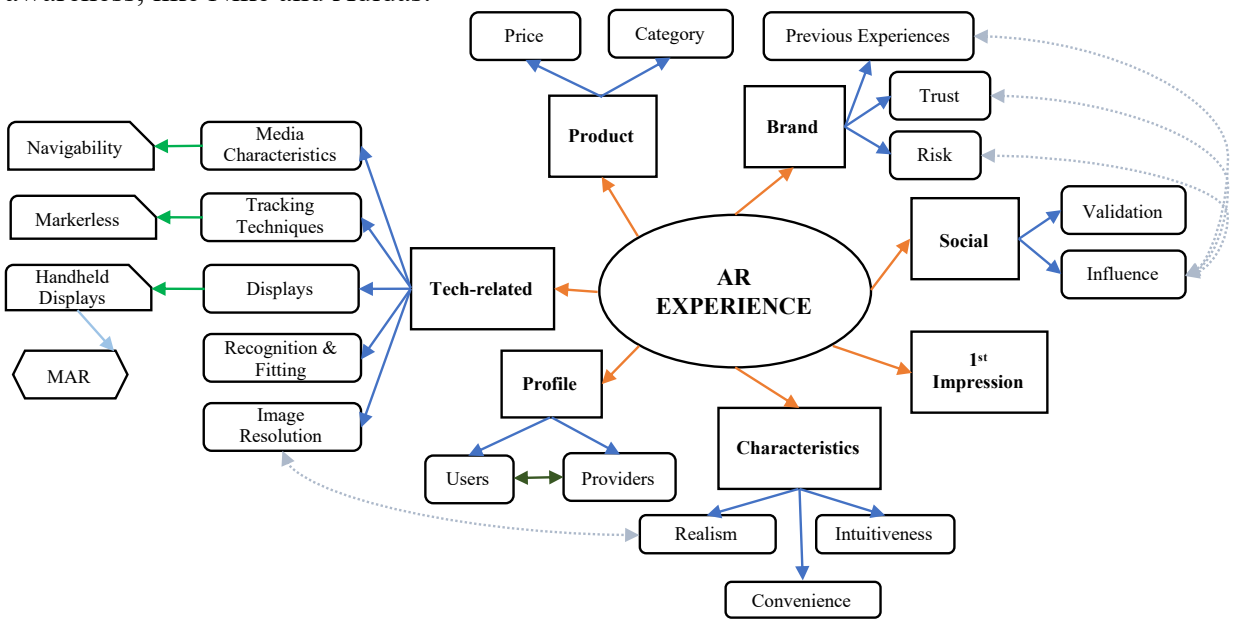

Fig. 1. Mind-map of the elements valued in an AR Experience

LIMITATIONS AND FURTHER RESEARCH

Different topics would emerge if other target generations were interviewed. By conducting this study applying the methodology as we did, our sample was limited to subjects with above-average educational level, which still rely economically on their parents, and are tech-savvy. This sample could be enlarged, to allow to grasp the perspective of other subjects on technology, especially older adults (aged 55+), who are a group whose digital skills are improving, and that represents a significant fringe of the population (Petrovčič et al. 2017).

Furthermore, the question of the different perceptions of product category and product price using AR is a gap that should be addressed in the future with more mixed-methods research.

It would also be useful to replicate this research focusing on other technologies that have emerged recently such as the use of 'personas' cultivated by AI algorithms, that could interact through robots/ humanoids (e.g. robot Sophia) (Bertacchini, Bilotta, & Pantano, 2017).

Due to the explorative nature of this study, it is advisable to conduct further research to understand precisely how the several topics approached are significant to the creation of an AR experience. Therefore, the next step of this research is the conduction of experimental design, aiming to understand better which specific aspect of the experience triggers the consumer response, and how.

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