Understanding customer satisfaction of augmented reality in retail: a human value orientation and consumption value perspective

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Abstract

Purpose – While customer perceived augmented reality (AR) values have generally enhanced customer experience, AR value would be appreciated the most by a consumer segment that remains unexplored. Drawing from human value orientation theory and consumption value theory, this research proposes a new model analysing the effects of human value orientation (openness to change, conservation, self-transcendence, and self-enhancement) on perceived AR values (playful, social, visual appeal, usability) and subsequently the effects on customer satisfaction.

Design/methodology/approach – :The authors employed a two-step online data collection. The first step was to identify those who had used retailers' AR applications, who were then invited to participate in the full survey in the second step. A sample of 253 AR technology users' data was analysed using partial least square and structural equation modelling.

Findings – The results reveal that each human value orientation is associated with its unique perceived AR values and that various perceived AR values influence customer satisfaction differently.

Originality/value – This study shows the pivotal role human value orientation plays in influencing customer perceived AR values and their impacts on customer satisfaction. The findings offer key implications for digital marketing segmentation.

Keywords Augmented reality, Customer satisfaction, Value orientation, Technology value

Paper type Research paper

1. Introduction

Augmented reality (AR) is defined as a "medium in which digital information is overlaid on the physical world that is in both spatial and temporal registration with the physical world, and that is interactive in time" (Craig, 2013, p. 20). AR links virtual reality with the real-world environment, allowing customers to visualise products online and engage in "touch and feel" experiences before actual purchases (Rauschnabel *et al.*, 2015). AR technology has become a new reality (Goebert and Greenhalgh, 2020), offering an innovative way for retailers to interact, engage with their customers and create a fun shopping experience (Yim *et al.*, 2017; McLean and Wilson, 2019). For example, the Makeup Genius app of L'Oréal, the IKEA Place app, and Ray-Ban magic mirrors allow consumers to try different products and preview how it looks on them.

Prior research mainly investigates the impact of technology attributes on customer satisfaction (Zolkepli *et al.*, 2021). For example, Sharma and Li (2013) and McLean *et al.* (2018)

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claim that technology attributes (e.g. convenience, interactivity, and ease of use) influence customer satisfaction with social networking technology and mobile applications of retailers. McLean and Wilson (2019) reveal that perceived ease of use, usefulness, enjoyment, and subjective norms of technology influence customer satisfaction and usage intention of brands who adopted AR technology. Similarly, Jung *et al.* (2015) explore the roles of AR content quality, AR system quality, and AR personalised service quality in determining customer satisfaction. While focusing on technical attributes is useful to gain insight into the effectiveness of a specific technical attribute (e.g. the vividness of AR), such research neglects that consumers with various backgrounds often use different product attributes to express similar underlying consumption values (Tse *et al.*, 1988). Another stream of research examines the impacts of perceived technology value to address the concern. Some research focuses on the perceived value of general technology (Goncalves *et al.*, 2018; Partala and Saari, 2015); other studies focus on a specific type of technology (McLean and Wilson, 2019). For example, McLean and Wilson (2019) reveal that AR consumption is driven by enjoyment, perceived usability, and ease of use. Kim *et al.* (2011) claim that when consumers purchase digital avatars, they use price utility to represent the utilitarian value, playfulness to reflect the emotional value, and social self-image expression represents a crucial social value element.

Despite the importance of perceived technological value, the aforementioned studies focus on the individual consumption value, which is specific to a product or a technology but fail to overlook the relationship/interlink between one's value orientation and individual consumption values to understand the underlying motivations/justifications for selected technological values. Understanding such a relationship is crucial because one's value orientation tends to provide a justification for individuals acquiring certain goods or services (Schwartz, 1992).

Furthermore, each consumer may hold a combination of different values. There is no consensus within the existing literature on the relative importance of a specific technological value. Retail managers need a deep understanding of which technological values customers appreciate the most in order to deliver a compelling experience (Javornik, 2016). Matching consumer segments with their preferred AR value will help retail brand managers tailor marketing communications. Such a gap in the literature also reveals a strong managerial need to understand how AR technology can drive customer satisfaction by satisfying their value orientations. This research offers the following contributions to the literature. First, we draw on Schwartz's (1992) human value orientation and consumption value theory (Sheth *et al.*, 1991) to show that consumers' value orientation explains the degrees of importance of a specific AR value within a consumer segment. That is, the universal cultural value explains the motivations and provides justifications for why a consumer appreciates a particular AR technological value over others. We conceptualise universal value orientation as guiding principles, varying in their importance, in people's lives (Bardi and Schwartz, 2003). Values are associated with what customers believe they ought to do, and those values can be acquired in the social interaction process (Bardi and Schwartz, 2003). Although value orientation is an individual difference variable, it can be activated and affect subsequent behaviour (e.g. Schwartz, 2003). Individuals tend to make decisions consistent with their value orientations when such orientation is activated, as customer value orientation predicts one's consumption choice (Kim *et al.*, 2011).

Second, we extend the existing literature on human value orientation which assumes that a value that sits at the opposite of the value circumplex to another will influence the same variable systematically with increasing or decreasing correlations as we move around the value circumplex (Fischer, 2013). In other words, conservation sits at the opposite of openness to change; both values are expected to show a systematic pattern of increasing or decreasing impacts on the third variable. However, interestingly, our findings demonstrate that such a

systematic pattern may not exist. The current research reveals that the seemingly conflicted value orientations do not exert opposing effects on AR values. This may extend the value orientation literature that only examines the impact of AR attributes and AR values on customer satisfaction. Second, by investigating the effects of AR values, our research provides deeper insights into the customer experience of retailers' AR applications.

2. Literature review and theoretical background

2.1 AR in retail marketing

Retailers have been using different advanced technologies as part of the smart retailing strategy. In particular, AR has been attracting many brands in various industries. For example, in the beauty industry, brands such as Sephora, L'Oréal, Benefit cosmetics, and Mac introduced virtual smart applications for makeup trials (Ameen *et al.*, 2020). In the fashion industry, ASOS introduced the virtual catwalk (Nazir, 2019).

AR technology enhances consumers' online shopping experience (Pantano *et al.*, 2017) and influences consumers' purchasing decisions (Spies *et al.*, 1997; Roggeveen *et al.*, 2020). Rauschnabel *et al.* (2019) propose that AR is distinguished from the other virtual reality (VR) technologies. AR describes the visual alignment of virtual content with real-world contexts. At the same time, VR completely separates the user from reality, and the user consequently only moves in an entirely virtual world. This specific feature of AR makes it more valuable in many ways from a marketing perspective because AR users do not disconnect from reality (Craig, 2013; Alimamy and Nadeem, 2022). Despite the importance of AR technology in the retail sector, not all customers appreciate the same AR values associated with specific AR attributes. Customers with different value orientations may put varying levels of importance on perceived AR technology values.

2.2 Human value orientation theory and value orientation components

Value orientation represents one's desired goals, varying in importance, and guiding principles in people's lives (Bardi and Schwartz, 2003). Values are multifaceted standards employed by consumers to evaluate and judge themselves and others (Schwartz, 1992). In contrast to personality, which reflects one's innate dispositions (Olver and Mooradian, 2003), values are subject to social influence and influence subsequent behaviour when they become salient. Consumers often behave according to the values they hold due to the high demand for consistency (Rokeach, 1973), and thus such values reflect consumers' actual needs (Bardi and Schwartz, 2003). Schwartz (1992) develops ten core values widely recognised in different cultures worldwide, including power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security. Bardi and Schwartz (2003) further categorise all ten fundamental values into one of the four value dimensions: openness to change, conservation, self-enhancement, and self-transcendence.

Openness to change represents individuals' thoughts, actions, and emotional interests based on stimulation, self-direction, and hedonism (Pepper *et al.*, 2009; Schwartz, 1992). Conservation is the opposite of openness to change, including conformity, security, and tradition. Openness to change and conservation value orientations are motivationally conflicting with each other. In particular, openness to change value orientation emphasises novelty and personal autonomy, whereas individuals who hold conservation values would focus on preserving their stability, safety, and traditions (Schwartz, 1992). Furthermore, self-enhancement focuses on power, achievement, and hedonism. These individuals tend to emphasise personal accomplishment, social status, and superiority over others (Pepper *et al.*, 2009). Conversely, self-transcendence reflects the essence of benevolence and universalism. Self-transcendence-oriented individuals are expected to focus on their welfare, supporting

others, and social justice (Schwartz, 1992). Similar to openness to change and conservation, self-enhancement and self-transcendence are also incompatible with each other. Self-enhancement emphasises personal interests (e.g. achievement and power), interfering with self-transcendence values that promote benevolence and universalism.

Although the importance of technical attributes is widely recognised, those specific attributes tend to associate with similar perceived technology values. For example, McLean and Wilson (2019) identify vividness, interactivity, and novelty as the particular attributes of AR technology that positively influence ease of use, usefulness, and enjoyment. Further, Šumak *et al.* (2011) suggest that consumers hold technology-specific values, influencing customer satisfaction.

2.3 Consumption value theory and perceived AR value dimensions

Turel *et al.* (2010) posit that the theory of consumption value represents "a means of explaining user decisions to employ a hedonic digital artefact" (p. 53). Customers tend to make informed purchase decisions after evaluating multiple value dimensions – usability value, playful value, social value, and visual appeal value (Turel *et al.*, 2010). The relative importance of a value component can vary from one context to another. In particular, Turel *et al.* (2010) highlight the claims that the playfulness value of hedonic artefacts (e.g. ringtone adoption) is more influential than the social value in predicting positive WOM intention. Siamagka *et al.* (2015) also reveal that perceived usefulness is one of the most influential values in organisational applications. Additionally, Han *et al.* (2020) claim that both usefulness and playfulness are essential in influencing the behavioural intention of using AR technology.

A consumer's past experiences and interactions with products or services may shape one's perceived consumption value. Some research focuses on the perceived value of general technology (Goncalves *et al.*, 2018; Partala and Saari, 2015); other studies focus on a specific type of technology (McLean and Wilson, 2019). To illustrate, Liu *et al.* (2015) examine the effects of perceived money savings, perceived convenience, and perceived enjoyment of mobile coupon applications. McLean and Wilson (2019) reveal that AR consumption is driven by joy, perceived usability, and ease of use. Therefore, the perceived values of AR technology differ from other technologies as a customer's overall assessment of the utility of AR technology will be based on their perception of what is received in comparison with what is given (Turel *et al.*, 2010).

Drawing on the consumption value theory and consistent with Turel *et al.* (2010), this research focuses on the AR technology values, including visual appeal, playfulness, social, and usability.

Visual appeal represents an aesthetic response that can be an essential motivator for interactive technology consumption. In an online shopping context, web/app aesthetics may mean how different elements and attributes of AR technology are combined to yield an impression of beauty. Many online shopping activities are driven by aesthetic design (Ganesh *et al.*, 2010). Consumers no longer rely on websites just for information searches; they are becoming a popular place for entertaining and recreational experiences (Ganesh *et al.*, 2010; Hartman *et al.*, 2006). Furthermore, the aesthetic design of AR technology has been found to influence visitors' evaluation of AR-facilitated museum experiences (He *et al.*, 2018). Thus, AR technology's aesthetic design that affects consumers' online experiences will be critical in understanding customer satisfaction with using AR technology.

Playful value is one of the key aspects of experiential value, according to Mathwick *et al.* (2001), and it determines the effectiveness of AR facilitated experiences (He *et al.*, 2018). Playfulness often depends on enjoyment and escapism (Turel *et al.*, 2010). Prior research suggests that AR technology's interactivity and vividness are associated with enjoyment experienced by the technology (Yim *et al.*, 2017). In a similar vein, AR technology's

interactivity influences the perceived ease of use and usefulness of AR technology (McLean and Wilson, 2019). AR technology provides consumers with the enjoyment of direct trial experiences of the products without physically trying them on in a physical store (Verhagen *et al.*, 2014). Furthermore, Yim *et al.* (2012) claim that consumers reported a greater enjoyment level when they experienced 3D images than those who experienced 2D experiences. Consumers experiencing more vivid product visualisations tend to report a more positive customer experience (Pantano *et al.*, 2017). Therefore, we posit that AR technology's playful value is one of the key determinants of customer satisfaction.

Social value refers to the "perceived utility of a digital item based on the item's ability to enhance one's social well-being" (Kim *et al.*, 2011, p. 229), similar to physical products, which may be associated with significant symbolic meanings and indicate one's social groups (Stathopoulou and Balabanis, 2019). The consumption of AR technology may depend on how customers perceive themselves or wish to be viewed by others. In other words, digital consumption can enhance one's self-image and indicate group membership (De Valck *et al.*, 2009). Social values in technology consumption indicate symbolic meanings, social relationships, and consumer identity (Kim *et al.*, 2011). Furthermore, community members' use of digital technologies, such as social networking sites, could build and maintain social relationships (Kim *et al.*, 2011). This indicates that social values may affect consumers' experiences with AR technology. The social value of AR technology has been highlighted in earlier studies (Cranmer *et al.*, 2020). For example, Tom Dieck and Jung (2017, p. 115) state, "An AR app could allow visitors to share their scores on treasure hunts or quizzes on social media, leading to a sense of personal fulfilment and sharing their experience with friends and family". AR apps offered by different brands such as L'Oreal, Sephora, Benefit cosmetics, Mac, Ikea, and Amazon describe the visual alignment of virtual content (e.g. a product) with real-world contexts. This helps customers obtain an initial feel of what the product would look like in the real world. In many cases, customers share the images they capture using the AR apps on social media with their networks (such as friends and family), making them feel that they are perceived better by their peers even before purchasing the product.

Usability value refers to users' state of experience during their interaction with technologies (Barnard *et al.*, 2013). It is a prominent motive in technology consumption (Barnard *et al.*, 2013; Lee and Coughlin, 2015). Usability value reflects one of the key intrinsic characteristics of the system about the abilities, skills, perceptions, and attitudes of the user. Interface attributes, including limited input methods, limited screen size, and navigation difficulties, influence users' experiences (Lee *et al.*, 2015). Other than the interface attributes, many other variables, such as the degree of interactivity and environment, also influence users' experience of usability value (Coursaris *et al.*, 2012). In a similar vein, Lee *et al.* (2015) posit that interactivity value is a key determinant of the usability of mobile phones. Retailers often implement AR technologies in their apps/websites to enhance interactivities and support consumer decision-making (Adebe Scene 7, 2020). Thus, we argue that usability value is one of the critical values associated with AR technology.

2.4 Conceptual model

Drawing on human value orientation theory (Schwartz, 1992) and consumption value theory (Sheth *et al.*, 1991), we propose a theoretical model for this research (Figure 1). The model depicts how customer satisfaction is influenced by perceived AR values and how the variation of human value orientation in terms of openness to change, conservation, self-transcendence, and self-enhancement influence various perceived AR values (i.e. usability value, playful value, social value, and visual appeal value).

To illustrate, the proposed model investigates the role of customers' openness to change, conservation, self-enhancement, and self-transcendence orientations in influencing the

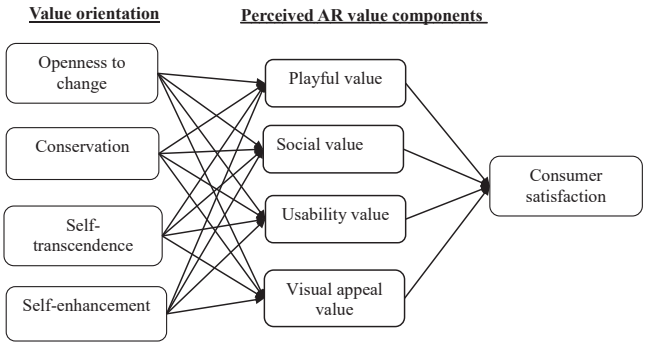

Figure 1.
Proposed research model

importance of AR technology's playful, social, usability, and visual value. The significant effects of customer value orientation are evidenced in the context of luxury consumption (Stathopoulou and Balabanis, 2019), pro-environmental consumer behaviour (Soyez, 2012), and vacation choices (Hedlund *et al.*, 2012), and fashion apparel consumption (Sarabia-Sanchez *et al.*, 2012). Despite a wide range of identified perceived technology values (Kim *et al.*, 2011; Turel *et al.*, 2010), there is a lack of understanding of which technology value is perceived as more important than others in influencing customer satisfaction for a customer segment.

2.5 Hypothesis development

The use of AR technology changes how consumers interact with retailers. Interaction with retailers can affect consumers' experiences with AR technology (McLean and Wilson, 2019). Individuals with a high degree of openness to change often enjoy novelty and exhibit a high degree of flexibility in imagination, processing, and responding to innovative stimuli (Russ, 1993). These individuals enjoy exploring new perspectives, knowledge, and exciting ideas. Aroean (2012) claims that consumers who are open to changes often pursue playful consumption, allowing them to enjoy creativity and innovation. Furthermore, Hur *et al.* (2017) find that individuals willing to use new technologies often experience enjoyment and demonstrate an interest in technology. Therefore, individuals who are open to new technologies may appreciate the fun and joyful experiences.

Openness to change may also affect one's usability expectations. Individuals who are open to change may have a high expectation of products/services easily and effectively used. These expectations would be even more important for the AR technology experience. Prior research shows that personal innovativeness with technology affects one's expectations for their digital experience (Yi *et al.*, 2006). Furthermore, Jackson *et al.* (2013) claim that innovative consumers often recognise and appreciate the usefulness of innovation. Openness to change values encourages individuals to pursue new intellectual and emotional avenues (Schwartz, 1992). Additionally, openness to change predicts teachers' usage of classroom technology (Baylor and Ritchie, 2002; Vannatta and Nancy, 2004). Teachers with high openness to change are more likely than those with low openness to change to use technology in instruction. Thus, Hartman *et al.* (2006) suggest that openness to change values is related to innovativeness. A lack of usability can be detrimental to one's usage experience.

Consumption can be used to enhance consumers' social images because these consumptions can convey symbolic meanings (De Valck *et al.*, 2009). Kim *et al.* (2011) further claim that digital items help consumers enhance the "representation and articulation" of consumers' online self-image, making others in the same social group consider

consumption and usage of the same digital items as symbolic products to express and improve their image. In the context of AR technology consumption, Guttentag (2010) suggests that AR technology enhances consumers' experience of cultural heritage. Oleksy and Wnuk (2016) affirm that AR could be a useful tool for reducing ethnic bias and increasing one's openness to other cultures. Consumers who are high in the openness to change orientation often seek diverse and innovative ways of building social relationships with other group members. Furthermore, those individuals who emphasise openness to change tend to develop complex and multiple social identities (Roccas and Brewer, 2002). Therefore, we expect individuals who are high in the openness to change orientation to appreciate the social values of AR technology.

In addition, AR technology combines virtual and real objects, and such a combination will bring a rich sensory experience (Steuer, 1992). Individuals who rely on openness to change as a guiding principle may emphasise the visual appeal values of AR technology. Prior research alludes to perceived AR values influencing customer satisfaction (e.g. McLean and Wilson, 2019). In this vein, one's value orientation is expected to determine the level of importance a specific AR value is in affecting customer satisfaction with using AR technology. Based on the reasoning above, we propose the following hypotheses:

H1a - H1d. Openness to change value orientation is related to (a) playful value, (b) social value, (c) usability value, and (d) visual appeal value associated with AR technology.

Moreover, consumers who place importance on conservation value demonstrate attitudinal differences toward innovative technology (Han *et al.*, 2009). Individuals high on conservation values are likely to focus on preserving their stability, safety, and traditions (Schwartz, 1992). Prior research indicates that individuals who display a strong need for security and conformity put more emphasis on peer recognition and group membership (Amaldoss and Jain, 2005). According to the dynamic group theory, one's sense of security can be achieved through group acceptance (Schein, 1988). This is in line with Bian and Forsythe's (2012) findings that individuals high in need of conformity ascribe more importance to social values than others. Social values will provide the individuals' required assurances and peer recognition, and group membership can help minimise the unexpected risks from the AR technology experience. AR technologies offer opportunities for consumers to reveal their group membership or demonstrate how they want to be perceived by other peers.

Conservation can be an individual difference variable that explains the attitudinal differences toward innovative technology (Han *et al.*, 2009). AR technology may bring challenges to conservative consumers who may consider the technologies familiar with enough. To persuade them to use AR technology, the technology itself must be sufficiently superior to the existing ones in that it dramatically changes their ways of living (Ishii *et al.*, 2007). McLean and Wilson (2019) suggest that vividness, interactivity, and novelty are AR-specific attributes. Such technology provides its consumers with distinctive and unique experiences so that conservative consumers are expected to perceive AR as fit to be used to enrich their visual experiences.

More importantly, Fischer (2013) claims that prior research focuses on the effects of a single value by excluding other values can produce misleading findings. Fischer (2013) further proposes that if the circumplex structure of value holds, "correlations between any value type and third variables should show a systematic pattern of increasing and decreasing correlations as we move around the value space" (p. 237). The sinusoid pattern suggests that any correlation with the third variable, such as the playful value in our study, decreases as one value orientation moves from one end to the other end of the circumplex. "This captures the extent to which the circular structure of values is present in a sample, and third variables follow this circumplex pattern of relationships". Therefore, we expect openness to change and conservation to influence the same AR values. The following hypotheses are proposed:

H2a – H2d. Conservation value orientation is related to (a) playful value, (b) social value, (c) usability value, and (d) visual appeal value associated with AR technology.

Individuals who rely on self-transcendence, which promotes benevolence and universalism as a guiding principle, tend to appreciate usability value. Roy *et al.* (2001) suggest that a less cognitively demanding interface signals the vendors' willingness to establish a mutually satisfying relationship. The importance of benevolence is also evinced in the context of employer-employee relationships (Tian and Sanchez, 2017). Employees often perceive leader benevolence as the extra reassurance, indicating that they will not be taken unfairly by their leader. Additionally, Flavián *et al.* (2006) claim that the degree of website usability perceived by the customers could also signal benevolence. Useable technology is interpreted as the desire to adjust to consumers' needs. As a result, the perceived usefulness of the AR technology can symbolise to what degree retailers care about the mutual relationship for those individuals who emphasise universalism and benevolence.

Prior research suggests that design aesthetics enhance consumers' trust in technology (Cyr *et al.*, 2008). Virtual experiences of the websites tend to influence one's purchase intention (Rosen and Purinton, 2004). According to Sarker and Wells (2003), the beauty of the website's aesthetics could be used to build consumers' trust. Without the physical touch and experience of the products, AR technology helps retailers create an immersive experience. Applying website design features to retailers' websites or mobile apps can be the most effective method of developing trust (Li and Yeh, 2010). Furthermore, Mcknight *et al.* (2002) claim that benevolence – which captures the degree to which the trustees feel empathy towards the trustor – affects the level of trust. Individuals who rely on benevolence as an important guiding principle in life are expected to value trust. We argue that trust in AR technology can be built through its visual appeals. In other words, visual appeals of AR technology could be used as a signal of trust. Despite the importance of visual appeals in developing trust, playful and social values could also be used as indicators of retailers' benevolence. Gefen and Straub (2004) and Hwang and Kim (2007) propose that customers' the perceived enjoyment and social needs influence consumers' trust in technology. Therefore, people with a high level of self-transcendence tend to appreciate AR technology's usability, and playful, social, and visual appeal values. Thus, we propose the following hypotheses:

H3a – H3d. Self-transcendence value orientation is related to (a) playful value, (b) social value, (c) usability value, and (d) visual appeal value associated with AR technology.

Consumers often use technologies to manage their self-representation (Strizhakova *et al.*, 2008). Social values in technology consumption reflect the symbolic meanings, social relationships, and consumer identity in their social group (Stathopoulou and Balabanis, 2019). Social values affect how consumers evaluate technology and reflect consumers' desire to use technology as a means to indicate group membership (De Valck *et al.*, 2009) and maintain social relationships with others in the social group (Kim *et al.*, 2011). Prior research suggests that the stronger a consumer's orientation toward self-enhancement values, the more likely they are to emphasise their self-interests and attain social superiority (Schwartz, 1992). Consumers may achieve self-enhancement by boosting self-esteem when interacting with social group members (Bagozzi and Lee, 2002). Technology consumption can be perceived as status consumption that individuals use to improve their social standing. To illustrate, Moore and Benbasat (1991) claim that playing a mobile AR game tends to be perceived to enhance their status in the social system. When consumers observe that the use of AR technology could create a positive image for others in the social groups, consumers may also attribute such a positive image to themself (Rauschnabel *et al.*, 2017). AR technology could be used by self-enhancement-oriented individuals to convey positive self-images, signal group membership, and improve their social standing.

Consumers often use the experiences they had to build and reinforce their self-concepts. Self-enhancement-oriented individuals often put great emphasis on positive self-images (Keinan and Kivetz, 2011). Digital technology could enhance one's image in others' eyes in the social group. Hedonism is perceived as a dimension of self-enhancement, and hedonic motivations drive these individuals' consumption choices. Pleasurable experiences can indicate one's success in achieving a positive ideal self (Uchida *et al.*, 2004). In a similar vein, Huang *et al.* (2013) provide further evidence that hedonic motivation plays a central role in Virtual Reality technology adoption.

Additionally, utility is one of the primary motivators of technology consumption (Barnard *et al.*, 2013; Lee and Coughlin, 2015). Self-enhancers would expect products to function as promised and expected (Ladhari *et al.*, 2011), and such expectation is high in technology consumption. Customers are expecting AR technology to showcase products and signify the brand's competence. Self-enhancers focus on personal achievement, social status, and superiority over others (Pepper *et al.*, 2009). These individuals may evaluate a brand competence depending on whether AR technology is fit for purpose and user-friendly. Finally, following Fischer's (2013) recommendations explained earlier, we would expect self-transcendence and self-enhancement to influence the same AR values. Thus, the following hypotheses are proposed:

H4a – H4d. Self-enhancement value orientation is related to (a) playful value, (b) social value, (c) usability value, and (d) visual appeal value associated with AR technology.

Matching customers' perceived value of a product or service often leads to customer satisfaction. The theory of consumption value assumes that customers' choice is a function of multiple consumption values. Such consumption values are being used as the basis upon which consumers decide their behavioural intention (Sirdeshmukh *et al.*, 2002). In the context of AR technology consumption, He *et al.* (2018) claim that the aesthetic design of AR-enabled museums influences visitors' experience. As one of the crucial elements of retail user experience, the aesthetic design of AR technology influences user satisfaction and willingness to buy (Poushneh and Vasquez-Parraga, 2017). AR technologies combine real and virtual environments that are interactive and useful in nature. Interactivity seems to determine the usability of technology (Lee *et al.*, 2015). For example, AR technology's usefulness and application for footwear customisation affect customer satisfaction (Jimeno-Morenilla *et al.*, 2013). Furthermore, Kim *et al.* (2011) highlight the role of digital technologies in supporting and maintaining customers' social relationships. Customers demonstrate favourable attitudes toward technologies, allowing individuals to confirm their group membership and self-identity (De Valck *et al.*, 2009; Kim *et al.*, 2011). Finally, prior research has shown that customer satisfaction often results from a playful experience (Kuo *et al.*, 2016). Perceived playfulness of digital items can enrich one's experience and enhance customer satisfaction (Kim *et al.*, 2011). Thus, we propose the following hypotheses:

H5. The playful value will positively influence customer satisfaction.

H6. Usability value will positively influence customer satisfaction.

H7. The social value will positively influence customer satisfaction.

H8. Visual appeal value will positively influence customer satisfaction.

3. Methodology

3.1 Measurement scales

The measurement items (Appendix) for all constructs were adapted from previous studies. AR technology value components, namely, *playful value*, *social* value, *usability* value, and

visual appeal value, were adopted from Turel *et al.* (2010). Human value orientation components, including openness to change, conservation, self-enhancement, and self-transcendence, are referred to Schwartz (2003). Measurement items of consumer satisfaction were borrowed from McLean and Osei-Frimpong (2017). We measured all items on a 7-point Likert-type scale.

3.2 Sampling and data collection

Our target population is the young UK consumers who have used retailers' AR technology and have gained insights from their AR shopping experiences. All participants were recruited from a reputed online consumer panel, Prolific Academic (Peer *et al.*, 2017). To confirm respondents had used the actual AR features, we employed a two-step data collection process. The first step was to approach general consumers to identify those who had used AR applications. First, our participants were informed that this academic research project looks at AR experiences daily as a customer. They were also informed that this survey remains strictly confidential and anonymous. As a result, 854 participants were recruited in step one, and 295 of them reported their previous usage of AR technology used by retailers. Some participants have experienced AR features from more than one retailer. Table 1 illustrates the list of retailers where participants have experienced AR features. We then invited the 295 participants to the second step of the main survey focusing on their experiences and value perceptions.

A sample of 258 completed responses was collected. Following James Gaskin's Data Screening method (Gaskin, 2016), five observations were identified as non-engaging cases. After the removal, 253 valid cases were used for the statistical analysis. Table 2 displays the descriptive profile of the respondents. Our sample is relatively young – e.g. about 42% in the 18–24 age group and about 36% in the 25–34 age group.

4. Analysis and results

We applied partial least squares and structural equation modelling (PLS-SEM) for the empirical analysis. PLS-SEM offers much greater flexibility than covariance-based structural equation modelling (CB-SEM), for instance, not assume normal distributions in the data; when the focus of research is predicting and exploring new conceptual relationships rather than testing theories; when the sample size is not large; allowing for testing more complex models (Hair *et al.*, 2016, 2020). These are the case in our research.

Table 1. Descriptive information for stage 1 data collection

Retailers' AR features	Frequency
eBay	69
Amazon	116
ASOS	41
IKEA	128
Delux Visualiser	13
L'OREAL smart mirror	21
Mister Spec virtual mirror	5
Ray-ban magic mirror	30
Benefit Cosmetics (Brow try-on)	11
Adidas	65
Levi's	19
Other shops not mentioned above (e.g. Pokemon go, Microsoft, Tourist attractions, Google)	47
Not experienced AR features	542

Indicator	Category	Frequency	Per cent
Age	18–24	105	42
	25–34	91	36
	35–44	43	17
	45–54	9	4
	55–64	5	2
Gender	Male	150	59
	Female	102	41
	I prefer not to say	1	0
Education	High school graduate	79	31
	College degree	50	20
	University degree	120	47
	No formal qualification	4	2
Use frequency	Less than once a month	153	60
	1–3 times per month	73	29
	4–6 times per month	16	7
	Over 7 times per month	11	4
Total		253	100

Table 2. Demographic characteristics of respondents

4.1 Analysis methods

We applied partial least squares structural equation modelling (PLS-SEM) for the empirical analysis. PLS-SEM offers much greater flexibility than covariance-based structural equation modelling (CB-SEM); for instance, easy to apply to solve complex relationships such as mediation and moderation models (Cao *et al.*, 2021), not assuming normal distributions in the data and allowing for small sample sizes and testing more complex models (Hair *et al.*, 2016, 2020), which are the case in our research. Furthermore, PLS-SEM is more applicable than the covariance-based SEM method when the research focuses on predicting and exploring new conceptual relationships, like this study, rather than testing theories (Richter *et al.*, 2016). Therefore, PLS-SEM was judged to be an appropriate choice for this study.

4.2 Measurement model analysis

First, we applied Harman's Single-Factor Test to detect common method bias (CMB) (Podsakoff *et al.*, 2003). The result indicated that the principal component extracted explained less than 22% of the variance of all 42 measured variables. This suggests that common method bias is unlikely to be a severe concern for this research (Podsakoff *et al.*, 2003).

We assessed the measurement model using confirmatory factor analysis suggested by Hair *et al.* (2020). Five items with loadings less than 0.6 were removed to achieve the reliability and validity of the measurement models. Five more items with loadings less than 0.7 were released to achieve the construct convergence indicated by the AVE value of over 0.50. Furthermore, two more items were removed due to cross-loading issues. As a result, nine measurement models are measured by 30 items, with a minimum of three items measuring each construct. Table 3 displays the results of construct reliability and convergent validity, including loadings, Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE). CA and CR values are all over the suggested threshold value of 0.7. Convergent validity of all constructs is satisfied as the AVE values range from 0.544 to 0.746, higher than the threshold value of 0.5.

Table 4 shows discriminant validity. All heterotrait-monotrait ratios (HTMT), ranging from 0.102 to 0.712, are lower than the suggested value, 0.85 (Hair *et al.*, 2016), indicating satisfactory discriminant validity of the constructs.

Construct	Item	Loading	CA	AVE	CR
Openness to change (OC)	OC1	0.730	0.708	0.533	0.820
	OC2	0.729			
	OC3	0.749			
	OC4	0.710			
Conservation (Con)	Con1	0.791	0.721	0.555	0.826
	Con2	0.730			
	Con4	0.706			
	Con6	0.719			
Self-transcendence (ST)	ST1	0.730	0.711	0.632	0.837
	ST2	0.810			
	ST4	0.841			
Self-enhancement (SE)	SE1	0.810	0.710	0.628	0.835
	SE2	0.784			
	SE4	0.784			
Usability value (UV)	UV1	0.813	0.887	0.689	0.917
	UV2	0.847			
	UV3	0.832			
	UV4	0.844			
	UV5	0.815			
Playful value (PV)	PV5	0.764	0.826	0.659	0.885
	PV6	0.781			
	PV7	0.857			
	PV8	0.841			
Social value (SV)	SV1	0.910	0.918	0.802	0.942
	SV2	0.918			
	SV3	0.864			
	SV4	0.889			
Visual appeal value (VAV)	VAV1	0.862	0.831	0.746	0.898
	VAV2	0.879			
	VAV3	0.850			
Customer satisfaction (CS)	CS1	0.836	0.810	0.724	0.887
	CS2	0.871			
	CS3	0.846			

Table 3. Construct reliability and convergent

	1	2	3	4	5	6	7	8	9
1 Conservation	*0.737*								
2 Customer Satisfaction	0.217	*0.851*							
3 Openness to change	0.159	0.142	*0.730*						
4 Playful value	0.180	0.632	0.273	*0.812*					
5 Self-enhancement	0.365	0.140	0.471	0.106	*0.793*				
6 Self-transcendence	0.466	0.204	0.573	0.164	0.158	*0.795*			
7 Social value	0.121	0.383	0.102	0.379	0.289	0.073	*0.895*		
8 Usability value	0.327	0.622	0.096	0.503	0.255	0.200	0.426	*0.830*	
9 Visual appeal value	0.173	0.688	0.301	0.712	0.152	0.323	0.393	0.540	*0.864*

Note(s): Diagonal shows square roots of the AVE values

Table 4. Discriminant validity (heterotrait-monotrait ratio [HTMT])

4.3 Structural model analysis

The hypothesised model was estimated using SmartPLS3 with a bootstrap re-sampling procedure using 5,000 sub-samples, which were randomly generated in the analysis process (Hair *et al.*, 2020). Table 5 reports the results, including path coefficients and their significance indicators – i.e. t values. Three AR value components – *usability value*, *playful value*, and *visual*

Paths	Coefficients	*t* Statistics	Results
H1a: Openness to change - > Playful value	0.227**	3.328	Supported
H1b: Openness to change - > Social value	−0.018	0.211	Rejected
H1c: Openness to change- > Usability value	−0.128	1.755	Rejected
H1d: Openness to change- > Visual appeal value	0.144*	2.302	Supported
H2a: Conservation - > Playful value	0.139	1.933	Rejected
H2b: Conservation - > Social value	0.060	0.793	Rejected
H2c: Conservation - > Usability value	0.175*	2.377	Supported
H2d: Conservation - > Visual appeal value	0.063	1.004	Rejected
H3a: Self-transcendence - > Playful value	−0.005	0.776	Rejected
H3b: Self-transcendence - > Social Value	−0.097	1.387	Rejected
H3c: Self-transcendence - > Usability value	0.140	1.933	Rejected
H3d: Self-transcendence - > Visual appeal value	0.178**	2.766	Supported
H4a: Self-Enhancement - > Playful Value	−0.074	1.043	Rejected
H4b: Self-enhancement - > Social value	0.238***	3.730	Supported
H4c: Self-enhancement - > Usability value	0.192**	2.791	Supported
H4d: Self-enhancement - > Visual appeal value	0.041	0.587	Rejected
H5: Usability value - > Customer satisfaction	0.280***	4.194	Supported
H6: Playful value - > Customer satisfaction	0.203**	3.114	Supported
H7: Social value - > Customer satisfaction	0.053	0.946	Rejected
H8: Visual appeal value - > Customer satisfaction	0.308***	4.466	Supported

Note(s): Model fit summary: SRMR = 0.068; NFI = 0.716. *p <0.05 (two-tailed); **p <0.01 (two-tailed); ***p <0.001 (two-tailed)

Table 5. Structural model results

appeal value – are the direct predictors of *customer satisfaction (H5, H6, H8)*. However, there is no evidence supporting the direct effect of *social value* on *customer satisfaction* (H7). Among the four value orientation variables, the significant antecedents include *openness to change* (- > *playful value*: $\beta = 0.227$, $t = 3.328$; - > visual appeal value: $\beta = 0.144$, $t = 2.302$), *conservation* (- > *usability value*: $\beta = 0.175$, $t = 2.377$), *self-transcendence* (- > *visual appeal value*: $\beta = 0.178$, $t = 2.766$), and *self-enhancement* (- > *social value:* $\beta = 0.238$, $t = 3.730$; - > *usability value*: $\beta = 0.192$, $t = 2.791$). Therefore, H1(a), H1(d), H2(c), H3(d), H4(b), H4(c), H5, H6, and H8 are supported.

R square values indicate the predictive ability of a model, indicating how well endogenous variables can be explained and predicted by the model. However, it should be noted that they are considered in-sample predictive metrics but not inferred from the population (Hair *et al.*, 2019). The R square results suggest that the model can predict about 45% of the variance of customer satisfaction.

5. Discussion

5.1 Key findings

Drawing on human value orientation theory (Schwartz, 1992) and consumption value theory (Sheth *et al.*, 1991), our research findings suggest that openness to change-oriented customers appreciate AR technology's playful value and visual appeal value. Thus, H1(a) and H1(d) are supported. In contrast, conservation-oriented customers only emphasise the usability value of AR technology. Thus, H2(c) is supported. Our findings also reveal that self-transcendence-oriented consumers only appreciate the visual appeal value of AR technology whereas those who are self-enhancement-oriented appreciate both social value and usability value. Therefore, H3(d), H4(b), and H4(c) are supported. Finally, the research findings identify positive relationships between usability, playful value, visual appeal value, and customer satisfaction. Hence, H5, H6, and H8 are supported.

5.2 Theoretical contributions

This research contributes to the existing literature on AR technology. First, a key contribution of this research relates to the unique theoretical lens that it employs in examining customer satisfaction behavioural for AR technology. Incorporating human value orientation theory (Schwartz, 1992), this research improves our understanding of customer satisfaction with AR technology used by retailers. While it is important to understand the impacts of perceived technology values, examining how individual value orientations influence the degree of importance of a specific perceived AR value is also crucial. Therefore, building on earlier research in AR technology experiences, we propose a new model that includes human value orientations, perceived technology values, and customer satisfaction. While extant literature on value orientations compares openness to change with conservation or compares self-enhancement with self-transcendence (McLean and Wilson, 2019; Stathopoulou and Balabanis, 2019) Fischer (2013) further claims that "correlations between any value type and third variables should show a systematic pattern of increasing and decreasing correlations as we move around the value space" (p. 237). A logical extension would allow us to assume that the same value orientations would affect the same perceived AR technology value. However, contrary to our intuitive logic, this research shows that each value orientation is associated with its distinctive AR values, indicating the importance of a unique perceived AR value for a selected consumer group or market segment. Accordingly, openness to change-oriented consumers tend to appreciate the playful value and the visual appeal value. This may be because individuals who adopt openness to change as a guiding principle often pursue playful consumption (Aroean, 2012). Their willingness to use new technologies often leads to joyful experiences (Hur *et al.*, 2017). Furthermore, openness to change-oriented individuals focus on individuality and how products help them demonstrate their thoughts (Pepper *et al.*, 2009). AR technology may allow these customers to demonstrate technical competence and explore novel ideas through joyful and rich sensory consumption. Interestingly, conservation sits opposite the value circumplex to openness to change. The findings suggest that conservative consumers only emphasise the usability value. Consistent with Ishii *et al.* (2007), conservative consumers often engage with new technologies when their functions are sufficiently superior to the existing ones.

Furthermore, our research extends Bardi and Schwartz's (2003) human value orientation theory by challenging its assumption that the paired value orientations (e.g. self-transcendence vs self-enhancement) are motivationally conflicting. Our results show that self-enhancement positively influences usability and social value, whereas self-transcendence positively impacts the visual appeal value. Self-enhancement-oriented consumers are expected to emphasise positive self-images (Keinan and Kivetz, 2011). One way to achieve such positive self-images is through more proactive consumer participation with efficient information processing, resulting in a more incredible experience of usability (Coursaris *et al.*, 2012). When customers observe that the aesthetic features of AR technology could be used to create a positive image for others in the social groups, customers may also attribute such a positive image to themselves (Rauschnabel *et al.*, 2017). In contrast to our intuitive thinking, individuals who are expected to focus on one's welfare, supporting others, and social justice (Schwartz, 1992) put a great level of emphasis on the visual appeal value. Li and Yeh (2010) suggest that retailers' website visual design features are among the most effective for developing trust. The visual design of websites/apps signifies trust, reflecting the key guiding principle in life that self-transcendent-oriented consumers use.

Moreover, our research advances the consumption value theory by identifying the unique AR-specific values that influence customer satisfaction in the retail sector. Such findings seem contradictory to Rauschnabel *et al.* (2017) and Kim *et al.* (2011). They highlight how individuals perceive technology consumption as status consumption to improve their social standing.

Furthermore, Turel *et al.* (2010) propose visual appeal value, social value, playful value, and value for money for hedonic digital technology. Usability is important in the organisational application context (Siamagka *et al.*, 2015), and playfulness is important in the usage intention of AR technology (Han *et al.*, 2020). The importance of technology associated consumption values seems to vary according to the specific technology used and the context in which the technology is applied.

Notwithstanding the effects of technology values on customer satisfaction, such effects seem inconclusive. We provide a theoretical rationale for examining the impacts of AR technology values in the retail sector. To illustrate, usability, playful, and visual appeal significantly influence customer satisfaction. However, social value does not link to satisfaction. Such finding contradicts Verma and Sinha (2018), who identify the significant role of perceived social value on customer satisfaction and technology adoption attached to general technology (e.g. SMS, mobile applications); our research suggests that social value has an insignificant impact on customer satisfaction. Similarly, Yim and Park (2019) propose that the customers' evaluation of body image influences their evaluation of AR technology. Such contradicting results indicate that social value is potentially a multidimensional construct, and we only focused on how usage of AR technology helps reflect one's social self-image representation. Future research may explore other dimensions - social relationship support, which captures how digital items can help form, maintain, and enhance interpersonal relationships (Kim *et al.*, 2011). Despite the popularity of AR technology, only 25% of the world's population is using it (Statista, 2021). Conservative customers may not necessarily associate AR technology with strong symbolic meanings and use such technology consumption to indicate one's social groups (Stathopoulou and Balabanis, 2019)

5.3 Practical implications

This study has several implications for retail brands and AR application developers as they improve their understanding of the critical determinants of customer satisfaction. Given that retail brands have adopted these applications to offer customers a more personalised experience and save cost, it is important to find ways to increase customer satisfaction, leading to continuous usage of these applications.

First, our results demonstrate that retailers aspiring to deliver a compelling customer experience of AR applications should understand the important role of value orientations in shaping one's attitudes. Retail brand managers ought to communicate the benefits of AR technology to their target consumer segments, outlining the appropriate perceived AR values. Retail managers can adjust their marketing communications to match target consumers' value orientation to deliver customised services due to the high level of congruency. Specifically, retail brand managers should tailor their marketing communication strategies to activate one's value orientation to match customers' preferred AR values to improve customer satisfaction. For example, managers can highlight the lifestyle of being creative, always looking for new things in life first, and then promote the playful value of AR technology or how AR technology enriches one's sensory experience for openness to change-oriented and self-transcendence-oriented customers. In a similar vein, managers should emphasize the usability value by communicating the characteristics of AR technology, such as the degree of interactivity and navigation experience to conservative and self-enhancement-oriented customers.

To understand the consumer segment's value orientation, we recommend retailers conduct short surveys that identify their target consumers' value orientation and highlight the appropriate AR technology value they appreciate the most in their communications to those target consumers. Furthermore, another way to understand one's value orientation is to

use artificial intelligence and machine learning to complement retailers' AR technologies when delivering a compelling customer experience. Retail brand managers can rely on artificial intelligence and machine learning to"guess" a customer's value orientation based on the language used by the customer in their messages with the brand. For example, computers can be programmed to highlight relevant AR values to the different customer "value orientations" to improve customer experience. Retail brands should emphasise the playful feature of their brands to customers who relish openness to change values. In contrast, conservation-oriented customers also appreciate the usability value of AR technology used by retailers. Furthermore, self-enhancement and self-transcendence values can provide a promising segmentation. Therefore, retail managers should promote the visual appeal value to self-transcendence-oriented customers and emphasise the social value of AR technology to self-enhancement-oriented customers. Stressing the importance of benevolence (e.g. helpfulness, honesty, and loyalty) and achievement values (e.g. competence, ambition, and individual accomplishment) in using AR applications may positively influence customer satisfaction.

Additionally, retail brand managers should be aware that not all perceived AR values will increase customer satisfaction and WOM intention. Except for social value, enjoyment, usability, and visual appeal, values seem to contribute positively to customer satisfaction for all customer groups. While acknowledging that AR app allows retailers to showcase new products, emphasising how using AR app improves the way customers look and make a good impression on other people can backfire as it may not contribute to customer satisfaction.

5.4 Limitations and future research directions

This research investigates the effects of human value orientations and technology values on customer satisfaction in the retail industry. The importance of individuals' value orientation may differ across different products type (Fam *et al.*, 2013). Future research may replicate the research findings in other industries, such as the service industry. Furthermore, values can be prone to social influence (Bardi and Schwartz, 2003) and can be cognitively activated to influence behaviour. Future studies can employ the experimental method to prime one's value orientation and examine its causal effect on customer satisfaction. Additionally, Boer and Fischer (2013) examine cultural differences in value orientations. Future research may investigate whether perceived technology value varies across different cultures. For example, East Asians often emphasise interdependence and conformity. Therefore, social values may be more important to them than to Westerners. In addition, our study only focuses on customer satisfaction of AR technology users; thus, it is limited to participants who have experienced the use of AR offered by retail brands previously. Hence, our findings cannot be generalised to non-users of this technology. Future studies can collect data from non-users and compare the findings. Furthermore, similar to other studies, this study is based on self-reporting, possibly affecting the results. Finally, our research focused on the general AR applications in the retail sector. Future studies can adopt our proposed model and apply it to specific types of AR applications used by various retailers and identify whether AR technology type is a moderator.

6. Conclusion

Our research shows that customer value orientation determines which AR technology value they appreciate the most and highlights the significant effects of AR technology values on customer satisfaction. The target customer segment's value orientation should be considered when retailers design and implement AR technology on their websites/apps.

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Appendix
Constructs and measurement items

Constructs	Measurement items	Mean/SD
Openness to change	He likes surprises and is always looking for new things to do. He thinks it is important to do lots of different things in life	5.27/1.30
	Thinking up new ideas and being creative is important to him. He likes to do things in his own original way	5.08/1.32
	It is important to him to make his own decisions about what he does. He likes to be free and not depend on others	5.76/1.12
	He looks for adventures and likes to take risks. He wants to have an exciting life	5.16/1.16
Conservation	It is important to him to live in secure surroundings. He avoids anything that might endanger his safety	5.00/1.32
	It is important to him that the government ensures his safety against all threats. He wants the state to be strong so it can defend its citizens	4.89/1.29
	It is important to him always to behave properly. He wants to avoid doing anything people would say is wrong	4.70/1.27
	Tradition is important to him. He tries to follow the customs headed down by his religion or his family	5.0/1.35
Self-Transcendence	It is important to him to help the people around him. He wants to care for their well-being	5.61/1.16
	He thinks it is important that every person in the world should be treated equally. He believes everyone should have equal opportunities in life	5.82/1.24
	He strongly believes that people should care for nature. Looking after the environment is important to him	5.76/1.19
Self-Enhancement	It is important to him to show his abilities. He wants people to admire what he does	4.98/1.38
	Being very successful is important to him. He hopes people will recognize his achievements	4.92/1.53
	It is important to him to get respect from others. He wants people to do what he says	4.60/1.46

(*continued*)

Constructs	Measurement items	Mean/SD
Usability Value	Using the AR features on the app/websites enables me to accomplish shopping tasks more quickly	4.66/1.36
	Using the AR feature on the app/websites enhances my shopping performance	4.94/1.31
	Using the AR feature on the app/websites increases my shopping productivity	4.58/1.37
	Using the AR feature on the app/websites increases my shopping productivity	4.74/1.33
	Using the AR feature on the app/website would make it easier to shop	5.17/1.31
Playful Value	The AR feature on the app/website makes me want to use them	4.95/1.14
	I feel relaxed about using the AR feature on the app/website	4.83/1.25
	The use of the AR feature on the app/website makes me feel good	4.67/1.20
	The use of the AR feature on the app/website gives me pleasure	4.54/1.22
Social Value	The use of the AR feature on the app/website helps me feel accepted by peers	3.48/1.41
	The use of the AR feature on the app/website improves the way I am perceived	3.58/1.61
	I use the AR feature on the app/website to make a good impression on other people	3.65/1.57
	The use of the AR feature on the app/website gives me social approval	3.35/1.57
Visual Appeal Value	The AR feature on the app/website is attractive	5.23/1.02
	The AR feature on the app/website is appealing	5.20/1.05
	I like the way the AR feature is	5.27/1.09
Customer Satisfaction	Overall, I was satisfied with my experience	5.60/0.96
	The experience is precisely what I needed	4.79/1.23
	The experience has worked out as well as I thought it would	5.21/1.12

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