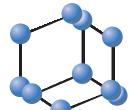


## RESEARCH ARTICLE

BENTHAM  
SCIENCE

## Exploring the Reality behind Augmented Reality Applications in Retailing: The Role of Value Orientation and Use Frequency

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**Abstract:** **Background:** Augmented reality (AR) technology has altered the retail business while also improving the shopping experience. Several studies have been conducted to investigate the factors that influence the relevance of perceived AR technology values, as well as how these values influence customer enjoyment and the desire to spread good word of mouth (WOM). This study explores how the perceived value of AR affects customer satisfaction, enjoyment, and recommendations.

**Objective:** This study aimed to examine how the usage frequency moderates the associations between human value orientation and perceived AR values, as well as the correlations between valued AR and satisfaction and positive WOM intention. It studies the relationship between perceived AR values and consumer happiness, as well as the influence of human value orientation on perceived AR values (receptivity to change, preservation of resources, self-improvement, and transcendence of oneself) (playful, social, aesthetic appeal, and usability).

**Methods:** This research extends the human value orientation theory by proposing a novel model for the link between AR value orientation and usage frequency. To obtain data, a survey was distributed to those who have engaged with retail AR features.

**Results:** Contrary to popular belief, the data demonstrate that a certain group of perceived AR values is linked to each value orientation, emphasizing the significance of a certain perceived AR value in affecting customer satisfaction and positive WOM intention. This study shows that usage frequency moderates the associations between human value orientation and perceived AR values, as well as the correlations between valued AR and satisfaction and positive WOM intention. It also shows that consumer value orientation is the most essential aspect in choosing which AR technology advantage they value most. AR technology values also affect consumer satisfaction and word-of-mouth marketing (WOM).

**Conclusion:** The value orientation of an individual influences the value of augmented reality technology, which may vary depending on the frequency of usage. This paper concludes with suggestions for merchants regarding augmented reality technology. Moreover, the precise number of applications that can be made available to customers and retailers is determined by this study, which benefits both retailers and researchers.

**Keywords:** Augmented reality, word-of-mouth (WOM), customer satisfaction, value orientation, technology value, use frequency.

### 1. INTRODUCTION

Augmented reality (AR) connects the virtual and physical worlds [1]. The global augmented reality industry was estimated to be worth \$18 billion by 2023. AR is a kind of media in which digital information is superimposed on the actual environment in real time. Also, a vibrant subject of study

is artificial neural networks (ANN) [2, 3]. Before making a purchase, customers may explore things online and interact with them using augmented reality (AR) [4]. Retailers are using more augmented reality to gain a competitive edge by offering an engaging shopping experience to customers. Customers may try on different items and see how they will appear by using Ray-Ban magic mirrors, the IKEA Place app, and the L'Oréal Makeup Genius app, for instance [5].

Augmented reality (AR) technology [6] provides merchants with a new approach to engaging and interacting with

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consumers. It also encourages optimistic attitudes [7]. Prior studies have mainly focused on how technological features influence customer pleasure [8, 9]. According to previous studies [10, 11], the level of satisfaction of consumers with the mobile and social networking services given by the merchant is influenced by their perceptions of several features of the technology, such as the amount of fun, interaction, and ease of use. According to another study [6], in businesses that use augmented reality technology, the satisfaction of customers and their desire to use the technology depends on how easy it is considered to use, how beneficial it is, and how pleasurable it is, based on subjective technological standards [12]. The quality of the augmented reality content, the quality of the augmented reality system, and the quality of the augmented reality personalized service each play a part in determining customer satisfaction and the desire to spread positive word-of-mouth. When investigating the repercussions of technical features, some researchers categorize certain traits depending on their perceived technological significance. According to a study [13], values may be broken down into three categories: emotional (as shown by playfulness), functional (as seen by price utility), and social (as indicated by the ability to express one's own self-image). Regardless of the importance of AR qualities and the perceived values associated with these traits, there is no agreement on which AR feature is more relevant for a certain client category. In other words, it is unknown which AR value would be most beneficial to customers.

Such perplexing outcomes may be, in part, due to a person's value orientation, the primary individual difference variable. There has been little research on the impact of precise differences in attributes on customer satisfaction and positive WOM intention about the usage of AR technology. This research gap must be filled for firms to successfully provide services to a target group whose members value a specific AR technology value [14]. According to previous studies [15, 16], different individuals place more or less emphasis on value orientation. Putting the customer first and focusing on what they value greatly influences consumer choices [13]. Buyers in a luxury environment use a range of elements to analyze and choose which items to acquire [17]. Customers who prioritize self-improvement tend to choose usefulness in luxury things, according to the human value orientation theory [16, 15]. This study examines how augmented reality values affect consumer satisfaction and word-of-mouth intention. Furthermore, the amount of technology utilized has an influence on customer satisfaction since when a significant amount of technology is used, one's expectations are likely to be surpassed [18, 19]. As a result, this study investigates how usage frequency affects the link between human value orientation and AR technology values.

This paper demonstrates significant improvements in theory and applications. By expanding the human value orientation theory, this research provides a novel model of AR value orientation and usage frequency. Second, our findings contribute to a better understanding of how customers interact with augmented reality technologies utilized by merchants. Third, by stressing the essential moderating functions of use frequency, our research investigates whether use frequency modifies both the link between perceived AR values and satisfaction/positive WOM intention, as well as the im-

pacts of value orientation on perceived AR values. The results of this study also yield vital advice for merchants developing and deploying augmented reality (AR) technology to increase customer satisfaction and positive word-of-mouth (WOM) intention.

### 1.1. Conceptual Model

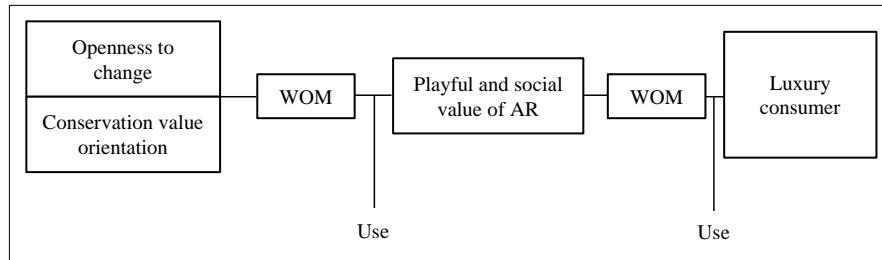
Consumer value theory [20] and human value orientation underpin this study [15]. This research is based on consumer value theory [20] and human value orientation [15]. Fig. (1) demonstrates how human values affect AR value perceptions, which in turn influences customer satisfaction and word-of-mouth intention. AR value perceptions are categorized into usability, play value, social worth, and visual appeal.

For instance, the suggested model explores how consumers' conservatism and willingness to change perspectives impact the relevance of AR technology's entertainment and social value. It also evaluates how self-improvement and self-transcendence affect utility and aesthetic beauty. Customer value orientation strongly influences luxury purchasing, pro-environmental consumer behaviour, vacation selections, and fashion garment purchases [17, 21, 22]. It is uncertain which of the many perceived technical values [13, 23] has the most significant influence on customer satisfaction and the desire to promote good word of mouth about a product or service within a particular consumer category. However, use frequency is often seen as a more reliable indicator of a person's technical competence and customer service experience [24, 25]. Thus, this study evaluates the relationship between values that exist in AR, levels of customer satisfaction and good WOM intention, and an orientation toward human values. Further, background information on the hypotheses produced throughout this investigation is provided in the following subsections.

### 1.2. Openness to Change, Playful Value, and Social Value

The use of AR technology influences customer interactions with merchants. Interaction influences how the users of augmented reality systems feel [6]. People who are adaptable in their brain processes and responses to new stimuli are more likely to find novelty appealing [26]. These people like seeing and developing new viewpoints and innovative ideas. Consumers who are open to change, according to a study [27], seek out joyful consumption because it helps them respect uniqueness and innovation. Furthermore, according to other studies [28, 29], people who are receptive to new technological developments often have a positive outlook on life and an interest in technology. Thus, open-minded people may like new technology.

Customers who are receptive to change may seek out unique and inventive methods to socially engage with other group members. According to a study [30], augmented reality technology improves client contact with cultural assets. According to another study [31], augmented reality may be an effective tool for eliminating racial prejudice and building cultural tolerance. Furthermore, a person's value orientation might actively impact the way they show themselves. People with more open minds are more adaptable to their identities than those with less open minds [32]. Similarly, people who



**Fig. (1).** Proposed research model.

prioritize adaptability are more likely to create complex social identities [33]. It is expected that adaptable people will realize the societal benefits of AR technology. In other words, the impact of fun and social value on consumer satisfaction and enjoyment is significant. In addition, the goal of WOM for merchants using augmented reality technology is determined by their agility and value focus.

### 1.3. Conservation, Playful Value, and Social Value

Conservation, an individual difference variable, may explain variations in attitudes toward progressive technologies [34]. Conservative clients who prefer established technologies may find AR difficult. To persuade people to utilize it, the technology must be considerably better than what is available now, which can significantly alter their way of life [35]. Augmented reality, according to a study [6], is characterized by its vividness, interaction, and novelty. To convince sceptics that augmented reality is acceptable for improving their visual experiences and enabling their connections with businesses, this technology must provide users with unexpected encounters. Conservation mostly opposes the benefit of being resistant to change [15]. Since both orientations are pushed in opposite directions, it is predicted that they will have varying degrees of influence on the same AR values (e.g., [17]).

Furthermore, security and conformity seekers appreciate peer approval and group engagement more, according to research [36]. In dynamic group theory, group acceptance may increase one's feeling of security [37]. This is consistent with the findings of another study [38], which observed that people with a high desire for conformity place a higher priority on social values than other people. Individuals will get the guarantees they need from social ideals, and peer acceptance and group involvement may assist in mitigating any hazards associated with the usage of augmented reality technology. Customers may use augmented reality technology to determine their group relationships. Furthermore, the adoption of new technology is influenced by societal conformity expectations [1]. As a result, it is logical to assume that conservatives who see augmented reality technologies as socially acceptable are more likely to utilize them. These people may believe that employing AR technology would help them fit in and blend in.

### 1.4. The Moderating Effects of Use Frequency

One's behaviour seems to affect one's technology usage [39]. It is logical to assume that regular technology users value the apparent benefits of its usage. Using technology

results in computer-mediated interactions that help clients satisfy their requirements [40]. Moreover, it was found that frequent Facebook users had higher narcissism ratings than infrequent users [41]. Regular Twitter users are more likely to broadcast information about themselves than less regular Twitter users, who prefer to share information about others [42]. Since consumer value orientation may limit the sorts of demands that may be satisfied with AR technology, we suggest that usage frequency moderates the influence of value orientation on perceived AR values. As a result, the following assertion is made:

The influence of value orientation on how users perceive the value of augmented reality is mitigated by frequency of use. Customer pleasure is moderated by use frequency and perceived AR values. Additionally, the use frequency affects good WOM intention.

## 2. METHODOLOGY

### 2.1. Measurement Scales

Based on past research, all measuring items for each construct were changed [23]. The components of AR technology were extracted, including fun, social, practical, and artistic worth. Change, preservation of resources, personal development, and transcending one's limitations are all aspects of the human value orientation, according to a study [43]. The customer satisfaction evaluation items and WOM intention scales were presented by previous studies [44, 45].

### 2.2. Sampling and Data Collection

Our target market consisted of Iraqi customers who have benefited from augmented reality technology and augmented reality purchasing experiences provided by retailers. Prolific Academic, a reputable online consumer panel, was used to select all participants. We devised a two-step data collection method to guarantee that respondents used the augmented reality elements. The first step in identifying folks who have utilized AR apps was to contact ordinary people. First, we made it clear to our participants that the purpose of this academic research is to investigate augmented reality experiences in the context of consumers' everyday lives. They were also made aware of the strict confidentiality and anonymity of the survey. As a result, 854 people were recruited in step one, with 420 having previous expertise with AR technology used by stores. Moreover, some participants made extensive use of shop AR features. Table 1 shows the locations where participants employed augmented reality. While Table 2 shows the respondent demographics.

**Table 1.** Initial data collection of descriptive data.

| AR Features Offered by the Retailers | Intensity |
|--------------------------------------|-----------|
| Alibaba                              | 69        |
| ALISON                               | 116       |
| Ocean Network Express                | 41        |
| Ebay                                 | 128       |
| Jumia                                | 13        |
| Etsy                                 | 21        |
| ShopNBC                              | 5         |
| NIKE                                 | 30        |
| SOUQ.com                             | 11        |
| Not experienced AR features          | 542       |

### 3. RESULT AND DISCUSSION

#### 3.1. Analysis and Results

For the empirical research, we employed partial least squares-structural equation modelling (PLS-SEM). Covariance-based structural equation modelling is less flexible (CB-SEM), enabling the testing of more complex models, as in our study, with less stringent requirements in larger sample sizes [46]. CMB was detected using Harman's Single-Factor Test. Only 25% of the 48 variables were explained by the extracted significant component. This implies that the study was devoid of procedural bias.

The statistical analysis was carried out in three stages. We moved on to the structural model after confirming the measurement model. In the third phase, we studied numerous

groups to determine the distinctions between AR user/consumer groups. During the analysis phase, the hypothesized model was estimated using SmartPLS3 with 5000 randomly generated sub-samples using a bootstrap re-sampling technique [46].

#### 3.2. Measurement Model Analysis

We initially assessed the normality of the dataset's distribution using descriptive statistics, such as skewness, kurtosis, mean, and standard deviation. Kurtosis varied from -4.5452 to 6.4444, while skewness ranged from -2.011 to 2.761. Furthermore, the confirmatory factor analysis of Hair *et al.* was employed. The concept reliability, convergent validity, and loadings to evaluate the measurement model (2020) are shown in Table 3. (AVE). Cronbach's alpha ranged from 0.784 to 6.02, whereas CR ranged from 0.762 to 6.06. Since AVE values varied between 1.39 and 1.36, which are more than the criterion value of 0.9, convergent validity was met for all aspects except adaptability. The nine loadings, ranging from 1.66 to 1.76, showed a lower AVE (1.05) for the concept of changeability. Cronbach's Alpha (1.552) and CR showed that the construct was still reliable. Thus, we moved on to the next step of inquiry (1.548). The descriptive statistics for the measurement items are shown in Table 3.

Table 4 displays differentiability values. All Heterotrait-Monotrait ratios (HTMT), ranging from 0.784 to 0.992, are lower than the suggested value [47], suggesting a differentiability value.

R square values measure a model's predictive ability. They are notable for being predictive in-sample markers, but they cannot be generalized to the population [46]. According to the R-squared value, the model can predict around 76% of the variation in positive WOM intention and 44% of customer satisfaction.

**Table 2.** Respondent demographics.

| -         | Category  | Frequency | Percentage |
|-----------|---|-----------|------------|
| Age       | Under 15  | 212       | 5.6        |
|           | 16-31   | 106       | 12.3       |
|           | 32-47   | 98        | 8.2        |
|           | 48-63   | 4         | 1.5        |
| Gender    | Male  | 242       | 16.9       |
|           | Female  | 178       | 13.7       |
| Education | Completed primary school                          | 93        | 7.8        |
|           | Completed intermediate school                     | 60        | 5.2        |
|           | Completed high school,                            | 128       | 9.3        |
|           | Bachelor's Degree                                 | 133       | 11.7       |
|           | A degree from an accredited college or university | 78        | 6.3        |
|           | Uncertified                                       | 4         | 1.5        |
| Total     | -   | 420       | 100        |

**Table 3. Measurement items, loading, mean, standard deviation, and reliability.**

|  |     |  |       |                 |       |       |
|--|-----|--|-------|-----------------|-------|-------|
| Availability Value                               | AV1 | Using augmented reality makes my shopping experience better. | 0.770 | 6.02/1.34 0.784 | 6.02  |       |
|  | AV3 | AR boosts my shopping efficiency.                            | 0.762 | 6.07/1.39       |       |       |
|  | AV5 | AR makes my purchasing more efficient.                       | 0.758 | 6.02/1.36       |       |       |
|  | AV7 | AR on the app/website makes shopping simpler.                | 0.784 | 5.16/1.34       |       |       |
| Amusing Value (AV)                               | AV1 | AR on the app/website is fun.                                | 0.944 | 6.54/3.09 0.944 | 0.929 | 0.961 |
| (Bhattacherjee, 2001; Kaur <i>et al.</i> , 2018) | AV3 | AR encourages me to want to utilize the app/website.         | 0.961 | 6.55/3.00       | -     | -     |
| -  | AV5 | I'm comfortable utilizing the app/AR. website's              | 0.996 | 6.13/3.298      | -     | -     |
| -  | AV7 | I enjoy AR on apps/websites.                                 | 0.992 | 6.06/3.76       | -     | -     |
| Friendly Value (FV)                              | FV1 | AR on the app/website makes me feel welcomed by my peers.    | 0.914 | 3.48/1.43 0.943 | 0.806 | 0.920 |
| (Bhattacherjee, 2001;                            | FV3 | App/website AR usage enhances my image.                      | 0.917 | 3.59/1.63       | -     | -     |
| -  | FV5 | Using the app/AR website's functionality impresses others.   | 0.870 | 3.66/1.58       | -     | -     |
| -  | FV7 | AR on the app/website makes me famous.                       | 0.891 | 3.36/1.58       | -     | -     |

**Table 4. Differentiability (Heterotrait-monotrait ratio, HTMT).**

| -                  | 1     | 3     | 5     | 7     |
|--------------------|-------|-------|-------|-------|
| Availability Value | 0.770 | 0.762 | 0.762 | 0.784 |
| Amusing Value      | 0.944 | 0.961 | 0.996 | 0.992 |
| Friendly Value     | 0.914 | 0.917 | 0.870 | 0.891 |

### 3.3. Multi-group Analysis of AR Frequency of Use

According to research, previous experiences may impact consumer satisfaction and positive WOM intention. In this context, we referred to usage frequency as the frequency with which customers interact with augmented reality (AR) features as a reflection of their previous experiences. We investigated the moderating effects of use frequency on (1) the relationship between human value orientations and perceived AR values and (2) explored consumer group differences in customer satisfaction, positive word-of-mouth intention, and perceived AR value.

Furthermore, there are two options available. The researchers can build two models in multiple group analysis (MGA): A confined model (where route values must be the same across all groups) and an unconstrained model.

A model comparison technique is used to identify any path that differs across groups between restricted and unconstrained models. Unlike MGA, a moderated regression model allows researchers to include additional paths indicating interaction effects inside a single model. In addition, multi-

ple-group analysis examines the structural variations in how variables are linked to consumer groups in more depth. Therefore, researchers must express interaction effects inside a single model using several pathways in moderated regression. MGA allows for the identification of a variety of variations across study model groups, including impact magnitudes, negative or positive effect directions, and effect significance. In contrast, the single moderated regression model investigates whether the moderating variable may increase or decrease the direct effect of the predicted association.

## CONCLUSION

Our study shows that consumer value orientation is the most essential aspect in choosing which AR technology advantage they value most. AR technology values also affect consumer satisfaction and word-of-mouth marketing (WOM). Businesses should consider target market value orientation while building and integrating augmented reality technologies on their websites and mobile apps. This study also sheds light on the impact of frequency of use on the connection between the values of customers and the values

of AR, as well as the relationship between perceived AR values and customer satisfaction and positive WOM intention. Our findings provide insights into how the value orientation of an individual influences the value of augmented reality technology, which may vary depending on the frequency of usage. As it can be utilized at home using computers and internet platforms, this approach is easier to use and more available. In the future, this kind of augmented reality can be used to let customers scan their faces, bodies, and homes to virtually try on items like furniture, clothing, makeup, and hair wigs.

## AUTHORS' CONTRIBUTION

Mais A. Al-Sharqi and Haitham S. Hasan contributed to the research design and experiments' implementation. Both authors performed the data analysis, resources, references collecting, and manuscript writing.

## LIST OF ABBREVIATIONS

|     |   |                            |
|-----|---|----------------------------|
| ANN | = | Artificial Neural Networks |
| AR  | = | Augmented Reality          |
| WOM | = | Word-of-mouth Marketing    |

## CONSENT FOR PUBLICATION

Not applicable.

## AVAILABILITY OF DATA AND MATERIALS

The authors confirm that the data supporting the findings of this research are available within the article.

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None.

## CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Declared none.

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