

The Impact of Augmented Reality Advertising Characteristics on Purchasing Intention

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Abstract

The purpose of this study is to examine the impact of augmented reality advertising characteristics (AR Ad) on purchasing intention in the Egyptian furniture industry. Accordingly, literature is reviewed, and secondary data regarding augmented reality advertising are gathered. Thereafter, a quantitative method is conducted using a post-test experimental design with a non-probability quota sample to collect data for the current study and determine the causal effect of AR Ad on purchasing intention. Over a period of two months, a single cross-sectional design is employed to gather the self-administered offline questionnaire from 400 Egyptian young adult (millennials) participants. Moreover, the data is analyzed using SPSS v.24. The findings reveal that Ad in an AR context is more influential in stimulating purchasing intentions than Ad in a non-AR context. Accordingly, augmented reality advertising characteristics has a positive impact on purchasing intention in the Egyptian furniture industry.

Keywords

Augmented Reality; Advertisement; Purchasing Intention; Ease of Use; Usefulness

Article history

Received: 13 February 2022 · **Accepted:** 18 August 2022

1. Introduction

The social distancing and lockdown to struggle with the COVID-19 pandemic have generated disruptions in customer behavior. It is imperative to understand the trend and influence of the COVID-19 pandemic on purchasing intention. All consumption is location-certain and time-certain, with flexibility in time but rigidity in location. Customers are educated to invent through innovative and creative methods. Work-life restrictions are now unclear as people relax, work at home, and study at home. Since the customer isn't capable of going to the storehouse, the storehouse has to come to the customer. It is even more crucial to embrace digital technology, which is likely to change current habits (Sheth, 2020). Thus, the virtual environment becomes more stimulating to customers compared to the real environment due to the lockdown of offline shops, restrictions on human-to-human contact, and social interaction (Lu et al., 2020).

AR is a technology that places augmented 3D objects into Ads, which are viewed by using an App on customers' smartphones or tablet computers in real environments. Through the camera and sensors in the devices, this technology increases layers of digital content that include video, sound, text, 2D virtual images, or 3D images, directly over the Ad shown on the screen (Sekhavat & Zarei, 2018). A system like this can be used in several industries (furniture, tourism, training, education, video gaming, and healthcare) and has had a significant impact on them. Since late 2012, the use of augmented reality in marketing and advertising has grown in popularity (Yaoyuneyong et al., 2016). The characteristics of AR ads make it a promising topic that is gaining power among researchers. In recent years, augmented reality has gradually become more prevalent in everyday life due to significant advancements in the development of various technologies such as image recognition, object tracking, and orientation (Olsson & Salo, 2012).

Despite the significant popularity of AR ads, there is no clear description of the AR Ad content characteristics in the academic literature to date (Yaoyuneyong et al., 2016). To fill this gap, this research will identify and evaluate an all-inclusive set of constructs as well as investigate the efficiency of the AR advertisement mechanism. Because AR technology is so new, academic research on AR Ads is still relatively scarce (Feng & Xie, 2019). Thus, this research will provide the research field with an empirical methodology to measure the impact of augmented reality advertising in enhancing purchase intention.

The Egyptian Furniture Export Council declared a decrease in Egyptian furniture exports by 44%. In August of 2019, it became \$7.12 million, compared to \$7.22 million in the same period of 2018. It also decreased in July 2019 by 8.12 million dollars, compared to 2.25 million dollars in the same period in 2018. The Egyptian Furniture Export Council aims to increase the competitive advantage of Egyptian furniture manufacturing through various activities and services, including offering a new

innovative advertising and marketing strategy (Emam, 2022). Undoubtedly, the fast growth of new technology has influenced many aspects of our lives and opened new challenges and possibilities. Moreover, there is an increasing interest in mobile Apps, and companies attempt to meet new market tendencies by investing in the development of mobile or web-based Apps. It is worth mentioning that there is an obvious improvement in the interaction between furniture manufacturing and new technology such as augmented reality (AR). AR can imitate the real house dimensions, and then the customer has the opportunity of furnishing it and trying various designs in cyberspace (Salama et al., 2017).

The framework of this study is a comprehensive theoretical model that builds upon a set of correlated frameworks of augmented reality advertising characteristics that are determined by three components of advertising value: entertainment, informativeness, and irritation (Ducoffe, 1996), in addition to components of the TAM Model (ease of use and usefulness) (Davis, 1989), and their impact on purchasing intention.

The term "entertainment" indicates the responses of consumers to the enjoyment and delight that exist in the advertisement; enjoyment and entertainment are positive or negative reactions. Then, customers will feel an emotion of satisfaction or frustration (Ducoffe, 1996). Informativeness is defined as the degree to which companies can give appropriate information for customers to make superior purchasing decisions. Pavlou et al. (2007) addressed informativeness as a perceptual construct assessed using a self-reported scale. Irritation in an advertising context is composed of discomforting or negative factors such as fear, offense, and confusion resulting from insulting, scary, confusing, and enraging advertising methods.

Previous research studies have revealed, using the Technology Acceptance Model (TAM) as a reference, that features such as ease of use and usefulness strongly impacts a user's purchasing intention. AR ads place virtual, animated objects in the real world, providing consumers with a more customized shopping experience. Apps like IKEA allow you to design and renovate living rooms, bedrooms, and kitchens to increase sales and engagement (El-Nahass, 2021).

AR in advertising is implemented when customers download the AR App and scan the symbols of a printed graphic with their smartphone camera. Once the camera captures the printed graphic symbols, the content of AR appears as an animation or a 3D model. When the customer turns the camera, the image on the screen turns also, so the customer has the opportunity to test the virtual things more carefully. The most significant advantages of AR are that it mobilizes the objective group and presents the products in an interactive manner (Choudhury et al., 2013). In this research, the quantitative research method was conducted as it is appropriate to assess the dimensionality, reliability, and validity of the measurement scale; to examine the structural relationship among the research model constructs; to supplement and extend the findings using statistics and content analysis; and to use large data samples to

be more trustful. The Posttest Experimental Design is used because of its established capability to examine the influence of an experimental inducement on the dependent variable via the participants that were randomly assigned to experimental and control groups (Hair et al., 2006). The Posttest Experimental Design contained two groups: the experimental group was subjected to a treatment condition (using AR application) and the control group was not subjected to the treatment condition. They just watched the video Ad. The two groups were harmonized to be interchangeable for the objectives of the test. Later, the treatment was only applied to the experimental group to investigate the effect of the independent variable (AR Ad) on the dependent variable (Purchasing Intention). Two tests were designed to disclose the efficiency of AR ads and, specifically, how AR-based advertising as compared with advertising without AR influenced consumer evaluations.

Augmented reality (AR) provides a bridge between the physical world in an interactive way and computer-generated digital information (Craig & Alster, 2013). Future research should examine several factors affecting the acceptance of augmented reality (AR) and the influence of interactive technologies on the quality of customers' lives. Future research should investigate the impact of AR-based advertising on purchasing intention (Perannagari & Chakrabarti, 2020). Thus, this research contributes to the AR Ad emerging field literature by developing and testing a contingency theoretical model that can be used to identify the influence of AR Ad characteristics on purchasing intention in the Egyptian furniture industry. It will aid academics in viewing advertisements through AR-enhanced lenses. It doesn't only obtain the total experience of customers using AR Ad Apps, but it also practically exhibits their significance and relevance in inspiring impulse purchasing behavior. Therefore, this study attempts to answer the following questions about the research problem:

1. What is the impact of AR Ad Characteristics on purchasing intention?
2. What is the contribution of academic and managerial understanding to the influence of AR Ad on Purchasing Intention in the Egyptian furniture context?

Based on the problem discussion, the main objective of this research is to close the gap within the augmented reality advertising field of study. The researcher will investigate the impact of AR Ads characteristics on purchasing intention in the Egyptian furniture industry. Accordingly, the following sub-objectives were formulated: 1-Examining the influence of entertainment of AR Ads on purchasing intention. 2-Testing the effect of the irritation of AR Ads on purchasing intention. 3-Investigating the impact of informativeness of AR Ads on purchasing intention. 4-Examining the influence of ease of use of AR Ads on purchasing intention. 5-Testing the influence of the usefulness of AR Ads on purchasing intention.

2. Literature Review

Advertising is a type of marketing communication in which information about a product or brand is delivered to customers to promote positive behavioral intentions (Ko et al., 2005). Advertising value is described as a "subjective appraisal of the relative value or usefulness of advertising to customers" and is a measure of advertising (Ducoffe, 1996). There are little researches that examine the relationship between advertising value and purchasing intention. When a customer's purchase intention increases, they demonstrate a positive attitude toward services or products (Ko et al., 2005).

Using AR technology, which is more commonly used in the advertising sector in newspapers, printed magazines, and outdoor advertising, provides a variety of experiences such as ease of use, personalization, information, interaction, excitement, participation, entertainment, and joining data from the real and virtual worlds. By changing the one-way communication of Ads into two-way communication, it provides interactivity between the brand and the consumer by trying to convert the one-way communication (Sayımer & Küçüksaraç, 2017).

Shopping-oriented AR Ad Apps usually object to delivering an attractive product experience to customers because direct interaction with the product is impossible in the digital world. According to Lu and Smith (2007), "conventional electronic commerce is limited since it cannot deliver enough direct information about the product to online customers," which generates high rates of return for the product. AR Ad Apps such as virtual try-on have the potential to improve conversion and decrease returns for online retailers. Furthermore, AR Ad enables customers to "try" products before buying them in a store (Schwartz, 2011).

Previous research was conducted to examine customers' intention toward AR Ad characteristics that can influence this shopping behavior. Some AR Ad papers compare AR Ad to other Ad plans, while others aim to develop a measurement instrument to assess the influence of different characteristics (entertainment, informativeness, entertainment, complexity, and novelty) of an AR Ad campaign on YouTube as a result of successful advertisement execution (Feng & Xie, 2019). There has also been some research on the impact of creativity on AR Ad (with its sub-dimensions of novelty, usefulness, and ad-customer association) or the impact of exposure-time, novelty, and technological self-efficiency on brand-related problems (e.g., brand message recall, brand attitude) (Gangadharbatla & Hopp, 2016). Utilizing AR technology in advertisements maximizes the liking level of Ads. Such Ads are described as informative, impressive, remarkable, entertaining, and interesting (Uğur & Apaydn, 2014).

According to Bayrak et al. (2020), the characteristics that influence a customer's attitude and intention to purchase are perceived information, perceived usefulness, perceived entertainment, and ease of use. Ads with AR Apps have higher ad effectiveness and likeability (Saymer & Küçüksaraç, 2017). Poushneh and Vasquez-Parraga (2017) demonstrated how AR has a significant and positive impact on customer experience and how an AR-enriched customer experience leads to higher customer satisfaction and purchase intent. Pantano et al. (2017) proposed a conceptual framework depending on the TAM Model that includes the new constructs interrelated to the technological features of "information," "telepresence," and "interactivity" of augmented reality applications, in addition to the TAM's conventional constructs (usefulness and ease of use).

Scholars have suggested that behavioral intentions, or emotional reactions triggered by numerous antecedents such as entertainment, content, and information, play an important role in the interaction between consumers' behavior and cognition. This shows that determining the consequences and determinants of customers' attitudes may be critical to a better understanding of how the attitude toward advertising is created and, thus, the impact of the generated attitude on consumption behavior. Prior research in the human-computer interface field has generally concentrated on three key characteristics: informativeness, interactivity, and entertainment, as having the most significant impacts on behavioral intentions towards context and websites. Perceived values are commonly verified by users' evaluations of advertisements (Sung & cho, 2012).

Yaoyuneyong et al. (2016) argue that the characteristics of AR ads satisfy customers' desires for pleasure, entertainment, and fantasy. It is correlated with their intrinsic motivators, which means doing something because it is naturally enjoyable. When consumers are subjected to AR ads, the customers' desires push them to search for entertainment value. Kowalczyk et al. (2021) claim that entertainment plays a key role in eliciting repurchase intentions as a behavioral reaction. The framework of consumers' perceptions of advertising value and attitudes is determined by three components: informativeness, irritation, and entertainment (Ducoffe, 1996). Moreover, the positive element of web advertising is rated for informativeness and entertainment, indicating the cognitive and emotional worth of web advertising, correspondingly. Irritation and entertainment, unlike informativeness, have little to do with advertising value but rather reflect consumers' unfavorable reactions to poorly presented web advertising. As a result, the global advocates of the advertising value model are informativeness and entertainment, as well as the model's parsimony (Liu et al., 2010).

Augmented reality advertising (AR Ads)

The Advertising Value Model was developed by (Ducoffe, 1996). Advertising value can be explained as consumers' subjective assessment of the significance or usefulness of the advertisement; entertainment; informativeness; and irritation. Ducoffe

(1996) proposed this model to measure consumers' perceptions of the relative worth or utility of advertising.

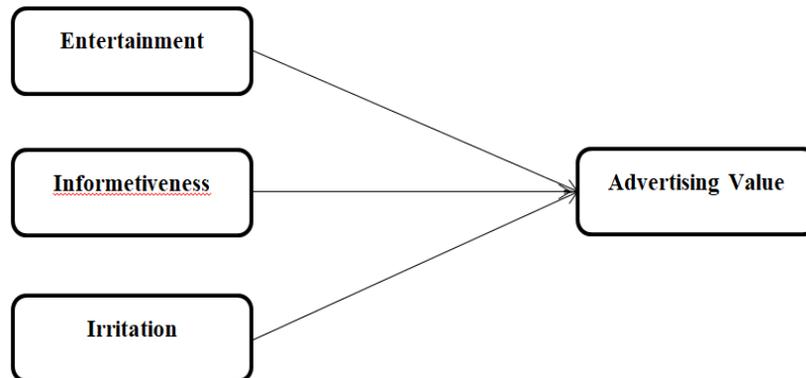


Fig 1 Advertising value Model Source: (Ducoffe, 1996)

Many studies have been conducted on advertising value determinants, but more comprehensive studies regarding this topic were conducted by Ducoffe (1996), listing three main determinants for advertising value: entertainment, informativeness, and irritation (Yaoyuneyong et al., 2016). A Model of Technology Acceptance (TAM) is a critical component of every emerging technology's market success. According to Davis (1989), the component that inspires consumers to utilize a system is defined by the customers' attitude towards utilizing it. Attitude towards (AT) is explained by both perceived ease of use and usefulness, and TAM is viewed as a direct predictor of behavioral intentions to use. In numerous empirical investigations, TAM has been shown to explain a significant amount of the diversity in the behavioral intentions of users and to accord with alternative theories such as the Reasoned Action Theory and the Planned Behavior Theory (Venkatesh & Bala, 2008).

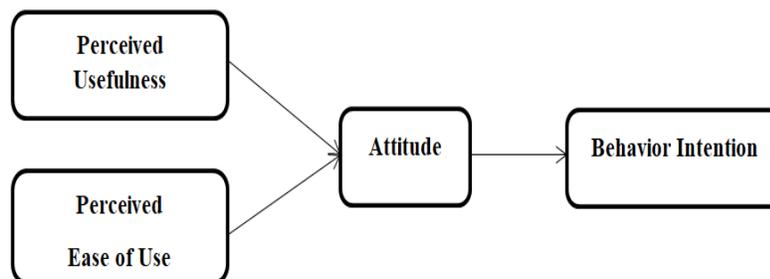


Fig. 2 Technology Acceptance Model Source: (Davis 1989)

According to TAM Model Fig. 2, ease of use and usefulness are the two most powerful perceptions of customers' behavioral intentions. When these two elements relate to the perception of technology acceptance, they are frequently viewed as going

together, or, as Venkatesh and Bala (2008) put it, "all factors being equal, the better a technology is to utilize, the more beneficial it can be." (Pantano et al., 2017).

Purchasing Intention

The purchasing intention construct has been frequently utilized in advertising research to better understand target audiences' thinking and anticipate service or product sales. According to previous studies, respondents' intentions to purchase relevant products or services are strongly influenced by their perceptions of the relevance of their demands, needs, and interests. According to numerous studies, factors such as simplicity of use, entertainment, and usefulness have a significant impact on users' purchase intentions. Because those structures are most commonly seen in interactive advertising, such as AR-integrated ads, it is also possible to conclude that technology-implemented advertising results in increased buy intentions. Technology with a lack of quality, irritation, and anxiety, on the other hand, has been shown in research to have a negative impact on purchase intention. Kim and Hyun were a couple in 2016. Moreover, trust is seen as another essential factor that influences consumers' purchasing intention. Users of e-commerce channels have been dealing with a lot of trust issues, especially as digitalization and technology have increased, and as a result, their purchase intention has decreased (Kwahk et al., 2012).

Some specific constructs have been selected to understand the impact of augmented reality advertising on purchasing intention. By taking three components of advertising value: entertainment, informativeness, and irritation (Ducoffe, 1996), components of the TAM Model (ease of use and usefulness) (Davis, 1989), and their impact on purchasing intentions, a research model is designed, and hypotheses are accordingly formed.

3. Hypotheses Development

In light of the literature review that was conducted, the research hypotheses were developed based on advertising perceived value (entertainment, irritations, and informativeness) and the Technology Acceptance Model (TAM) (Ease of Use and Usefulness) are used as independent variables on purchasing intention.

3.1 Entertainment of AR Ad

The term "entertainment" indicates the responses of consumers to the enjoyment and delight that exist in the advertisement; escapism and enjoyment are the positive and negative reactions, respectively, and customers will feel an emotion of satisfaction or frustration (Ducoffe, 1996). Prior studies have verified the growing impact of entertainment while the main advertising channel has transformed from TV advertising to virtual advertising. Technology advertisements, as opposed to non-technology advertisements, can use various features supported by smartphones and Apps. As a result, they can entertain customers more thoroughly. Existing entertainment in

advertisements is normally supposed to be a real method of attracting the attention of consumers, but it couldn't be suitable if the persuasion of consumers were to purchase the related services and products (Aziza & Astuti et al., 2019). Yang and Smith (2009) have shown that innovative entertainment positively impacts purchase intention. Thus, it lowers the customer struggle levels for persuading customers to purchase the product. The absence of attention and escape from advertising are the main aims of unsuccessful advertising. Therefore, the researcher hypothesizes that:

H1: Entertainment of AR Ad has a positive impact on purchasing intention.

3.2 Informativeness of AR Ad

Informativeness is defined as the degree to which a corporation can provide appropriate information for customers to make better purchasing decisions (Alalwan, 2018). Kim and Lennon (2008) revealed that, despite the significance of a product's visual appearance, product information is crucial in positively influencing online shoppers to purchase a product. Increased product information also results in more educated consumers who can make better judgments. Internet buying is frequently linked with high uncertainty or risk because of the platform's inability to enable a physical check of the goods, and this risk has a negative impact on consumers' behaviors and intents (Kim and Lennon, 2000). As a remedy to this risk, the increased availability of product information functions as a risk-reducing technique, combating the high level of risk related to online shopping and having a favorable influence on purchasing results (Kim & Lennon, 2000). Hence, the following hypothesis was proposed:

H2: Informativeness of AR Ad has a positive impact on purchasing intention.

3.3 Irritations of AR Ad

Irritation is defined as the degree to which a customer perceives mobile advertising as annoying, irritating, or having negative emotions toward the advertising (Yang et al., 2013). Previous research tested irritation as being negatively correlated to advertising value. Thus, it will decrease advertising efficiency and customers' perceived value. Augmented reality advertisements may provide disturbing information that confuses the customer, which can be perceived as an interruption to the customer's privacy. When customers feel disturbed about the advertisement, they respond negatively to it. Irritation caused by unwanted or incomprehensible augmented reality advertisement messages may harm the AR Ad (Lu et al., 2017). Hence, the researcher hypothesizes that:

H3: Irritation of AR Ad has a negative impact on purchasing intention.

3.4 Ease of Use of AR Ad

Ease of Use (EOU) is defined as "the degree to which an individual feels that utilizing a given system will be free of effort" (Davis, 1989). The definition of "easy" in this component is "the absence of difficulty or substantial effort." An effort is the limitless resource that an individual may devote to a certain endeavor. EOU was discovered to have a direct influence on the user's intentions when utilizing a new technology. Nonetheless, a technical application that is viewed as simple to use has a better chance of being adopted by people (Davis, 1989). In the researches that related to the effectiveness of AR on customer intention, EOU was discovered to be a key determinant affecting user intentions. EOU has a significant influence on online consumers' behavioral intentions (Lee et al., 2006). Hence, the following hypothesis proposes that:

H4: Ease of Use of AR Ad has a positive impact on purchasing intention.

3.5 Usefulness of AR Ad

Usefulness is defined as "the extent to which a person believes that using a particular system will enhance his or her job performance." Therefore, it is associated with the belief that technology improves a customer's performance (Liu et al., 2010). The TAM and its extended models from other researchers reveal that usefulness improves a customer's objectives in voluntary and mandatory situations. However, prior research has shown that there is an opposite finding related to the influence that usefulness has on a customer's usage behavior of an innovative technology system. This inconsistency of findings leads to the question of to what extent an individual adopts a new technology system, as PU and new technology system acceptance is an emerging research field. According to the technology acceptance paradigm, perceived utility (PU) and perceived ease of use (PEOU) are the primary factors that influence the attitude toward utilizing (AT) the technology system (Davis et al., 1989). Simultaneously, AT is believed to impact behavioral intention (BI) to employ technological innovation, while PU is postulated to favorably affect BI without creating an attitude toward new innovation. Furthermore, PEOU has a favorable effect on PU. Customers are pragmatic and goal-oriented by nature, so they seek informative, valuable, useful, and worthwhile online experiences (McLean et al., 2018). Yim et al. (2017) argue that the technology's usefulness has a direct influence on a consumer's satisfaction and on their continued use of it. Furthermore, following the construction of the TAM model, the greater the usefulness of augmented reality, the more positive the attitude toward the media itself (Yim et al., 2017). Accordingly, the following hypothesis has been developed:

H5: Usefulness of AR Ad has a positive impact on purchasing intention.

4. Research Model

The research model of this study is a comprehensive theoretical model that is composed of three components of advertising value: entertainment, informativeness, and irritation (Ducoffe, 1996), components of the TAM Model (ease of use and usefulness) (Davis, 1989), and their impact on purchasing intention.

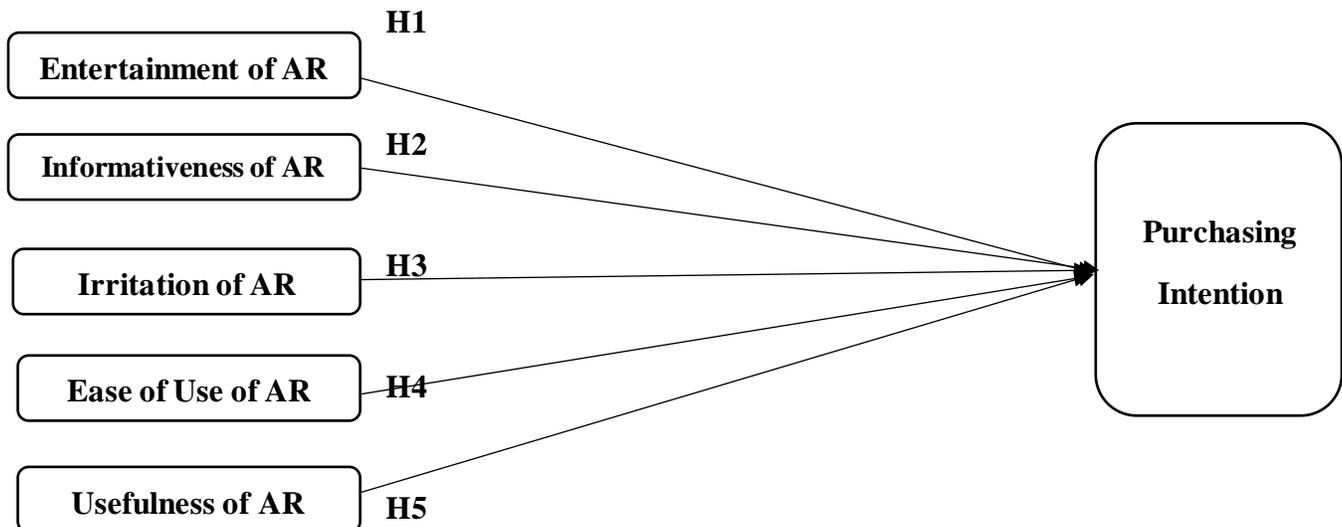


Fig.3 Research Model

5. Research Methodology

5.1 Data Collection

The data from the experimental and control groups were collected quantitatively using an offline questionnaire in each case. A questionnaire is claimed to be a suitable method for deepening research knowledge. Furthermore, quantitative research provides more accurate findings than qualitative research methods because it integrates responses from large samples. Additionally, the quantitative method quantifies results in order to analyze them using mathematical relationships and statistical methodologies. Moreover, the quantitative technique delivers more accurate results and is more suitable for generalization (Malhotra & Birks, 2007). Due to the area of the technology acceptance model (TAM Model) (Davis, 1989) and the Model of Advertising Value Ducoffe (1996) are well studied, the quantitative approach was used because the paper aims to test the relationships of different factors of these models towards purchasing intention.

5.1.1 Experimental setup (Posttest)

The Posttest Experimental Design approach was convenient due to its established ability to test the influence of an experimental stimulus on the dependent variable via participants who were randomly assigned to experimental and control groups. The Posttest Experimental Design included two distinct groups: the experimental group was

subjected to a treatment condition (using the AR Ads application), while the control group was not. They had just seen the video advertisement. The two groups were matched so that they could be interchanged for the purposes of the test and as a supplement to randomization (Hair et al., 2006).

Later, the treatment was only performed on the experimental group to examine the impact of the independent variable (AR Ads) manipulation on the dependent variable (Purchasing Intention). Two studies were planned to disclose the effectiveness of AR ads. More specifically, how AR-based advertising influences consumer evaluations when compared to advertising without AR. The structural relationships and hypotheses in the theoretical model will be empirically tested.

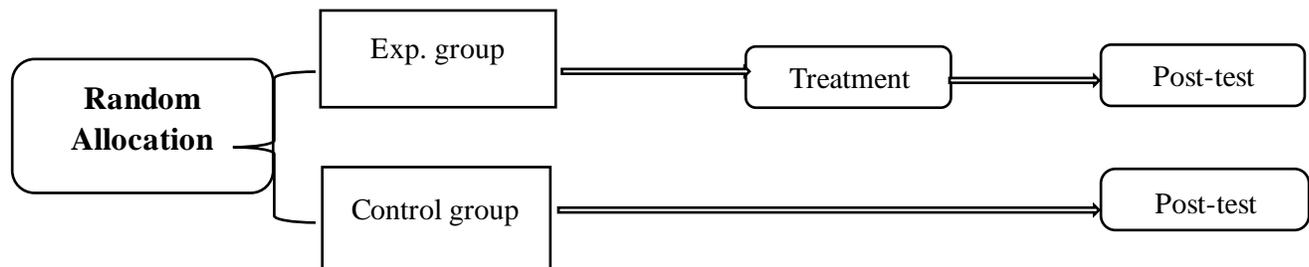


Fig. 4 Random Selection, Posttest Experiment

Participants

The research's goal is to understand how AR Ad affects purchasing intention; only customers who are likely to use AR Ad should be included in the study's population. Smartphone use and the readiness to experiment with innovative technology are well-known among consumers, particularly among younger generations. Thus, the sampling frame was limited to Generation Y customers (also known as millennials). The concept behind this method is that customers of the same generation have similar beliefs and values because they grew up during the same time period and under the same political, social, and technological standards as well as economic events. The values created under these effects have been established to stay stable throughout a customer's life (Lissitsa & Kol, 2016). In order to accomplish this, the study's target population consists of all homogeneous populations of Egyptian youth that have a common set of traits and are members of Generation Y, or Millennials, the most recent generation, born between 1980 and 1990. (Malhotra & Birks, 2007). Individuals between the ages of 22 and 42 make up the sampling unit. From a product standpoint, Generation Y is regarded as an important group because the younger generation is known for its use of new technology and willingness to try new technologies. They are sizeable and have considerable purchasing power. Members of this generation are often referred to as "digital natives," with 71% owning a smartphone or tablet. The majority of Gen Y are early adopters of new technology. Thus, they are more likely to use augmented reality advertising (Lissitsa & Kol, 2016).

In light of the research objectives, the research population is heterogeneous in terms of age, gender, and conclusive in nature. Therefore, probability sampling would have been the most favorable option, as it permits the researcher to make statistical assumptions about the whole target population. However, this option could not be appropriate since it entails the possession of a sampling frame over the entire population, which the researcher is not able to get (Malhotra & Birks, 2007). Therefore, the researcher chose the second possible technique: non-probability quota sampling, which is also known as deliberate sampling. This technique was used to select millennials in Egypt. The younger generation Y in Egypt constitutes the majority of the population (a homogeneous and distinct population).

Regarding sample size, previous studies that used experimental methods have not specifically mentioned a precise number of participants to be enrolled in each group. An accurate estimation of the sample size isn't important as there is already so much uncertainty in an experimental study. In theory, a large sample size ensures both a higher accuracy of results and a better balance between the proportions in the sample and the proportions in the overall sampling frame. The sample size should be large enough as the researcher aims to analyze quantitative data using statistical methods (Malhotra & Birks, 2007).

The researcher used the following equation to estimate the sample size

$$n = \frac{Np(1-p)}{(N-1)d^2/z^2} + p(1-p), \text{ where:}$$

N: Population size

D: The acceptable error ratio for the estimation is 0.05

Z: The standard score for the confidence level = 95% (1.96)

P: The proportion of a population with a particular characteristic is 0.5

So, the calculated sample size from the previous equation is

$$N = \frac{31620000 * 0.5 * 0.5}{((31619999 * (0.05^2) / (1.96^2) + (0.5 * 0.5))} = 384.155$$

Table 4.2: Allocating Sampling Units to the proportion of the millennial gender population of Egypt in 2021

Gender/Generation	Male	Female	Total
Gen Y	16,126,200	15,493,800	31,620,000
Required Sample Size	51.1% * 400 = 204 Participants	48.9% * 400 = 196 Participants	400 Participants

Source: Prepared by the researcher based on the Central Agency for Public Mobilization and Statistics 2021 (CAPMAS).

The sample isn't demographically representative of the population due to the researcher's targeting of the digital native generation, which well represents this population.

Procedure

The offline questionnaire began with a brief introduction that included some study background information, a few instructions, and the necessary disclaimers. Participants spent about two minutes before the test learning how to use the AR Ads App to experience the ads. After the participants gave their explicit consent, they were asked a series of demographic questions. The participants were then randomly assigned to one of two conditions, each of which displayed an advertisement with or without AR features. They were instructed to thoroughly examine the advertisements before proceeding to the survey questions.

Malhotra and Birks (2007) emphasize the importance of eliminating other potential factors in experiments. In the absence of other potential causal factors, the investigated variable is assumed to be the cause of the effect. Other purchasing intention factors, such as product quality, brand, and price, were thus controlled by utilizing the same product in two groups without mentioning the brand name. Furthermore, to ensure equal conditions in each group, the price, brand logo, slogan, and product layout were removed from the screenshot shown to the control group utilizing graphics software, as there was no visible price during the experimental group's product AR experience. They only differed in the manner in which the content was displayed as a result of the interactive AR feature that was added to the advertising in the experiment condition. To limit treatment diffusion, which could be a threat to internal validity; the two groups have been kept separate (Wedel et al., 2020).

The participants from the experimental group and members of the control group were approached offline. Furthermore, to lower the possibility of dropouts of participants that can occur during the experiment (Denson et al., 2009), the offline self-administered questionnaires were collected by a data collection marketing team. The team consists of four collectors who are working for a marketing company (GAMMA Company). They are familiar with the research topic. They were trained by the researcher on how to find and guide participants, and they shouldn't interfere with the respondents' answers.

At the beginning of the questionnaire, participants of group 1 (experimental group) were offered the opportunity to experience an augmented reality advertising application (Houzz furniture APP). As an example of a furniture application, it represents catalogs with the function of augmented reality applied to handheld devices and to provide consumers with additional information about products. After using the furniture application, participants were asked to fill out a questionnaire based on the user's content and their feelings, thoughts, and expectations about it.

The researcher didn't interfere with the experiment after a brief explanation of the functions, and the participants were free to interact with the Houzz furniture APP. Participants could visualize several pieces of furniture by using the camera of a smart

device to measure the room in comparison to the actual size of the catalog inside their homes using the augmented reality advertising application. Following that, participants were able to see the product in its true size and color to help them make a purchasing decision. This was done to remove any kind of observer effect, which could cause participants to change their behavior and thus potentially affect data collection (Saunders et al., 2016). As a result, the experiment group was asked to test the AR experience on an iPhone 6 SE with products of their choice in order to gain a better understanding of how interactive technology works. Lastly, they were instructed to visualize and experience the chosen piece of furniture. Participants were instructed to utilize the app for as long as they desired to gain a thorough understanding of the app's capabilities. A questionnaire was required to be completed after each experiment that lasted between 8 and 10 minutes.

Participants of group 2 (the control group) were offered to watch a video ad without using the augmented reality application. For example, furniture ads are used. In the video, ads represent catalogs with information about products (which are, respectively, furniture in this research). After watching the videos, participants were asked to fill out a questionnaire based on the watched content and their feelings, thoughts, and expectations about it. Finally, their work was checked during the data collection process.

5.2 Measurers

Previous scale items were modified to measure the research variables. The questionnaire instruments were translated into Arabic because the questionnaires were posed to Egyptian millennials. Then, they were developed and evaluated by five marketing professors from the Faculty of Commerce at Cairo University, who served as expert judges to assess content validity. They evaluated the content, clarity, and response format of each item. The questionnaires were modified based on their feedback. As a result, the questionnaires were modified and pretested among an Egyptian millennial sample. The objective of the questionnaire was clearly explained, each question was carefully designed, and the questionnaire form layout was clearly planned to maximize response rate, reliability, and validity.

Both the experimental and control groups used questionnaires with itemized rating scales (Malhotra & Birks, 2007). When investigating preferences and attitudes, these types of questions are assumed to be appropriate (Saunders et al., 2016). All measurement items were scored on a 7-point Likert scale, with 1 representing strongly disagree and 7 representing strongly agree. More specifically, four items adapted from Ducoffe's (Liu et al., 2010; Yang et al., 2013) study were used to assess entertainment. Three items adapted from Ducoffe's (1996) study were used to assess irritation. Perceived Ease of Use (PEOU) was assessed using five items adapted from the studies

of Davis (1989) and Lee et al. (2006). Three items adapted from Venkatech and Davis (1996) were used to assess perceived usefulness. Seven items adapted from Ducoffe were used to assess informativeness (Liu et al., 2010). Three items adapted from Schwartz's (2011) study were used to assess purchasing intention.

5.3 Manipulation Check

Before actually conducting the experiment, treatment and testing the hypotheses, manipulation checks were conducted with 30 participants (millennials) with two items used for each group to determine whether, or to what extent, the participants understood the independent variables that could generate better advertising effectiveness. Participants were asked to rate the levels of information gained from the AR advertisement by ranking the statement, "This augmented reality advertisement provides me relevant information on this product" on a 7-point scale. To evaluate the levels of entertainment, participants were asked to rate the statement, "This augmented reality advertisement is entertaining" on a 7-point scale, with 1 indicating strongly disagreeing and 7 indicating strongly agree. The results of (T) test analysis showed that participants in the experiment design considered their Ads significantly more instrumental and dynamic than those in the control group (Ads with AR) $M = 4.70$ vs. (Ads without AR) $M = 1.98$, $p < .001$). Thus, the AR Ads manipulation had the proposed impact.

6. Statistical Analysis and Results

Statistical analysis: In this section, collected data was statistically analyzed using a well-known tool such as IBM SPSS, which was used for data screening, descriptive analysis, T-test, evaluating the proposed model, and testing the proposed relationships between variables.

6.1 Descriptive statistical methods

It is illustrated in Table (1)

Table (1) Respondents' Profile

Demographics	Number	Percentage
1-Gender		
Female	195	49
Male	200	51
2-Age		
20-less than 27 years	110	27.8
28-less than 36 years	129	32.7
36-less than 40 years	156	39.5

3-Education		
PHD	99	25
Masters	134	34
Bcs	138	35
Less than Bcs	24	6
4-Income	99	25
less than 5,000	119	30
5,000 to less than 10,000	115	29
10,000 to less than 15,000		
15,000 to less than 20,000	63	16

Source: Prepared by the researcher based on the results of statistical analysis of the data.

In this study, the researcher used the mean, which is a measure of central tendency, and the standard deviation, which is a measure of the dispersion of a dataset relative to its mean. The results confirmed that the mean for the dimensions (entertainment, informativeness, ease of use, usefulness, and purchasing intention) was higher than (4), which confirms the agreement of respondents on these dimensions. While the mean for the dimension (irritation) is lower than the (4), which confirms the disagreement of respondents on this dimension. The researcher also observed the low value of the standard deviation and the coefficient of variation (less than 30%), which means there was a concentration in the answers and the dispersion was small.

6.2 Reliability and validity analysis:

To measure the internal consistency, the researcher used Spearman's rank correlation between each item and the total variable as below:

Table (2) correlation coefficients for study dimensions

Study Dimensions	Correlation coefficient		Validity
	Minimum	Maximum	Valid
Entertainment	0.640	0.814	Valid
Irritation	0.759	0.839	Valid
Informativeness	0.614	0.690	Valid
Ease of Use	0.681	0.808	Valid
Usefulness	0.775	0.792	Valid
Purchasing intention	0.854	0.903	Valid

Source: Prepared by the researcher based on the results of statistical analysis SPSS.

The results of the above table confirmed that the validity of all items for all dimensions of the study was confirmed by the values of the correlation coefficients, which ranged between 0.640 and 0.903. All of them were significant at the 0.01 level, so the researcher can use them in this analysis. The researcher measured the reliability of the study variables and dimensions using Cronbach's alpha coefficient (α).

Table (3) Cronbach's alpha coefficients for study variables and dimensions

Dimensions	No. of items	Cronbach's alpha
Entertainment	4	0.770
Irritation	4	0.835
Informativeness	4	0.645
Ease of Use	5	0.797
Usefulness	3	0.754
Purchasing intention	3	0.815
Total	23	0.856

Source: Prepared by the researcher based on the results of statistical analysis SPSS.

It is clear from the above table that Cronbach's alpha coefficient is greater than 60% for all dimensions of study, and also that Cronbach's alpha coefficient for the total scale is greater than 80%, making us believe that a questionnaire is a reliable tool for research. The researcher will proceed with the analysis.

6.3 T-test comparison for experiment groups

To analyze the significant differences between the experiment and control group (with AR Ads and without AR Ads), the researcher conducted an "independent samples T-Test" analysis, as well as descriptive statistics as follows:

Table (4) Descriptive statistics & T-test results for study dimensions

Dimension	Groups	N	Mean	standard deviation	coefficient of variation	T-test values	Sig
Entertainment	with AR Ads	200	5.92	0.69	0.18	-2.964	0.003
	without AR Ads	195	5.10	0.52	0.13		
Irritation	with AR Ads	200	3.17	0.63	0.29	-1.662	0.097
	without AR Ads	195	3.26	0.48	0.21		
Informativeness	with AR Ads	200	5.87	0.63	0.16	-3.240	0.001
	without AR Ads	195	5.08	0.63	0.15		
Ease of Use	with AR Ads	200	5.97	0.71	0.18	-2.826	0.005
	without AR Ads	195	6.15	0.54	0.13		
Usefulness	with AR Ads	200	6.10	0.68	0.17	-2.215	0.027
	without AR Ads	195	6.23	0.47	0.11		

	without AR Ads	195	6.26	0.47	0.11		
Purchasing Intention	with AR Ads	200	5.00	0.85	0.21	-3.287	0.001
	without AR Ads	195	5.27	0.74	0.17		

Source: Prepared by the researcher based on the results of statistical analysis SPSS

From the above table, the researcher can conclude that:

The mean for the dimensions (entertainment, informativeness, ease of use, usefulness, purchasing intention) is higher than (4), which confirms the agreement of respondents on these dimensions. While the mean for the dimension (irritation) is lower than the (4), which confirms the disagreement of respondents on this dimension. The researcher also observed the low value of the standard deviation and the coefficient of variation (less than 30%), which means there was a concentration in the answers and the dispersion was small. From the two samples of the T-test, the sig level for the dimensions (entertainment, informativeness, ease of use, usefulness, and purchasing intention) is less than 5%. Hence, the researcher rejects the null hypothesis, which means there is a significant difference between the two groups (with AR Ads and without AR Ads) for the mean of those dimensions. while the sig level for the dimensions (irritation) is higher than 5%. Hence, the researcher didn't reject the null hypothesis, which means there is not a significant difference between the two groups (with AR Ads and without AR Ads) for the mean of those dimensions.

6.4 Hypotheses testing

Table (5) Simple regression model

independent variable	Estimated parameter β_i	T. test		F. test		R^2
		Value	Sig level	Value	Sig level	
Constant	1.937	6.286	0.000	83.663	.000	0.383
Entertainment	0.548	8.715	0.000			
Constant	1.060	5.156	0.000	229.588	.000	0.369
Informativeness	0.774	15.152	0.000			
Constant	1.774	6.263	0.000	70.691	.000	0.152
Irritation	- 0.541	-8.41	0.000			
Ease of Use	0.61	7.625	0.000	78.043	.000	0.176
Constant	1.796	6.765	0.000			
Usefulness	0.561	8.891	0.000	79.051	.000	0.167

Source: Prepared by the researcher based on the output of statistical analysis SPSS.

Based on the results of the above table:

Entertainment

The significance level of the F-test is less than 1%, which means that the model is significant. Also, the sig level for the estimated parameter of entertainment is less than 1%, as the researcher rejected the null hypothesis and accepted the alternative hypothesis, which means that there is a statistically significant positive effect of entertainment on purchasing intention. It was noted that the value of the coefficient of determination (R^2) amounted to 0.383, which means that the independent variable (entertainment) explained 38.3% of the total variation in the dependent variable (purchasing intention). The rest of the percentage is due to random error or perhaps due to not including other independent variables that were supposed to be included in the model.

Informativeness

The significance level of the F-test is less than 1%, which means that the model is significant. The sig level for the estimated parameter of (Informativeness) is less than 1%, as the researcher rejected the null hypothesis and accepted the alternative hypothesis, which means that there is a statistically significant positive effect of informativeness on purchasing intention. It was noted that the value of the coefficient of determination (R^2) amounted to 0.369, which means that the independent variable (Informativeness) explained 36.9% of the total variation in the dependent variable (purchasing intention). The rest of the percentage was due to random error or perhaps due to not including other independent variables that were supposed to be included in the model.

Irritation

The significance level of the F-test is less than 1%, which means that the model is significant. The sig level for the estimated parameter of irritation is less than 1%, as the researcher rejected the null hypothesis and accepted the alternative hypothesis, which means that there is a statistically significant negative effect of irritation on purchasing intention. It was noted that the value of the coefficient of determination (R^2) amounted to 0.152, which means that the independent variable (irritation) explained 15.2% of the total variation in the dependent variable (purchasing intention). The rest of the percentage is due to random error or perhaps due to not including other independent variables that were supposed to be included in the model.

Ease of use

According to the sixth main hypothesis, the sig level for the direct effect of (Ease of Use) is less than 1%, as the researcher rejected the null hypothesis and accepted the alternative hypothesis, which means that there is a statistically significant positive effect of ease of use on purchasing intention. Also, the value of the coefficient of determination (R^2) amounted to 0.176, which means that the independent variable (Ease

of Use) explained 17.6% of the total variation in the dependent variable (purchasing intention).

Usefulness

The significance level of the F-test is less than 1%, which means that the model is significant. The sig level for the estimated parameter of Usefulness is less than 1%, as the researcher rejected the null hypothesis and accepted the alternative hypothesis, which means that there is a statistically significant positive effect of usefulness on purchasing intention. It was noted that the value of the coefficient of determination (R²) amounted to 0.167, which means that the independent variable (usefulness) explained 16.7% of the total variation in the dependent variable (purchasing intention). The rest of the percentage is due to random error or perhaps due to not including other independent variables that were supposed to be included in the model.

7. Discussions

This section consists of a discussion of the hypothesis testing results presented in the previous table.

7.1 Entrainment of AR Ad

When studying the impact of entertainment of AR Ads on purchase intention, the results revealed that there is a statistically significant positive impact on purchase intention. This is consistent with the outcomes of Pantano et al. (2017), who stated that the usage of AR raises both entertainment and purchasing intention and supports its interpretation into a virtual context. An explanation for the positive impact of entertainment from AR Ads on purchasing intention may be that the entertainment value of innovative technology is positively related to customer perception, which, in turn, has a direct effect on customer satisfaction (Pantano & Servidio, 2012). Moreover, Bulearca and Tamarjan (2010) concentrated on the AR virtual-try-on App and revealed that AR marketing increases entertainment and has positive effects on brand attitude.

The AR Ad App can form stronger emotional connections with customers than traditional advertisements. Since high media immersion leads to more entertainment, it might generate a positive attitude for customers. People's emotions of enjoyment correspond with advertising and entertainment could be the most essential aspect affecting a customer's attitude and purchasing intention toward a brand. Entertainment is vital in advertising since it influences a participant's attitude toward advertising. Several practical studies have discovered that entertainment has a positive relationship with advertising value (Martins et al., 2019).

7.2 Informativeness of AR Ad

When examining the impact of the informativeness of AR Ads on purchasing intention, the results found that the informativeness of AR Ads has a statistically significant positive influence on purchasing intention. This finding is in agreement with findings by Wakim et al. (2018), who found that the outcomes of the study indicated that the virtual information in AR for the product has a positive impact on purchasing intention. An explanation for The positive impact of the informativeness of AR Ads on consumers' attitudes toward the intention to purchase may be that the amount of information available in an AR Ad has the ability to help customers make better purchase decisions and, thus, increase their intention to purchase. Furthermore, providing truthful information about a product is critical in establishing consumer recognition. Customers' attitudes toward advertising and their intention to purchase are directly affected by the informativeness of advertising (Ducoffe & Curlo, 2000).

7.3 Irritation of AR Ad

When testing the impact of irritation of AR Ads on purchasing intention, the results revealed that irritation of AR Ads has a statistically significant negative effect on purchasing intention. This is consistent with the outcomes of Park and Yoo (2020), which discovered that augmented reality advertising may provide distracting and overwhelming information to the consumer, which can be perceived as an invasion of privacy. This is consistent with the findings of Saleem et al. (2022), which found that Irritation of AR Ad has a direct negative impact on purchasing intention. This negative impact of the irritation of AR Ads on purchasing intention could be explained by the fact that while utilizing AR Apps, advertisers must avoid overcomplicated and complex Web design since some consumers would neglect this type of advertising if the level of irritation is too high. Consequently, advertisers should consider this factor when designing their AR advertising.

7.4 Ease of Use of AR Ad

When testing the impact of ease of use on purchasing intention, the results indicated that there is a statistically significant positive effect of ease of use on purchasing intention. The finding is consistent with the work of Chang and Chen (2021), who found that ease of use positively affects customers' purchase intention and shopping effectiveness. This finding is inconsistent with the work of Wakim et al. (2018), who found that perceived ease of use failed to clarify the variations in product purchasing intention (PPI). Therefore, the assumption that EOU had a positive impact on PPI was rejected. An explanation for the discrepancies between the two studies may be that, although the majority of consumers found the AR Ad App very easy to use, they did not expect the same levels of purchasing intention. And the findings of Wakim et al. (2018) were based on experience from customers who were familiar with the usage of

technology. Moreover, one explanation for the discrepancies between the two studies could be that familiarity with a specific technology has a mediation effect in influencing product purchase intention and also that consumers intend to work with technology if they believe it is easy to use (Liu et al., 2010).

7.5 Usefulness of AR Ad

When testing the impact of the usefulness of AR Ads on purchasing intention, the results revealed that the usefulness of AR Ads has a statistically significant positive impact on purchasing intention. This is consistent with the results of Chang and Chen (2021), who found that the behavioral intention to visit the AR shopping center and acquire things in the virtual world was positively associated with their usefulness during the AR purchasing process. An explanation for this could be that the usefulness of the information system has a significant effect on the consumer's intention to interact with innovative technology (Jain et al., 2017). Meanwhile, recent research has revealed that usefulness is described as what and how consumers believe about the likelihood of improving performance on a purchase by utilizing a specific technology. Usefulness refers to the capability of augmented reality to assist consumers in making a purchasing decision and is referred to as usefulness.

8. Implications

The implications of the study can be discussed from both a theoretical and practical perspective.

8.1 Theoretical implications

Theoretically, this research contributes to the emerging field of AR advertising literature by proposing a contingency theoretical model that can be utilized to identify the influence of AR Ad characteristics on purchasing intention in the Egyptian market. It will aid academics in viewing advertisements through AR-enhanced lenses. Another main contribution of this research is that it added to the very scarce literature on the influence of AR Ad characteristics on the customer's purchasing intention in the Egyptian market, as it highlighted the AR benefits that are valued more by adding Ads to them. This research contributed to a better understanding of AR Ad characteristics drawn from the combined components of the TAM Model (ease of use and usefulness) (Davis, 1989), supplementing elements of advertising value characteristics (entertainment, informativeness, and irritation) and their impact on purchasing intentions. Moreover, this study contributed to the AR Ad literature by examining why and when individuals show a higher understanding of advertising messages and interests in AR Ads when compared to conventional ads by conducting an experimental design using a real AR Ad application.

The current research adds to the very scarce literature by taking into account how AR Ad can enable customers to more efficiently narrow their choice set when presented with a wide range of options. Consequently, it will reduce choice confusion. Furthermore, this study responded to the need for AR technology and psychological models to be integrated. It contributes to the literature on the SOR framework (Stimuli-organism-response) by being one of the first studies to describe the phenomena of impulse purchasing intention using this framework in the Egyptian furniture industry. This research contributes to the emergent stream of studies on the blending of real worlds and virtual environments. This blending can support the consumer experience. The line between real and virtual is becoming increasingly blurred, which has implications for how retailers engage customers through AR Ads.

8.2 Managerial implications

Managerially, the results of this research suggest to marketers and advertisers that they should integrate AR Apps into their advertising to allow customers to customize their product selection based on their personality. The customers should be capable of looking for their favorite furniture brands, indicating their suitable size, and choosing their desired designs to avoid dissatisfaction with the experience. It is critical that customers can leave their fingerprints on the customized product. Moreover, adding an AR App to the Egyptian Furniture Ads will increase ease of use, interactivity, and show personally relevant satisfaction to each customer. The results show that, based on the principle that customers already have a brand preference, packaging, and product designs as evaluation criteria, the AR Ad App should contain brand logos or product images in the product description. Subsequently, the product information of the AR Ad App might guide customers subconsciously, and it incentivizes them to purchase. Additionally, more extended product information from the AR Ad App should be provided to give customers the chance to gain a better understanding of what they are going to purchase. According to the results of the current study, the AR Ad App is mainly used as a source of stimulation, and to narrow down options for further offline evaluation, the advertisers would need to make sure to display all the diverse furniture products. Therefore, the AR Ad App should contain availability features for advertising furniture products.

9. Limitations and future research

This research has several limitations that present opportunities for future research.

First, the findings are limited to a single digital platform, namely home furniture (beds, tables, and sofas). Thus, it will be interesting to see if future research is established with multiple items and small-sized products (watches, diamond rings). Second, the current study's time horizon was a cross-sectional design since the research

is resource and time constrained. It entails collecting data from a specific sample of the population just once. So, future studies should replicate the current research using a longitudinal design. Third, the chosen method, with non-probability quota sampling, in which the researcher conducted the study at the expense of more generalizability to real-world environments, where the techniques of probability sampling should be applied in future research. Fourth, this AR ad study relied heavily on young people (Gen Y) samples, with differences in socio-demographics being excluded. Therefore, future studies should consider more diverse populations and examine how age impacts the effectiveness and usability of different AR APPs. Fifth, just one AR App form was used in the experiment, essentially exploring a single augmentation technique (AR App). Future research could explore how different techniques of augmentation compare in the behavioral and affective responses that they provoke. In this regard, augmentation techniques that increase sensory modality richness in terms of breadth and depth (the number of senses inspired) may induce stronger effective and thus behavioral responses. This research used augmented reality mobile applications to answer the research question. Newly developed AR glasses such as Microsoft Hololense or Google Glass might be interesting topics for future study.

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