

The utilization of augmented reality in Saudi Arabia e-commerce websites

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Abstract

During the Covid-19 crisis, many people have tended to buy online due to social distancing. The use of artificial intelligence applications helped improve the user experience in purchasing from the Internet. However, some limitations may affect the buyer's decision, such as the lack of clarity of the image of the products, the need for more details, and the inability to try the product before purchasing. Augmented Reality (AR) is a technology that facilitates online shopping activities, which allow the customers to interact with the product and get more details before buying decision. This research aims to study the role of AR in e-commerce (EC) websites in Saudi Arabia (SA). The study uses a quantitative method questionnaire to assess the effectiveness of AR in EC websites. The results showed that AR had a major role in improving the user experience when buying from the Internet, leading to an increase in profits.

2010 Mathematics Subject Classification. **68T01**. 68T07, 68M01.

Keywords. augmented reality, e-commerce, artificial intelligence, Covid-19, online shopping.

1 Introduction

In EC, artificial intelligence plays a significant role and has several applications, like searching for products using voice recognition or image analysis, chatbot, virtual reality, and AR. EC has modified the purchase behavior of customers and improve the mechanisms used by sellers to advertise their products. AR allows the sellers to sell at a reasonable cost and expanding to large segments of the population due to the rapid growth of technology [1]. EC is a process represented by the trade of products, administrations, and different business practices that are economical, through electronic or distinct business practices. During the Covid-19 crisis, people turned to online shopping due to home quarantine and the importance of social distancing. Accordingly, it was dangerous for people to go out to buy from stores. Therefore, the safest choice was to buy from the Internet. EC gives numerous comforts and aspects of interest to purchasers when contrasted with the traditional way of shopping. The most ideal conditions are that it tends to be quicker and shorter regarding time. Moreover, customers can get a significant product on websites around the world [2]. However, there were limitations regarding how the way the product was presented and the lack of necessary information about the product. Traditional commerce (Buying from physical/ real store) enables the customer to observe, touch, try, and use the product. Indeed, even customers can contact the dealer or the shop assistant to ask for some product information. Besides, all the encounters are not completely gained by buyers when they shop online. AR is an innovation to present the products in EC. AR is represented as the superposition of virtual items on the genuine condition of the customer [3]. AR allow EC vendors to magnify their goods in exceptional detail, rendering them equivalent to their actual products [4]. AR promotes the process of purchasing for customers by allowing them to

try and use the product visually buying decision. Additionally, customers can get more details to ensure that the item is relevant. This paper discusses the impact of AR technology in EC websites on SA. AR has three unique properties that identify online item with AR from other Kinds of online item [5]:

- AR incorporate the virtual and physical world by overlaying virtual objects on the customer or their environmental variables, which empowers them to attempt an object as if it was actually there.
- The virtual product in AR is clever, which means the consumer will be able to interact with it like a real product.
- The virtual product is enlisted in 3D and subsequently has a fixed position in the 3D area.

AR is like virtual reality (VR) with the hope that a watcher's perception will be enhanced or improved. Unlike VR, which electronically generates an image of the entire actual environment, AR generates a superimposed approximation of the watcher in an electronically generated environment [3].

2 Related work

This section discusses the importance of AR in previous research related to EC. AR is an active research area, several types of research and surveys are published to discuss AR technology, applications, services, importance as in [6, 7, 8, 9] In SA, AR technology has been applied in the field of education as in [10, 11, 12, 13, 14, 15, 16]. Moreover, in the field of Hajj and Umrah as in [17, 18]. Another field that applies AR is in directions guide like [19]. This study aims to encourage the use of AR technology in the field of EC. Few merchants in SA use this technology like Golden Scent, an application for selling cosmetics. According to [20] the researchers carried out 3 experiments to assess the usage of AR advertising in e-commerce and the impact of AR advertisements on sales. The first research examines AR advertising with conventional advertisements, resulting in AR improving the behavior of the customer. The second research utilizes eye-tracking to assess the visual interest of the consumer, and the result reveals that AR receives a greater percentage of customer focus. The third study assesses the significance of AR knowledge and familiarity. Based on [21] the study uses a socially situated theory of cognition. The researchers perform five experiments to investigate how social AR facilitates mutual decision-makers in dyads of recommender's decision makers. The researchers are investigating a modern social AR framework that allows users to share decision-making using photo and video formats. In the sense of perceived pleasure and utility through EC experience, the study [22] explores the effect of AR technology on purchasing intention. Surveys were distributed to collect data and test the influence of AR on EC purchases. Partial least squares path modeling (PLS-PM) test was performed to evaluate the hypotheses of the study. Almost all of the respondents in this research are students from high school and university. The result revealed that virtual presence, directly and indirectly, affects the enjoyment and usefulness of the purchasing purpose significantly. In order to establish augmentation quality that tests the performance quality of AR in three different contexts, the study [23] conducted a qualitative experimental study: online shopping, entertainment facilities, and basic service maintenance. To analyze user satisfaction, monitor, and increase efficiency, the Analysis of Variance (ANOVA) test was applied. Results have shown that individuals care about the protection of their personal data

and the efficacy of augmentation. There are some drawbacks to this report. First, it limited the sample size. Second, this study used only smartphone applications of AR to answer the research issue. The study [24], examines the influence of AR on consumer activities in the online retail world, by examining the cross-country similarities between two different groups of people from Italy and Germany. The study focuses on youth markets between the ages of 20 and 30 due to the massive use of the internet, especially those who will try online glasses. The examination demonstrates similarities and variations in behaviors between two groups using AR in internet shopping. In addition, 13 hypotheses were explored about the behavior of internet shopping customers using AR.

3 Hypotheses

This section provides the hypotheses used in this research study.

- H1: AR makes the buying and selling process in EC effective than the traditional Method. AR is being used before shopping to help shoppers decide on a purchase [23]. It allows the seller to give the product a comprehensive overview.
- H2: Understanding the prosperities of AR encourage both buyers and sellers to use AR in EC. A significant factor in the success of AR is the ability of both buyers and sellers to use and understand AR features. User experience, that relates to how a person interacts with products, services, knowledge, and objects through a user interface, is a key contributor to customer experience [25].
- H3: the use of AR in EC increases the profits. The advantages offered by augmented reality technology such as image quality and resolution, details, interaction and ease of use are factors that encourage the user to buy and thus increase profits.

4 Methodology

In this section, the methodology used to accomplish the study is proposed.

The study uses a quantitative method questionnaire to evaluate the efficacy of AR in EC websites. The objective is to assess the hypotheses and measure the degree to which people embrace AR technology on Saudi EC websites. The questionnaire was performed using Google Forms and distributed online in two languages English and Arabic. It targets both males and females, of all age segments. Information required before answering the questionnaire: gender, age, and previous experience or not.

Steps: The work is divided into two main parts: A literature review and a questionnaire represented in Figure 1.

Literature review:

1. Determine the general topic and subtopics.
2. Determine Keywords (augmented reality, online shopping, internet shopping, e-commerce, AR)
3. Determine the hypotheses.
4. Select database (Since-Direct, Scopus, IEE Explore, ResearchGate, Springer, Google scholar).
5. Start search using keywords for AR applications in EC in the world.

6. Customizing the search process and collect previous research related to AR applications in SA.
7. Customizing the search process for AR applications in the EC field in SA.

Questionnaire:

1. An online questionnaire is implemented.
2. Distribute the questionnaire through social media.
3. Data collection
4. Data analysis
5. Examines the Hypothesis
6. Interpretation of finding
7. Result

Based on the literature search, more than 80 scientific papers have been obtained discussing the use of augmented reality technology in the world. In the next step, all papers not related to SA were excluded. After that, the research was strictly dedicated to obtaining AR applications in SA only. The remaining scientific papers were sorted to obtain the scientific papers that present the AR applications in the field of EC in SA.

5 Results and discussions

In this section, the result of the questionnaire is discussed and analyzed.

After the questionnaire was distributed, 208 people participate on it. The percentage of the female is 84% and 16% for male. The highest percentage of participants were in the age range from 21 to 30 years old. On the other hand, the age group from 14 to 20 years comes after the first group of participants. Furthermore, the third group was for the age group from 31 to 40 years old. While the last group was for the age group from 41 to 50 years old, and there were no participants older than 50 years old. Moreover, 60.2% of people who participate in the questionnaire have previous experience in AR and 39.8% of them don't have any experiences. Depend on the evaluation criteria displayed in Table 1, 62.1% of respondents agree with the convenient use of EC websites that use AR, which support H1. Moreover, 68.4% of respondents supports the use of AR on EC websites in KSA.

Additionally, based on H2, 82% of people who participate in the questionnaire agree that the AR improves their trust in the products and their suitability for them. The percentage of the participants who can easily understand the graphical interface and the function of each item is 62.6%. Besides, 65% of respondents liked the interaction of the products with them more than traditional static pictures. Furthermore, 68.4% of respondents believe that using AR in EC has a major role in increasing the percentage of revenue and profits. This experience was enjoyed by 82% of the people. Based on H3, 68.4% of the participant agrees with H3, the use of AR help to increase the profits. The study showed that age has a direct impact on the shopping experience. These percentages show the age group from 21 to 30 years old is the most frequent use of the EC websites and the Internet. In contrast, people whose ages range from 41 to 50 fewer age groups buy from the

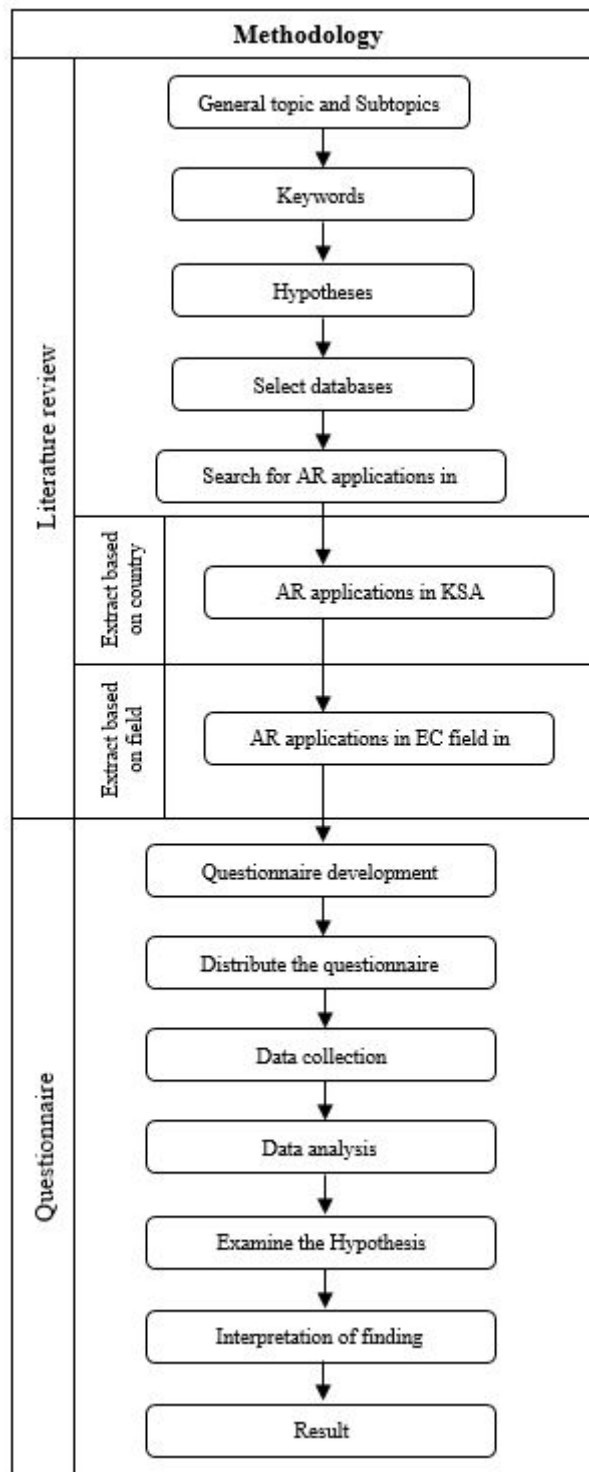


FIGURE 1. Methodology

Internet. In addition, the majority of participants are female. Moreover, previous experience and awareness of AR have served an important role in the understanding of buyers. Customers who had prior experience in AR were very excited to use it again, while customers who had no prior experience in AR were a little hesitant.

TABLE 1. Questionnaire Effectiveness criteria

Effectiveness criteria	Agree	Neutral	Disagree
Ease of use			
Augmented reality technology is easy to use in e-commerce and shopping sites	62.1 %	34.5 %	3.4 %
Clarity			
The AR visual interface was clearly detailed and I can understand all the icons and navigation activities.	62.6 %	32.5 %	4.9 %
Interactivity			
The product interacts with me reasonably and I like this interaction more than a static image of the product.	65.0 %	32.5 %	2.4 %
Enjoyment			
Using AR in the E-commerce website can be enjoyable and exciting.	82.0 %	17.0 %	1.0 %
Usefulness			
The use of AR enhances the customer's confidence in the product by providing more details about the product.	82.0 %	17.0 %	1.0 %
Recommended			
I recommend adding AR technology to the E-Commerce websites in Saudi Arabia	82.0 %	16.5 %	1.5 %
Profit			
Do you think that augmented reality technology has a role in raising the percentage of profits and sales when used in e-commerce sites?	68.4 %	28.2 %	3.4 %

6 Conclusion

This research confirms the previous studies examining the effect of AR on internet shopping. The results of the study show that age, gender, previous experience, the convenience of use, transparency, interactivity, enjoyment, usefulness, and profit have a direct effect on recommending the use of AR in EC websites. Based on the answers of the respondents in the questionnaire and their support for the idea of using AR technology in EC websites, the result of this study can be classified as positive, and the idea will meet with success and demand from users. It demonstrates that the use of AR with EC websites can help clients increase the effectiveness and satisfaction of shopping online. In addition, it gives more benefits for sellers either wholesalers or retailers, by increasing their sales and profits from online shopping, and rich to massive volumes of people from a different location. The goal of this research is to encourage Saudi Arabia's owners of stores and EC websites to AR in their trade, which will offer them benefits and profits.

7 Acknowledgment

The researchers would like to thank the Deanship of Scientific Research, Qassim University for funding the publication of this project

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