The Use of AR Technology to Overcome Online Shopping Phobia

A Systematic Literature Review

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Abstract—With every year's start being a new beginning and a source of happiness, reigniting hopes and optimism around the world, the happiness and enjoyment of the year 2020 faded away quite earlier. It was not long into the year 2020 that the notorious COVID-19 hit the world. Millions of people died of it and billions of people got affected by it either directly or indirectly. With its impact on everybody, it drastically affected the business world as well; individuals lost their jobs and companies lost their businesses. However, companies learned to respond to the pandemic by converting their businesses to online business model and the customers also shifted to online shopping. With this compelling shift, the customers still had the phobia of online shopping and tried to abstain from it as much as possible. To respond to this, a systematic review in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was developed to offer a systematic and holistic literature review of the research regarding costumer confidence in online shopping particularly by the use of Augmented Reality (AR) technology. The database of this review includes a set of 54 systemically selected state-of-the-art articles from Scopus database covering empirical and theory research conducted in different countries with different resource endowments. The results show that the use AR technology can help customers in overcoming their shopping phobia and thus, it can be a source of enhanced online business for companies. Some possible opportunities for future research are also illustrated in this paper.

Keywords—Online Shopping; Augmented Reality; AR Technology; Shopping Phobia

1 Introduction

The beginning of the year 2020 has been remarkably different from the rest of the years. January used to symbolize new beginnings and fresh starts along with many remarkable events happening around the globe; for instance, The Harbin International Ice and Snow Sculpture Festival, China; International Kite Festival India; Wakakusa

Yamayaki Festival, Japan; Mardi Gras Festival, New Orleans (USA) and the like. However, 2020 has turned out differently in all respects; be it economically, medically, politically or psychologically. It was on January 7, 2020 when a notorious virus (officially named as COVID-19 by the World Health Organization—WHO) was detected in the Laboratory of Virology, Chinese Center for Disease Control and Prevention [1]. In a short period of only 2 months, it affected the whole world spreading incessantly to more than 200 countries and territories with more than 25 million confirmed cases (as of August, 2020) and more than 845,000 deaths around the globe [2].

In an attempt to curb the devastating situation and put a halt to this pandemic, governments around the globe have levied movement control orders (hereafter MCO) thereby restricting their citizens to minimize all the activities and practice social distancing to reduce the transmission intensity [3]. This social distancing has already cushioned the decrease of spread in the South Korea [4] and Singapore [5]. Thus, medically, MCO has resulted in significant gains; nonetheless, economically the MCO has shattered almost all the businesses around the globe making them face acute impoverishment.

However, the current situation has signalled the shift of customers from conventional shopping to online shopping facilities due to almost all the people sitting out COVID-19 by staying at home [3]. In order to kill their loneliness and enjoy the leisure times, people spend most of their times on the internet [6]. Besides, due to the lockdown imposed by almost all the governments around the world, customers are forced to refer to online vendors for buying products. Consequently, in the current times, people normally reluctant to online shopping are highly likely to turn to online stores for fulfilling their needs (shopping) as well as for entertainment (e-window shopping). Thus, it serves as the best times for organizations to enhance people's confidence in online shopping.

Why people do not opt for online shopping?

Although many people visit online stores and search for different items [7], still it is worth mentioning that majority of the people have been reluctant to use online shopping lately [8]. Although online shopping offer convenience as compared to the conventional bricks-and-mortar store shopping [9], there exists a lack of confidence among people to exploit its benefits [10]. To say the least, online shopping is perceived by most to be risky and insecure [11]. Consequently, contemporary market studies have revealed that approximately 54% of the customers feel dissatisfied with their latest online experiences [12].

In order to overcome these insecurities, the corporate world has been in a continuous struggle to develop strategies and tools that encourage and entice people's online shopping behavior which include social media marketing, mobile applications development, cash-on-delivery, enhancing hedonic motivation, product ratings, creating a sense of brand [13] and the like. Among these developments evolved the revolutionary technology of Augmented Reality (AR) that removed the boundaries between online and offline channels [13]. AR consolidates the digital substance interactively and in real time into customer's physical environment [14]. This revolutionary development is expected to trigger online shopping behavior [14]. In the words of Apple's CEO Tim Cook, AR is "changing the whole experience of how [customers] shop" [15], thus guiding Apple

to allude to AR as a central technology and follow an AR-based future maneuver. It offers an exclusively influential arrangement of "smart" technologies [16] established to impeccably unify online and offline encounters by means of an instinctual, context-based, and socially connected interface.

Nevertheless, regardless of such advancements, it appears that users tend to be insipid by existing AR encounters. A latest assessment by Digital Bridge [17] shows that even though clients signpost an inclination toward purchasing online when aided with AR services, more than half (51%) of the customers still feel reluctant to consider online shopping as the prioritized mode of shopping. One of the major causes for such underwhelming performance may be due to the reason that firms are not yet capable of effectively boosting customers' confidence in online shopping [18].

Hence, the aforementioned discussion leads to the question; how can we build customers' confidence in online shopping through AR technology? Different research studies in the field have proposed different results of AR on online shopping; however, it is still unclear why online market does not hold its due position. Thus, this study is concerned about examining customers' confidence in online shopping. Specifically, it aims to study the existing literature and examine how AR can remove confidence barriers in online shopping.

2 PRISMA-Based Systematic Literature Review on Online Shopping Confidence via Augmented Reality

2.1 Objective

This study aims to conduct a systematic literature review using "Preferred Reporting Items for Systematic reviews and Meta-Analyses" (PRISMA) approach to identify customers' confidence in online shopping when aided with AR technology.

2.2 Methods

A comprehensive literature review was conducted following the guidelines of PRISMA mechanism [19] to find evidences if AR serves as a means of boosting customer's confidence in online shopping. The different phrases and keywords used to search for the relevant studies included: AR and online shopping, AR and online purchase, AR and e-commerce, AR and online buying behaviour, and shopping through AR. The criteria assessed included: Online shopping done via conventional online stores; AR technology employed to enhance online shopping; evidence of difference in online shopping convenience through AR technology; and comprehensive elaboration of the statistical methods employed to examine online shopping confidence.

In terms of the authors' contribution, the first author conducted the screening and examined the eligibility of the papers along with documenting this study, the second author evaluated the final list of papers and the last author validated the screening.

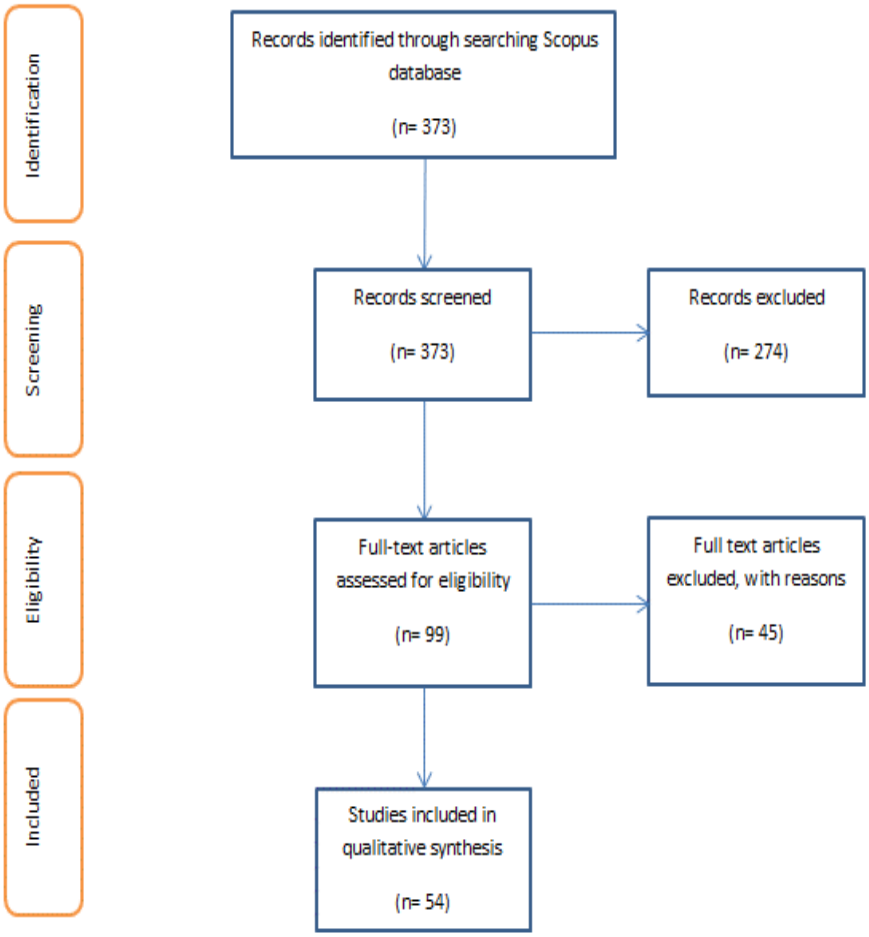

Fig. 1. PRISMA flow diagram

Eligibility and inclusion criteria: After the initial selection of various research articles, a rigorous selection criterion was followed for the final list of papers as follows:

- Scopus database was used to search articles published in peer-reviewed journals since 2011 with the latest search run in April 2020 limiting the language to English only.
- During the selection, only those articles are included that had access to full text.
- Most of the studies included are comprised of quantitative analysis. However, few studies with qualitative analysis of high value have also been incorporated.
- Duplicate studies from different keywords have been excluded.

2.3 Articles included in qualitative synthesis

After conducting article search with different key terms and phrases on Scopus database, the resulting list went through a stringent inclusion and exclusion criteria. This process resulted in a total of 54 studies for the review, as shown in PRISMA flow diagram. The final list from the Scopus database was put to a two-steps analysis. Initially, the list was exported to Microsoft Excel 2016 in order to reveal descriptive statistics of the contemporary literature on the use of AR in online shopping that includes the apportion of year, subject areas, and countries. In the subsequent stage, a thorough content analysis was carried out to distinguish and examine major research areas, outlining elaborate research across various themes and signifying the possible challenges and opportunities for future studies. Content analysis is a technique to analyse different research articles under foreordained classes, employing a systematic approach, permitting replicable and substantial derivations from the studies [20].

3 Results

3.1 Descriptive analysis

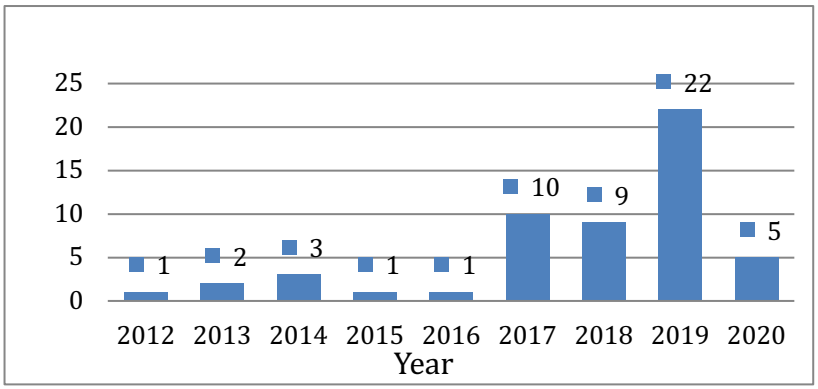

Fig. 2. Evolution of Publications over the Years

Figure 2 shows the manifestation of the number of researches on the use of AR technology in online shopping. It is evident that the number of publications has escalated recently. Particularly, researchers seem to have shown greater interest in AR technology after the year 2016 with the highest number of publications to be seen in 2019. Consequently, majority of the papers selected for the current study are quite recent and contemporary, precisely from 2017 to April 2020, constituting 85% of the total research articles. It reveals that the study of AR in online shopping is increasing significantly.

In terms of distribution of studies by country, Figure 3 represents the top five most productive countries. In rankings, United States of America and United Kingdom hold the first two positions with nine and eight publications respectively. A possible

justification could be the fact that the two countries usually are the first adopters of any new technology [21]

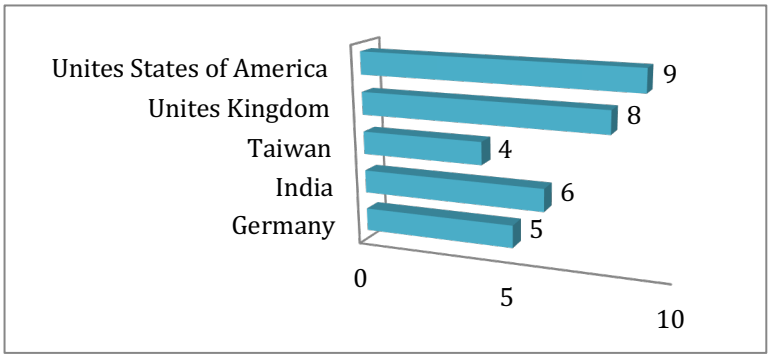

Fig. 3. Distribution by Countries

Moreover, Table 1 shows the number of publications with respect to the journals in which they were published. It can be observed that the maximum number of studies have been published in Journal of Retailing and Customer Services. However, it is also apparent that most of the studies selected for review in this study have been published in separate sources.

Table 1. List of the Major Journals Publishing Articles on the Topic

Journal	Number	Percentage
Journal of Retailing and Consumer Services	7	13%
International Journal of Retail and Distribution Management	2	4%
Computers in Human Behaviour	2	4%
Journal of the Academy of Marketing Science	2	4%
Others	41	75%

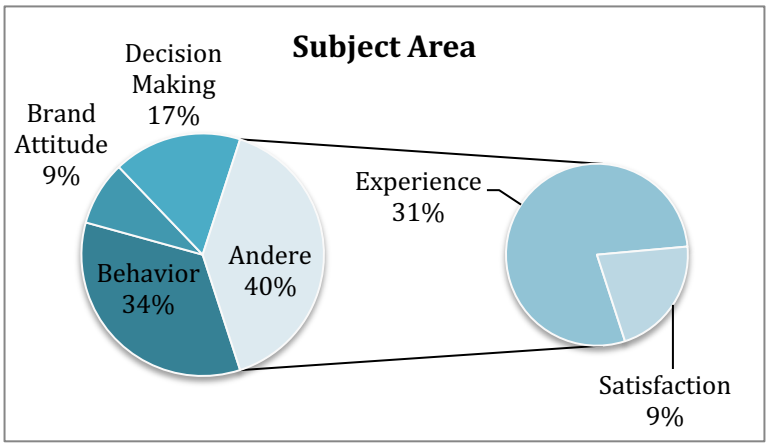

Fig. 4. Distribution by Subject Area

With respect to publication by subject area, most of the studies conducted in AR examined the behavioural aspect of consumers. Behavioural aspect of AR technology comprises 34% of the overall research. Other major research fields include brand attitude, decision making, purchase experience and satisfaction as shown in Figure 4.

3.2 Content analysis

Most of the human activities transformed completely with the advent of internet technology. In the flow of these changes, shopping patterns also shifted from traditional brick-and-mortar store shopping to online shopping. However, it is still difficult for many customers to opt for online shopping. They refrain from online shopping because they consider it risky due to the insufficient product information and the lack of touch and try [22]. This incapability of the conventional 2D web based online shopping has been compensated by the digital technologies [23], [24] such as 3D, AR, VR (Virtual Reality), headsets and the like. The advent of these technologies has also accounted for the sensory shopping experience—video, audio, text etc.—a feeling considered inevitable for enhanced decision making and satisfactory shopping experience [24]. In particularly, AR offers an effective simulation of the shopping experience with the provision of the ability to better assess the product and make effective decision with considerable confidence [22]—[26].

Besides, AR technology offers delightful and captivating experience through its interactive 3D presentation of the product [14], [24]. As a matter of fact, the quality of information articulated by AR technology has the capacity to alter customers' behavioural intention [25]. The delightful experiences garnered by AR urge customers to look for and do online shopping from online vendors equipped with AR technology [26]. Thus, the superior AR quality not only generates shopping experiences, it also supplements them [26].

The next sections cover the major themes related to AR technology identified during the analysis of the various researches incorporated in this systematic literature review.

AR vs. VR: Although this study was focused on the AR aspect of the digital online shopping, many studies selected for the final analysis included both the AR and VR technology. The percentage of these studies is shown in Figure 5.

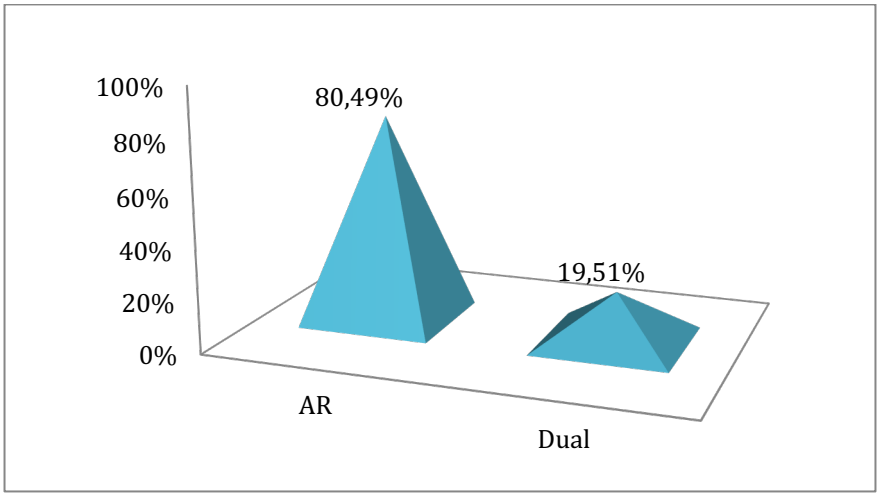

Fig. 5. Studies Incorporating AR with the VR Technology

These studies not only discuss the ease and comfort of online shopping through digital technologies, they also compare and contrast the two mediums on the basis of different characteristics. For example, Zhao et al., [22] in his study contrasted AR and VR in terms of mental workload and compared the results for males and females. The authors argued that VR posed more mental workload for the females as compared to the males. They even argued that shopping through the VR technology has similar effects as the traditional online shopping. On the other hand, AR poses more mental workload for the males than females. The reason presented is twofold: (i) males do online shopping less frequently thereby making them more cautious whether to buy the product or not; (ii) they mostly purchased high price and high-quality products which increased the mental workload. Besides, online shopping serves as a source of rational thinking for males and they give more importance to the practical aspects of the product. On the other hand, females prioritized the entertainment and emotional aspects of online shopping [22]. Hence, males' mental workload in online shopping is greater.

Another study conducted by Bonetti et al., [27] examines the use of AR and VR in the fashion industry along with the software developers. Such retailers are more inclined toward the use of these immersive engineers [28]. They prioritize the AR technology by arguing that AR integrates real-time and computer-generated data into physical world making them appear as a single environment [29]. By the amalgamation of the digital and effective reality, AR is the enhanced form of the contemporary VR technology thereby alleviating various shortcomings of the VR technology [30], [31]. On the continuum of digital immersion experiences, VR, on one hand, circumvents real-world sensory experiences by using a wearable device (usually a head-mounted set) and submerges the user in digital and amusing 3D environment [27], AR, on the other end, enables users to go through enriched and more realistic exposure to the real world [24], [32], leading to an augmented physical world [25], [30].

Innovation in AR and its impact on e-businesses: The literature with respect to AR not only covers its impact on consumers rather it also covers the organizational

implications of AR technology. The erosion of the boundary between the online and offline channels has blessed all the major stakeholders of a business i.e., consumers, retailers and manufacturers thereby inviting the researchers to investigate its impact from different perspectives. In terms of manufacturers, AR technology is capable of affecting the slotting fees and pass-through rates on retailers' shelves. Moreover, as and when AR becomes first priority of customers for the identification and selection of products, many issues such as premium shelving, space allocation, and end of aisle allotments along with any related retailer fees is highly likely to recede significantly in importance [33].

Consumers' level of certainty and ease of transaction with AR: The modern technologies such as 3G, 4G, and (in the not distant future) 5G networks have increased and continue to increase human efficiency in almost all walks of life. However, retailers do not wish for the customers to undergo efficient shopping experience. In a grocery store, for instance, shelves are set in such a way that people have to walk almost the entire store to find items of their choice. This not only leads to increase in the shopping time, it also results into buying some extra items due to impulsive buying behaviour.

Nonetheless, with the aid of AR technology, where customers get benefit of convenience of finding item of their choice efficiently, it also assists them in a confident transaction. Thus, vendors in the online business can augment their sales through employing AR technology. It can be concluded that AR not only helps the customers in online shopping, it also helps the online vendors in enhancing their sales.

Side effects of AR: It goes without saying that convenience comes at a cost and shopping convenience is not any exception to it [34]. Undoubtedly, when individuals opt for tech-based shopping, where they gain many advantages over the traditional shopping, they have to withdraw from certain shopping experiences. The use of technology dictates individuals' perception and behaviour on the basis of various psychophysiological factors. Probably the most significant, yet underrated, psychophysiological component is the sense of 'touch' which in the case of online shopping is the desire to touch the product. When consumers opt for a product entirely on the recommendation of AR technology, they miss the opportunity to sense the product physically prior to purchase. Consequently, the lack of touch might have significant inferences for product recognition and the choice [33]. This absence of physical touch is likely to decrease shopping confidence, purchase decisions, brand attitude and brand loyalty [35].

4 Discussion

This research complements the contemporary body of knowledge by offering an elaborate mapping of the studies of AR technology in the context of COVID-19 to frame a systematic literature review. The brief descriptions of the context and development process of research are also devised to inculcate superior comprehension of the study. By consolidating the current literature, this study presents a methodical and comprehensive picture of AR technology after the COVID-19 pandemic. Nonetheless, the current study is still not free from limitations. First, subjective elements play a critical role especially in qualitative studies. In systematic reviews, designing the layout of the research tends to be a similar factor. The researcher's abstract assessment of the current studies when deciding various dimensions and their organization needs to be taken into

account. However, a significant level of legitimacy can be guaranteed, as the success proportions depend on strong academic references [36]. The reference studies included in this research endeavour have been published in journals of high notoriety and status in their particular discipline making them highly illustrative. Most of the selected studies incorporate methodologies and empirical results, however, studies without methodology and empirical results can also be included to depict a methodical image of research in the relating area. Second, this study considers primarily academic articles. Albeit various books and reports have been referred in the study, they have not been put to a thorough examination.

Regardless of the different limitations in the study, it opens different avenues for future research. In light of the outcomes of this study, a research plan can be formulated for further research endeavours. First, it covers how AR technology alleviates the phobia of online shopping and encourages people for e-shopping. However, there still exists need for researchers to study how and what changes could be made to the design and use of the AR technology itself so that it can be employed by majority of e-shoppers.

Second, a significant portion of the literature is devoted to the behavioural outcomes of the use of AR in online shopping which continues to be an attractive research area for future studies. However, AR must be studied under the umbrella of neuroscience. Future studies must verify the results of using AR in e-businesses by employing neuromarketing methods.

Third, researchers must take into account the industrial orientation so as to improve the efficiency of AR. It will not only help the developers of AR; it will also enhance the sales of online vendors by encouraging customers to shop online with ease and confidence.

5 Conclusion

In this paper, studies devoted to the AR technology have been reviewed systematically to devise an all-encompassing image of the literature. The review is carried out with a sample of 54 articles. The results reveal that the number of studies has significantly risen after 2017. Particularly, an abrupt rise in the number of publications happened in 2019, constituting 41% of the total articles. Besides, among the different subject areas in the field, the most famous research theme corresponds to the consumer behaviour, which comprises 34% of the total studies. Among the list of the various countries, most of the research studies imparted to the current body of literature are from the US and the UK, which can be credited to their emphasis on the use and continuous enhancement of the computer technology.

Moreover, the role of COVID-19 in shifting people from brick-and-mortar shops to e-shops has also been incorporated in this paper. The pandemic compelled customers to stay home and shop from online vendors. Thus, it necessitated to investigate how customers can do online shopping with confidence and ease. Among the options of tech-based online shopping (AR vs VR), this study focused on the AR technology as it offers increased confidence and true picture of the product.

Finally, research into AR technology will continue because of its contribution and significance to the businesses. Future researches might across different regions

depending upon various factors such as country's economic condition, literacy rate, technology adoption and the like.

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