

Research Article

Factors Affecting the Intention to Use Virtual Stores: Perspectives of Consumers in Saudi Arabia

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Companies have explored various forms of virtual reality (VR) shopping, yet what is known about the user adoption behavior of VR apps is minimal and research into VR shopping from a user acceptance perspective is limited. This study investigates the factors that affect the intention to use VR for online shopping through undergoing a virtual shopping experience in the VR app. This is an exploratory study using a quantitative methodology. The findings indicate that telepresence, attitude, perceived control (PC), satisfaction, hedonic motivation (HM), and perceived usefulness (PU) are direct determinants of intention to use, whereas perceived security risk has no effect. Moreover, PEOU, PU, PC, and telepresence are indirect determinants of intention to use. This research is valuable for its identification of the determinants that can affect the adoption of VR in online shopping. This study helps store owners to understand what features will enable a successful implementation of virtual stores (VSs). This study has several limitations. First, the study was conducted using a convenience sample, making it difficult to generalize the results to the whole population. In terms of method, the study was entirely quantitative, using a questionnaire entirely consisting of close-ended questions, so participants were limited in their response options. The final limitation is in the scope of the research, which covered the perceptions of consumers only, while employees' and ICT experts' perspectives were not considered. In light of these limitations, this study allows some suggestions for future research directions to be made. (a) The perspectives of employees and ICT experts could be included so that more factors will be generated. (b) Future research could use different methodologies such as mixed methods to gain a deeper understanding of the responses. (c) A longitudinal study could be designed to address any developments occurring in VS features, as e-commerce is continually being developed.

1. Introduction

New technology should be studied because of the increasing importance of applying it in a retail context in order to succeed in today's market [1]. Lee [2] asserts that innovative technologies affect how marketers deliver value to the customer and offer attractive experiences. According to Blázquez [3], improvements in IT have helped consumers to evaluate products online using new tools that offer realistic viewing and self-service. Furthermore, these new technologies have an essential role in the retail sector, as they help to enrich consumers' purchasing experience to increase their benefits [4]. Among these so-called emergent technologies are virtual reality (VR) and augmented reality (AR).

VR has the potential to be the “next big computing platform” [5] and is continuously developing to boost online retail [6]. VR has various definitions. According to Mealy [7], it is “an immersive computer-simulated reality that creates a physical environment the does not exist.” Alternatively, Arnaldi et al. [8] defined VR as “the capacity given to one (or more) user (s) to carry out a set of real tasks in a virtual environment, this simulation being based on the immersion of a user in this virtual environment through the use of interactive feedback from and interaction with the system.”

Many companies have sought to extend VR technology to other areas such as e-business because of the great success that this technology has achieved in recent years [9]. As

mentioned, VR technology and e-commerce will be combined and the focus will be on how e-commerce suppliers should offer a good experience to consumers while they are shopping and how they should design their interfaces for online shopping [10]. According to Su et al. [11], the main ways of representing products in the e-commerce environment are by means of pictures and text, which do not give consumers an accurate view of the products on offer. The focus of this study is on applying VR in e-commerce, because this is a field in which VR will be widely used in the future [11].

According to Peukert et al. [12], little is known about user adoption behavior of VR apps, because many such apps are still at a nascent stage. Peukert et al. [13] also state that the research lacks empirical studies that examine VR shopping from a user acceptance perspective. In addition, Gao and Bai [14] assert that research on the factors affecting customer adoption of new IT is limited in understanding. Thus, researchers see a need to evaluate whether customers will accept and use VR for shopping. The field of e-commerce is expected to adopt VR widely in the future [11]. Accordingly, this study focuses on applying VR to e-commerce.

According to Zhang [15], Bonetti et al. [6] reviewed the literature and found that work on the realistic implementation of VR remained incomplete. Although there is some work on the use of VR in sectors such as education and healthcare, there are few studies of how VR can affect consumer behavior, the interaction between consumers and retailers, and the shopping experience of consumers. Furthermore, in his systematic review of the use of VR in online retailing, Zhang [15] concludes that VR is beginning to be used in e-commerce, but still has a long way to go.

According to Xue et al. [16], 37% of all papers focusing on VR or AR suggested that retailers must consider the variables that influence consumer perceptions. Specifically, the variables that impact virtual commerce (v-commerce) consumers must be better understood. Furthermore, Xue et al. [16] found that 50% of all papers stated that major limitations remained in the knowledge relevant to VR shop design (i.e., consumer behavior, VR/AR-related studies, and how they might link to sales). In addition, their review identifies certain fields of study that remained unaddressed and where further research is still most called for (i.e., the lack of influencing variables linked to v-commerce shopping). Finally, as mentioned earlier, existing research largely disregards shopping online using VR (immersive environment). Hence, to fill all of these gaps, the present work explores the theoretical aspects of intention to use VSs and identifies various factors affecting it.

Another gap is that Fetscherin and Lattemann [17] and Manis and Choi [18] studied the effect of perceived ease of use (PEOU) and perceived usefulness (PU) on intention to use. But they did not study the security, privacy, satisfaction, control, and telepresence factors. Also, Phosaard [19] confirmed that PU positively related with the purchase intention in online VR stores. They discard PEOU, security, privacy, and satisfaction. In addition to that, Verhagen et al. [20] studied motivations to engage in VW. Also, they did not study the security, privacy, satisfaction, control, and telepre-

sence factors. Moreover, Han et al. [21] studied the behavior intention in VR shopping experience; they did not study the effect of PEOU, satisfaction, security, and privacy. What we want to say is that there is no previous literature that studied the effect of PEOU, PU, hedonic motivation (HM), telepresence, satisfaction, control, security, and privacy in one model. Also, there is scarcely ever a study that examined the factors affecting intention to use virtual store in Saudi Arabia.

This study is aimed at identifying the factors that affect the intention to use VSs from the consumer perspective in Saudi Arabia. It is hoped that it will also motivate further research into the implementation of VSs.

The study makes contributions in two categories: practical and theoretical. On the theoretical side, it extends the literature about consumer intention to use VSs. On the practical side, this study's findings will help to enhance knowledge of the factors affecting the intention to use VSs from the consumer perspective, thus improving the chances of VS success through understanding consumers and providing what they want.

This paper is a quantitative study using experiment and a paper-based survey technique. This paper is structured into the following parts. The research hypotheses are listed in Section 2. Section 3 presents the methodology for the study. The hypothesis testing results are in Section 4. The discussion of findings and the limitations and future work are discussed in Sections 5 and Section 6.

2. Research Hypotheses

We reviewed the literature in the context of this study and chose the most frequently used factors.

The most frequently used factors are PEOU, PU, HM, telepresence, satisfaction, perceived control (PC), perceived risk, and attitude as shown in Table 1.

2.1. Perceived Ease of Use. In agreement with Changchit et al. [22] and based on Liu and Wei [23], in learning the reaction of people to IT, PEOU plays a vital role. It is explained as "the degree to which a person believes that using a particular system would be free of effort" [24]. Fetscherin and Lattemann [17] studied the user acceptance of virtual world (VW). They said PEOU has a positive and clear influence on the behavioral purpose of using the method. In addition, Manis and Choi [18] found that PEOU significantly influence the attitude towards using VR hardware, and in consequence, the intention to use VR hardware has a positive effect on the attitude.

When we look to the e-commerce context, we find various studies confirmed the effect of PEOU. For instance, Gillenson and Sherrell [25] confirmed that attitude toward using the VS was positively affected by PEOU, and attitude positively impacts intention to use VS. [26] found that PEOU, while using a VS, had a favorable impact on attitude to use the VS. In turn, attitude positively impacts intention to use the VS. Shang et al. [27] studied online shopping motivation, and the results confirmed that PEOU had a positive relationship with online shopping behavior. Maditinos et al. [28] observed that PEOU had a decent link with the

TABLE 1: Most frequent factors based on literature review.

Factor	Supporting literature
PEOU	Fetscherin and Lattemann [17], Shang et al. [27], Mohd Suki et al. [29], Manis and Choi [18], Gillenson and Sherrell [25], L.-d. Chen et al. (2004), Maditinos et al. [28], Oh et al. [36], J. Kim and Forsythe [30], Reyes-Mercado et al. [31], tom Dieck et al. [32], Hsu et al. [33]
PU	Phosaard [19], Han et al. [21], L.-d. Chen et al. (2004), Purosothuman [35], Wu and Liao [37], Reyes-Mercado et al. [31], Han et al. [34], Verhagen et al. [20], Manis and Choi [18], Gillenson and Sherrell [25], Oh et al. [36], J. Kim and Forsythe [30], Tom Dieck et al. [32], W.-C. Hsu et al. [33]
HM	Nah et al. [42], Thombre [43], Guo and Barnes [44]; [88] Phosaard [19], Domina et al. [45], Papagiannidis et al. [46], Papagiannidis et al. [47], Pookulangara et al. [48], Papagiannidis et al. [49], Figliozzi [4], Han et al. [21], Avcilar and Ozsoy [51], An et al. [52], Tandon et al. [40], Peukert et al. [13], Han et al. [34], Xue et al. [50]
Telepresence	Nah et al. [42], Papagiannidis et al. [46], Papagiannidis et al. [49], Martínez-Navarro et al. [10], K. Song et al. [55], R. S. Algharabat [56], R. Algharabat et al. [56], Tussyadiah et al. [57], Phosaard [19], Han et al. [21], Peukert et al. [12], Han et al. [34]
PC	Lee et al. [59], Domina et al. [45], George [60], Hongyao [61], Ashraf et al. [62], Papagiannidis et al. [49], Sang-Lin Han and An (2019), Han et al. [34]
Satisfaction	Papagiannidis et al. [46], Papagiannidis et al. [49], . C.-W. D Chen and Cheng [26], Belanche et al. [64], Avcilar and Özsoy [51]
PISR and PIPR	Liu and Wei [68], Pavlou [69], Junli Zhang [92], Mandilas et al. [70], Masoud [71], Thakur and Srivastava [73], Tandon et al. [40]
Attitude	Manis and Choi [18], Gillenson and Sherrell [25], L.-d. Chen et al. (2004), Maditinos et al. [28], Oh et al. [36], J. Kim and Forsythe [30], Wu and Liao [37], Reyes-Mercado et al. [31], Tussyadiah et al. [57]

attitude towards using the B2C e-commerce method and that the desire to transact had a positive relationship with the attitude. Mohd Suki et al. [29] have shown that PEOU has a positive impact on the intention to buy online. Kim and Forsythe [30] studied the deployment of product virtualization technology (PVT) in e-commerce. They confirmed that PEOU of PVT had a clear beneficial impact on the attitude towards PVT use. In turn, attitude positively influences the intention to use. Reyes-Mercado et al. [31] indicated that PEOU influences attitudes toward adopting online shopping. If the customer PEOU is at lower stages, their attitude towards online shopping adoption would be adversely affected. They also confirmed that it impacts the behavioral intention to accept online shopping if the amount of attitude rises. tom Dieck et al. [32] indicated that PEOU influences VR adoption. In addition to that, Hsu et al. [33] confirmed that PEOU positively influences the attitude towards using a VR shopping interface. In turn, attitude towards using a VR shopping interface positively influence the purchase intention. Thus, it is hypothesized that

- (i) H1a: PEOU has a direct positive relationship with consumer intention to use the VS
- (ii) H1b: PEOU has a direct positive relationship with consumer attitude toward using the VS
- (iii) H1c: attitude toward using the VS has a direct positive relationship with consumer intention to use the VS
- (iv) H1d: attitude will mediate the relationship between PEOU and consumer intention to use the VS

2.2. Perceived Usefulness. It is explained as “the degree to which a person believes that using a particular system would

enhance his or her job performance” [24]. In the scope of this study, PU will be described as the range to which a person thinks that the VSs would improve his or her shopping process.

Phosaard [19] confirmed that PU positively related with the purchase intention in online VR stores. Verhagen et al. [20] studied motivations to engage in VW. They found that PU had a beneficial effect on the attitude to use a VW. According to Manis and Choi [18], PU has a positive effect on the attitude towards using VR hardware, and as a result, the attitude has a positive impact on the desire to use VR hardware. Moreover, Han et al. [21] confirmed that usefulness had a positive relationship with behavior intention in VR shopping experience. The goal of Han et al. [34] was to consider the fundamental factors that promote VR technology adoption. They found that in the VR shopping experience, PU is favorably correlated with behavioral intentions.

Furthermore, various studies confirmed the impact of PU in the electronic commerce field. For instance, Gillenson and Sherrell [25] confirmed that attitude toward using the VS was positively affected by PU. As a result, attitude positively affects behavioral intention toward using VSs. Additionally, Purosothuman [35] indicated that behavioral intention toward using the VS was directly and positively affected by PU. Similarly, Oh et al. [36] found that PU, while using a VS, had a clear positive impact on attitude to use the VS. In turn, attitude positively affects the behavioral intention to use. Kim and Forsythe [30] studied the adoption of PVT in e-commerce. They confirmed that PU of PVT had a direct positive influence on attitude, and as a result, attitude positively affects the intention to use. Similarly, Wu and Liao [37] confirmed that PU directly and positively influences the behavioral intention to use Internet shopping and indirectly through attitude. tom Dieck et al. [32] indicated that PU influences VR adoption. In addition to that, Hsu et al. [33] confirmed that PU positively influences the attitude towards using a VR shopping interface. In turn,

attitude towards using a VR shopping interface positively influences the purchase intention.

According to the above, we observe that PU impacts the intention directly and indirectly through consumer attitude, as mentioned in Zhou et al. [38]. Thus, it is hypothesized that

- (i) H2a: PU has a direct positive relationship with consumer intention to use the VS
- (ii) H2b: PU has a direct positive relationship with consumer attitude toward using the VS
- (iii) H2c: attitude toward using VS has a direct positive relationship with consumer intention to use the VS
- (iv) H2d: attitude will mediate the relationship between PU and consumer intention to use the VS

2.3. Hedonic Motivation. This factor explained as “the fun or pleasure derived from using a technology” [39] and can be conceptualized as perceived enjoyment [40]. HM is one of the contributing factors of technology acceptance and use Childers et al. [41]. Nah et al. [42] compared a 3D virtual world environment and a 2D virtual environment. They proved that enjoyment in the 3D virtual world environment is higher than that in the virtual 2D environment. They also confirmed that enjoyment positively affects behavioral intention.

Thombre [43] found that shopping enjoyment in a Second Life store has a positive effect on consumer purchase intention. Another study by Guo and Barnes [44] (2012) confirmed that perceived enjoyment positively affected purchase behavioral intention in virtual worlds. In addition, Phosaard [19] confirmed the positive relationship between enjoyment and purchase intention in online VR stores. Domina et al. [45] have demonstrated that perceived enjoyment had a positive impact on the decision to shop in a VW. Moreover, Papagiannidis et al. [46] confirmed that hedonic experience values affect the engagement levels with the simulated retail environment. Papagiannidis et al. [47] have developed a model on the determinants of engagement to driving a simulation vehicle. They checked the relationship of this engagement with enjoyment and other factors. The result confirmed that if the level of hedonic experience increased, then user engagement levels increased. Additionally, Pookulangara et al. [48] confirmed that enjoyment positively affects purchase intention from the Second Life store. [49] studied the effect of experience on engagement. They found that hedonic experience had a direct positive relationship with engagement with the simulated retail environment. Figliozzi [4] stated that perceived enjoyment has a beneficial impact on the decision to use technology (VR) for buying. Han et al. [21] confirmed that playfulness has a positive relationship with behavior intention in VR shopping. Furthermore, Peukert et al. [12] studied shopping in virtual reality stores; they confirmed that enjoyment has a beneficial impact on reusing the retail experience. Finally, Han et al. [34] aimed to understand the underlying factors that facilitate the acceptance of VR technology. They found that perceived playfulness is favorably correlated with behavioral intentions in the VR shopping adventure. Moreover, Xue et al. [50] found that hedonic consumers are more likely to accept v-commerce.

In contrast, various researches confirmed the effect of this element in the context of e-commerce. For instance, in Avcilar and Ozsoy [51], the result showed that hedonic value significantly affects intention. Furthermore, An et al. [52] confirmed that HM positively influenced online shopping intention. Tandon et al. [40] verified the favorable association between HM and online shopping behavioral intention. In addition to that, Xue et al. [50] proved that hedonic consumers are more open to accept v-commerce. Thus, it is hypothesized that

- (i) H3: HM has a direct positive relationship with consumer intention to use the VS

2.4. Telepresence. The VR experience’s success is determined by the feeling of being in a simulated world; thus, telepresence is considered an important factor to describe the VR experience [53]. It is defined as “the experience of presence in an environment by means of a communication medium” [54]. Nah et al. [42] compared the 3D virtual world environment with the 2D virtual environment. They also demonstrated that the impression of telepresence in the 3D virtual world environment is stronger than that in the 2D virtual environment. They also confirmed that telepresence positively affects behavioral intention. Moreover, Papagiannidis et al. [46] discovered that telepresence (color or graphics vividness, 3D realism) positively affects user engagement. Another study conducted by Papagiannidis et al. [49] indicated that telepresence positively affects the simulated experience. Martínez-Navarro et al. [10] showed that the sense of presence positively affected purchase intention in VSs.

In contrast, various studies confirmed the effect of this factor in the circumstances of e-commerce. For instance, Song et al. [55] confirmed that telepresence was positively related to willingness to purchase from a website. Moreover, Algharabat [56] found that telepresence positively correlates with user engagement in online retail. In addition, Algharabat et al. [56] confirmed that telepresence was positively related to user brand engagement.

Despite the direct influence of this factor, some researchers have demonstrated its indirect impact through enjoyment. For instance, Song et al. [55] confirmed that telepresence is a beneficial indicator of customer enjoyment. As a result, shopping enjoyment had a positive influence on purchase from a website. Furthermore, Nah et al. [42] confirmed the favorable association between telepresence and enjoyment. In turn, enjoyment positively affects behavioral intention. Moreover, in the study of online VR stores, Phosaard [19] found that telepresence had a positive relationship with enjoyment. In turn, enjoyment positively affects the purchase intention in online VR stores.

Tussyadiah et al. [57] proved that sense of presence in VR experience positively affects enjoyment. Han et al. [21] found that telepresence positively impacts VR shopping’s playfulness. In turn, playfulness is strongly associated to the behavioral intention in the VR shopping experience. Peukert et al. [12] studied shopping in VR stores. They confirmed that perceived telepresence positively influences the perceived enjoyment, and ultimately, increasing the enjoyment will positively affect the reusing of retail environment.

Finally, the goal of Han et al. [34] was to consider the fundamental factors that promote VR technology adoption. In the VR shopping experience, they found out that telepresence is favorably correlated with perceived playfulness. In turn, perceived playfulness is favorably correlated with behavioral intentions. Thus, it is hypothesized that

- (i) H4a: telepresence has a direct positive relationship with consumer intention to use the VS
- (ii) H4b: telepresence has a direct positive relationship with enjoyment
- (iii) H4c: HM (enjoyment) has a direct positive relationship with consumer intention to use the VS
- (iv) H4d: enjoyment will mediate the relationship between telepresence and consumer intention to use the VS

2.5. Perceived Control. The role of the control factor in predicting consumer intent has been investigated in several previous studies. It is described as “the level of one’s control over the environment and one’s actions” [58]. Lee et al. [59] proved that the level of PC in virtual shopping had a positive effect on the intention to shop in a VW. Moreover, Domina et al. [45] showed that PC positively influences the intention to shop in a VW.

Some studies have found that control has an indirect relationship with other factors. For instance, [49] confirmed that a higher level of control had a direct relationship with a higher level of simulation experience, which resulted in higher engagement with the simulated retail environment. Similarly, Han et al. [21] found that playfulness moderates the connection between control and behavioral aim in the VR shopping experience. Moreover, Han et al. [34] aimed to realize the underlying elements that facilitate adoption of VR technology. They found that control is favorably correlated with perceived playfulness. In turn, perceived playfulness is favorably correlated with behavioral intentions.

In contrast, various studies confirmed the effect of control in the field of e-commerce. For instance, George [60] reported that perceived behavioral control directly impacted online purchase behavior.

Similarly, Hongyao [61] observed that perceived behavioral control in business-to-consumer e-commerce has a strong association with the desire to buy. Moreover, Ashraf et al. [62] suggested that the intent to buy online is favorably influenced by perceived behavioral control. Thus, it is hypothesized that

- (i) H5a: PC has a direct positive relationship with consumer intention to use the VS
- (ii) H5b: PC has a direct positive relationship with enjoyment
- (iii) H5c: HM (enjoyment) has a direct positive relationship with consumer intention to use the VS
- (iv) H5d: enjoyment will mediate the relationship between PC and consumer intention to use the VS

2.6. Satisfaction. Satisfaction has a significant role in identifying the intention to use and the actual use of consumer (C.-W. D. [26]) in addition to its measuring information system success [63]. In Papagiannidis et al. [46], the findings indicated that satisfaction resulting from the virtual shopping environment experience positively affects the intention to buy items. Moreover, based on Papagiannidis et al. [49], if you are satisfied with the simulated retail environment then this will affect the purchase intention.

In the field of e-commerce, Chen and Cheng [26] suggested that the degree of intent to buy online is high when the level of customer satisfaction is high. Moreover, Belanche et al. [64] indicated that satisfaction has a positive effect on the consumer intention to use a website. The impact of online shopping satisfaction on the decision to shop online was evaluated by Avciilar and Özsoy [51]. The result shows that intention is highly impacted by satisfaction. Thus, it is hypothesized that

- (i) H6: satisfaction has a direct positive relationship with consumer intention to use the VS

2.7. Perceived Risk. Kim et al. [65] explained perceived risk as the “consumer’s belief about the potential uncertain negative outcomes from the online transaction.” Shin and Shin [66] found that perceived risk in virtual mall services negatively affects consumer attitudes. Furthermore, Herz and Rauschnabel [67] studied the attitude toward using VR glasses and found that health risks and privacy risks negatively affect the attitude toward using VR glasses.

In contrast, in the field of e-commerce, different studies have verified the impact of risk. For instance, Liu and Wei [68] found that perceived risk negatively impacts consumer acceptance to adopt e-commerce. Pavlou [69] aimed to forecast customer adoption of e-commerce. The result showed that perceived risk negatively affected consumer intentions to shop online. Moreover, Mandilas et al. [70] findings supported that perceived risk affects customer intention to do shopping online negatively. Masoud [71] studied the impact of perceived risk on online shopping. He observed that information security risk negatively affects online shopping. Moreover, Tandon et al. [40] supported that perceived risk negatively affects the behavioral intention of online shopping.

As shown above, some studies tested perceived risk as a multidimensional factor (e.g., S.-H. [40, 71–73]). In contrast, some researchers view perceived risk as a one-dimensional factor (e.g., [66]). However, VR is the future of e-commerce. As Martínez-Navarro et al. [10] stated, “the development of virtual reality (VR), together with other technological innovations, will shape the future of e-retailing.”

Accordingly, there are three dimensions of risk considered to be important in Internet shopping: financial risk, information risk, and product risk [74]. This study focuses on information risk (privacy risk and security risk). Thus, it is hypothesized that

- (i) H7a: perceived information security risk (PISR) has a direct negative relationship with consumer intention to use the VS

- (ii) H7b: perceived information privacy risk (PIPR) has a direct negative relationship with consumer intention to use the VS

3. Research Methodology

3.1. Data Collection Techniques. The main techniques chosen for collecting primary data in this study were experiment and a paper-based survey with close-ended questions. These techniques were chosen for the following reasons:

- (i) This research is innovative, so participants needed to experience the virtual environment to learn more about terms such as “virtual store” and “virtual reality” before completing the questionnaire
- (ii) To avoid misunderstanding and make sure that participants successfully completed the questionnaire, it needed to be administered physically
- (iii) The chosen methods helped participants to complete the questionnaire at their own convenience and to take as much time as they needed to consider their responses [75]. This resulted in more valid answers
- (iv) The researcher met with the individuals who volunteered for the study. She explained the purpose of the study and how their participation would help the research. She also made it clear that their participation was voluntary

3.2. The Experiment. The participants were asked to try shopping in a virtual supermarket environment based on a smartphone platform for about 30 min. The participants were given an HMD to experience the VR mobile app. The HMD (see Figure 1) was used to visualize images and to feel immersed in the VR. To select an item, the participants looked at this item and then waited 3 seconds for the circle to complete. Moreover, the participants could move through the environment by moving their bodies (see Figure 2). The participants also could view the products in the 3D image and buy the items they wanted. They could move directly to the section they wanted without taking a tour to reach that section (see Figure 3). They could view the product information, including description, 3D image, and price. At the end, all participants had online shopping experience.

3.2.1. The Experiment Setting. The following instructions were given to the participants before the experiment:

- (i) Put the virtual reality headset in front of your eyes
- (ii) Once you are within the virtual world, select the supermarket option from the screen by looking at the supermarket window and wait 3 seconds for the circle to complete, and then, do the following steps:
 - (1) After entering the supermarket, look at your feet, *select* the green arrow on the right of the cart, and keep moving between the shelves



FIGURE 1: HMD used in the experiment.



FIGURE 2: A participant doing the experiment for the present research in the room.

- (2) Now stop in front of any shelf by looking at your feet and *select* the sign
- (3) Look at any product for 3 seconds to see the information about it
- (4) Look at the cart that appears on the product until the circle completes, and then, the product will be in your cart
- (5) Add one more product to your cart. There will now be 2 items in the cart
- (6) Delete one item from your cart by looking at your feet and selecting the ! sign, and then, select **X** and look again at the ! sign to keep the other products
- (7) Now there will be one item in your cart
- (8) Look at your feet, select the *Teleport* option, and then, select the *milk* category. This will allow you to move directly to the section you want
- (9) Add one container of milk to your cart. There will now be 2 items in your cart
- (10) After adding milk, move around the supermarket by looking at the arrow
- (11) Stop anywhere by looking at the sign

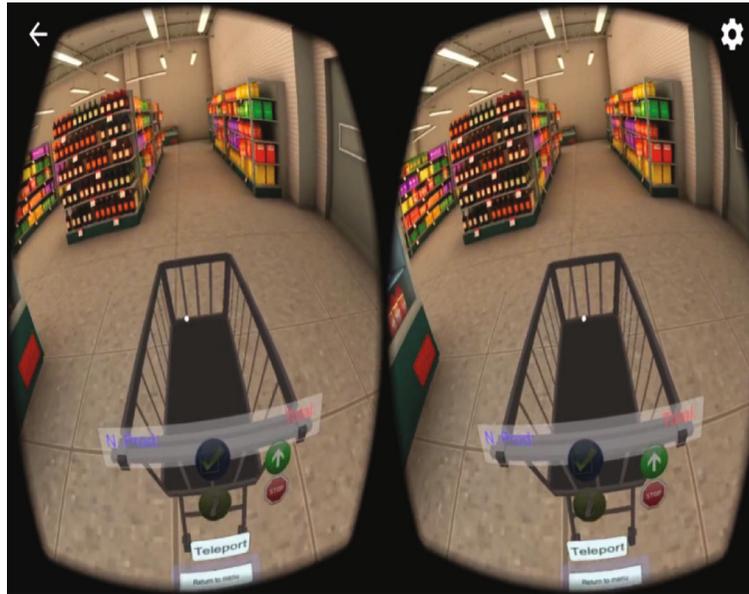


FIGURE 3: Move, stop, check, and teleport signs.

- (12) Now checkout by looking at your feet and selecting ✓ by looking at it until the circle completes
- (13) You are now in front of the cashier
- (14) Your items now are on the cashier's desk
- (15) Assume that you forgot to buy cheese
- (16) Select the ✗ option that appears on the front of the cashier's desk
- (17) The items will be back in your cart
- (18) Now select the Teleport option
- (19) Select the cheese section
- (20) Add one cheese to your cart. There are now 3 items in the cart

(iii) Checkout

- (1) Check out by looking at your feet and select ✓ by looking at it until the circle completes
- (2) Your products are on the cashier's desk
- (3) The number of items and the total will appear on the cashier's desk
- (4) Now select the ✓ option that appears on the desk

To select an item, participants looked at it and then waited three seconds for the circle to complete. They could move through the environment by moving their bodies and could also view the products in the 3D image and buy

those that they wanted. They could move directly to the section they wanted without taking a detour to reach that section. They could view the product information, including description, 3D image, and price. It is important to note that all participants had online shopping experience. After the virtual shopping experiment using the VR app, the participants were invited to complete the paper-based survey to evaluate their experience.

3.3. Survey. After the virtual shopping experience in the VR app, the samples were asked to fill out a paper-based questionnaire to assess their shopping experiences.

The questionnaire comprised three parts. The first part contained an introduction to the objectives of the study, the type of information that we wished to collect from the participants, a guarantee of confidentiality of the information provided, and instructions on the experiment. The second part contained a preexperiment survey about the participants (name (optional), job description, workplace, gender, age, and online shopping experience). The third part contained a postexperiment survey that consisted of 41 statements distributed on nine axes.

3.4. Scale Development. Scales were taken from the previous literature, as shown in Table 2. We changed some words to meet the purpose of this study. The questionnaire consisted of 41 items to assess the 10 constructs: PU, PEOU, HM, telepresence, PC, satisfaction, perceived risk, attitude, and intention to use. A 5-point Likert scale was used.

3.5. Desired Sample Size. Somekh and Lewin [76] recommend minimum sizes for various approaches, where the characteristics of each study will determine the ideal sample size. They state that correlational studies should have at least 30 participants. In addition, Bentler and Chou [77] suggest that "the ratio of sample size to the number of constructs

TABLE 2: Measurement scale.

Factor	Scale	Source	
PEOU	PEOU1: learning how to use VS was easy.	Davis [24]	
	PEOU2: it is easy to get VS to do something that I request from it.		
	PEOU3: dealing with VS was intelligible and comprehensible.		
	PEOU4: I considered VS to be flexible to work with.		
	PEOU5: It easy for me to become skillful at using VS.		
	PEOU6: I have found it easy to use VS.		
PU	PU1: the use of VS in my shopping will allow me to execute tasks faster.	Davis [24]	
	PU2: VS would boost my shopping performance.		
	PU3: the use of VS in shopping will improve my productivity.		
	PU4: using VS would improve my effectiveness in shopping.		
	PU5: using VS would make my shopping easier to do.		
	PU6: in my shopping, I would consider VS useful.		
HM	HM1: using VS was fun.	Venkatesh et al. [39]	
	HM2: using VS was enjoyable.		
	HM3: using VS was very entertaining.		
Telepresence	T1: I felt like I am really in that environment of the virtual store.	Klein [93]	
	T2: while I was in the experiment, I forgot that I was in the center of the experiment.		
	T3: my body was in the room, but my mind was within the world created by the shop.		
	T4: I forgot about my immediate surroundings when I was experimenting.		
	T5: I felt like I was on a journey and I back to the “real world.”		
	T6: virtual store world seemed to me as a place I visited rather than “something I saw.”		
PC	PC1: I felt I could deal with the environment and control it easily.	Papagiannidis et al. [46]; J. H. Song and Zinkhan [94]	
	PC2: I felt I could deal with the products and control them easily.		
	PC3: I felt that the shopping experience was strongly controlled by me.		
	PC4: I found like I could deal with the products when I used virtual reality glasses.		
	PC5: I felt that in the virtual shop, I could control my movements.		
Satisfaction	SAT1: my interaction with VS is really satisfying.	[95] Wixom and Todd [96]	
	SAT2: I am really delighted with the virtual experience.		
	SAT3: the virtual experience has worked as well as I expected it would.		
	SAT4: this virtual shopping experience was ideal for me.		
PISR and PIPR	Security	[97] Swaminathan et al. [98]	
	PR1: in the virtual store, I am concerned about security.		
	PR2: in relation to making purchases through the virtual store, I am concerned about safety.		
	PR3: I am concerned about having a safe place for shopping in the virtual store.		
	Privacy		
	PR4: virtual stores need information about their users to market their store to advertisers.		
Attitude	PR5: content providers are able to share information about their users with other companies.	Taylor and Todd [99]	
	PR6: a user should have complete control over which store gets what personal information.		
	ATT1: using a virtual store is a worthy decision.		
	ATT2: I like the concept of shopping in a virtual store.		
	INT1: I plan to use a virtual store.		Taylor and Todd [99]
	INT2: I plan to use a virtual store to do my shopping.		
INT3: I plan to use a virtual store frequently.			

should be at least 5 : 1 and ideally 10 : 1 to be optimal.” As the present study was designed to examine the effects of 10 factors ($10 * 5 = 50$), the data were collected from 50 individuals in Saudi Arabia.

3.6. Source of Data. All responses ($N = 50$) were usable. However, as shown in Table 3, most of the respondents were unemployed (86%; e.g., student and have no work) while just 14% were employed. The majority of the participants were female (86%), and the rest were male (14%). We predicted that the women sample would be larger than the men sample in this study because, as found in Anjana and Naidu

TABLE 3: Participant characteristics.

		N	%
Gender	Female	7	14.0
	Male	43	86.0
Job	Unemployed	43	86.0
	Employed	7	14.0
Age	Less than 20	15	30.0
	20–29	33	66.0
	50 and above	2	4.0
Shopping online	Have shopped online	50	100.0

[78], females prefer shopping online much more than males do. In addition, women are typically more interactive customers, spend longer in shops, and seek more information and options than males [79]. Most participants were 20–29 years (66%), while 30% were less than 20 years old, and 4% were 50 years old and above. Everyone (50, 100%) had shopped online.

Data analysis methods: the data analysis was conducted using SPSS. First, we analyzed the descriptive statistics of the responses (Table 4 and assessed the sample's demographic characteristics (Table 3). Second, the item reliability was tested using (Cronbach's alpha (α)) to ensure the tool's consistency. Third, the validity of the questionnaire's internal consistency was verified by calculating the Pearson correlation coefficient. Fourth, face validity was used to ensure that it measures what was set to measure. After that, Pearson correlation tests were performed to test the relations between variables. Finally, both simple and multiple regression tests were performed to test the hypotheses of the study. The authors used SmartPLS to do SEM (Figure 4); the model was not significant. Only two paths were significant which are PU \rightarrow attitude and attitude \rightarrow intention. Also, the authors used bootstrapping and other methods but there are no significant results. So, we chose to test the hypothesis (Figure 5) individually using simple and multiple linear regression. Multicollinearity tests were carried out for all regression models. The results revealed the VIF (variance inflation factor) for all models was <3 , indicating the nonexistence of a multicollinearity problem. All models' residuals were normally distributed. Thus, the assumptions for regression analysis were met (Table 5).

However, with so many multiple tests the author did not use a Bonferroni correction because generally there is a fine balance between the two types of error, and as one type of error increases, the other tends to decrease and vice versa. Bonferroni correction can rapidly reduce the type 1 error by reducing α level as the number of tests increases. However, this comes at a cost since it quickly increases the type 2 error or chances of finding false-negative results. This means the Bonferroni correction can seriously reduce the statistical power of my test, making it harder to find a true effect so it is always worth keeping in mind when considering the Bonferroni correction procedure.

3.7. Form of Regression Used to Determine the Achieved Power

- (i) Type of power analysis: post hoc: compute achieved power—given: α , sample size, and effect size (f^2)
- (ii) Test family: F -tests
- (iii) Statistical tests: linear multiple regression: fixed model, R^2 deviation from zero
- (iv) Cohen's f^2 effect size for an F -test:

$$f^2 = \frac{R^2}{1 - R^2}, \quad (1)$$

where R^2 is the squared multiple correlation.

3.8. Item Reliability Test. In this study, Cronbach's alpha was used to measure the stability of the tool and to make sure the tool used is consistent. Table 6 shows the Cronbach's alpha test. The result shows a high internal consistency with a result of 0.920 ([80]). According to Nunnally [81], if the value of alpha (α) is from 0.70 to above, the items can be reliable. This research questionnaire ranged between 0.541 and 0.897, which indicates that this survey is reliable.

3.9. Face Validity. To identify the questionnaire's face validity and to ensure that it measures what it was set to measure, it was presented in its initial form to a number of arbitrators specialized in the area of the study. The number of arbitrators was three. They were asked to assess the quality of the questionnaire in terms of its ability to measure what it was designed to measure and to judge its suitability to the aims of the study by determining the clarity of the statements, their affiliation to the axis, their importance, and their linguistic integrity. After taking opinions and reviewing the notes, the necessary and common amendments were made.

3.10. Consistency Validity. The validity of the questionnaire has been confirmed by calculating the Pearson correlation coefficient. Table 7 shows the internal consistency validity (Pearson's correlation coefficient) for all items, significant relations between each item, and sections with $p < 0.01$.

3.11. Relations between the Variables. In order to test the relations between the overall mean scores of all the study's variables, Pearson correlation were carried out.

A significant relation was found as follows. Intention to use correlated positively with attitude by Pearson correlation $r = 0.697$ ($p < 0.01$), followed by PU with Pearson correlation $r = 0.577$ ($p < 0.01$), followed by PC with Pearson correlation $r = 0.506$ ($p < 0.01$), followed by HM with Pearson correlation $r = 0.468$ ($p < 0.01$), followed by telepresence with Pearson correlation $r = 0.454$ ($p < 0.01$), and followed by satisfaction with Pearson correlation $r = 0.432$ ($p < 0.01$). The least relation for intention to use was for PEOU with Pearson correlation $r = 0.310$ ($p < 0.05$); all three relations consider a moderate level of relation ($0.50 < r < 0.70$), while there is no relation between intention to use and security or privacy ($p > 0.50$).

3.12. Post Hoc Power Analysis. Post hoc power is "the retrospective power of an observed effect based on the sample size and parameter estimates derived from a given dataset" [82].

In this section, the post hoc power analysis for this study is investigated, as well as informativeness of understanding the power for detecting significant impacts of the results assessed, using the same data as the power analysis.

Power analyses can assist to determine whether or not a hypothesis is still valid. Estimates of power can help with detecting significant results (Y. [83]).

G*Power version 3.1.9.7 was used to do a post hoc power study [84]. The sample size of 50 was used for the statistical power analyses and 9 predictors variable equation was used as a baseline. The recommended effect sizes used for this assessment were as follows: small ($f^2 = 0.02$), medium ($f^2 = 0.15$), and large ($f^2 = 0.35$)

TABLE 4: Questionnaire and obtained statistic results.

Statements	N	Minimum	Maximum	Mean	Std. deviation	RII (%)	Rank
It is easy to get VS to do something that I request from it.	50	2.00	5.00	4.4800	0.61412	89.60	5
Learning how to use VS was easy.	50	3.00	5.00	4.5000	0.61445	90.00	3
Dealing with VS was intelligible and comprehensible.	50	2.00	5.00	4.5000	0.67763	90.00	4
I considered VS to be flexible to work with.	50	2.00	5.00	4.2400	0.87037	84.80	6
It is easy for me to become skillful at using VS.	50	3.00	5.00	4.7000	0.50508	94.00	1
I have found it easy to use VS.	50	3.00	5.00	4.6000	0.63888	92.00	2
Perceived ease of use	50	3.00	5.00	4.5033	0.49083	90.07	SA
The use of VS in my shopping will allow me to execute tasks faster.	50	2.00	5.00	4.2400	0.93808	84.80	4
VS would boost my shopping performance.	50	2.00	5.00	4.1000	0.90914	82.00	5
The use of VS in shopping will improve my productivity.	50	1.00	5.00	4.1000	1.07381	82.00	6
Using VS would improve my effectiveness in the shopping.	50	1.00	5.00	4.2600	0.89921	85.20	3
Using VS would make my shopping easier to do.	50	2.00	5.00	4.2800	0.90441	85.60	2
U6: in my shopping, I would consider VS useful.	50	2.00	5.00	4.3400	0.79821	86.80	1
Perceived usefulness	50	2.67	5.00	4.2200	0.68383	84.40	SA
Using virtual store was fun.	50	4.00	5.00	4.8600	0.35051	97.20	1
Using virtual store was enjoyable.	50	4.00	5.00	4.8400	0.37033	96.80	3
Using virtual store was very entertaining.	50	3.00	5.00	4.8000	0.45175	96.00	2
Hedonic motivation	50	4.00	5.00	4.8333	0.33840	96.67	SA
I felt like I am really in that environment of the virtual store.	50	4.00	5.00	4.5800	0.49857	91.60	2
While I was in the experiment, I forgot that I was in the center of the experiment.	50	2.00	5.00	4.0600	0.99816	81.20	6
My body was in the room, but my mind was within the world created by the shop.	50	3.00	5.00	4.7000	0.54398	94.00	1
I forgot about my immediate surroundings when I was experimenting.	50	2.00	5.00	4.3400	0.93917	86.80	5
I felt like I was on a journey and I back to the "real world."	50	1.00	5.00	4.4600	0.83812	89.20	4
Virtual store world seemed to me as a place I visited rather than "something I saw."	50	2.00	5.00	4.5800	0.70247	91.60	3
Telepresence	50	2.67	5.00	4.4533	0.57935	89.07	SA
I felt I could deal with the environment and control it easily.	50	1.00	5.00	4.0600	0.89008	81.20	4
I felt I could deal with the products and control them easily.	50	2.00	5.00	4.2400	0.87037	84.80	1
I felt that the shopping experience was strongly controlled by me.	50	2.00	5.00	3.9600	0.98892	79.20	3
I found like I could deal with the products when I used virtual reality glasses.	50	2.00	5.00	4.2000	1.01015	84.00	2
I felt that in the virtual shop, I could control my movements.	50	1.00	5.00	3.8600	1.06924	77.20	5
Perceived control	50	2.60	5.00	4.0640	0.71078	81.28	A
My interaction with VS is really satisfying.	50	3.00	5.00	4.4800	0.64650	89.60	2
I am really delighted with the virtual experience.	50	3.00	5.00	4.6800	0.55107	93.60	1
The virtual experience has worked as well as I expected it would.	50	2.00	5.00	4.4000	0.75593	88.00	3
This virtual shopping experience was ideal for me.	50	2.00	5.00	4.2000	0.98974	84.00	4
Satisfaction	50	3.00	5.00	4.4400	0.57268	88.80	SA
In the virtual store, I am concerned about security.	50	2.00	5.00	4.5800	0.78480	91.60	2
In relation to making purchases through the virtual store, I am concerned about safety.	50	2.00	5.00	4.7000	0.67763	94.00	1
I am concerned about having a safe place for shopping in the virtual store.	50	1.00	5.00	4.2200	1.01599	84.40	3
Perceived information security risk	50	2.67	5.00	4.5000	0.57637	90.00	SA
Virtual stores need information about their users to market their store to advertisers (reverse item).	50	1.00	5.00	3.7600	1.17038	75.20	3
Content providers able to share information about its users with other companies (reverse item).	50	2.00	5.00	3.9800	0.97917	79.60	2

TABLE 4: Continued.

Statements	N	Minimum	Maximum	Mean	Std. deviation	RII (%)	Rank
A user should have complete control over which store get what personal information.	50	1.00	5.00	4.4800	0.88617	89.60	1
Perceived information privacy risk	50	2.00	5.00	4.0733	0.75680	81.47	A
Using a virtual store is a worthy decision.	50	4.00	5.00	4.8600	0.35051	97.20	1
I like the concept of shopping in a virtual store	50	3.00	5.00	4.7600	0.59109	95.20	2
Attitude	50	3.50	5.00	4.8100	0.43904	96.20	SA
I plan to use a virtual store.	50	2.00	5.00	4.5200	0.73512	90.40	1
I plan to use a virtual store to do my shopping.	50	2.00	5.00	4.4600	0.83812	89.20	2
I plan to use a virtual store frequently.	50	2.00	5.00	4.2400	0.98063	84.80	3
Intention to use	50	2.00	5.00	4.4067	0.78040	88.13	SA

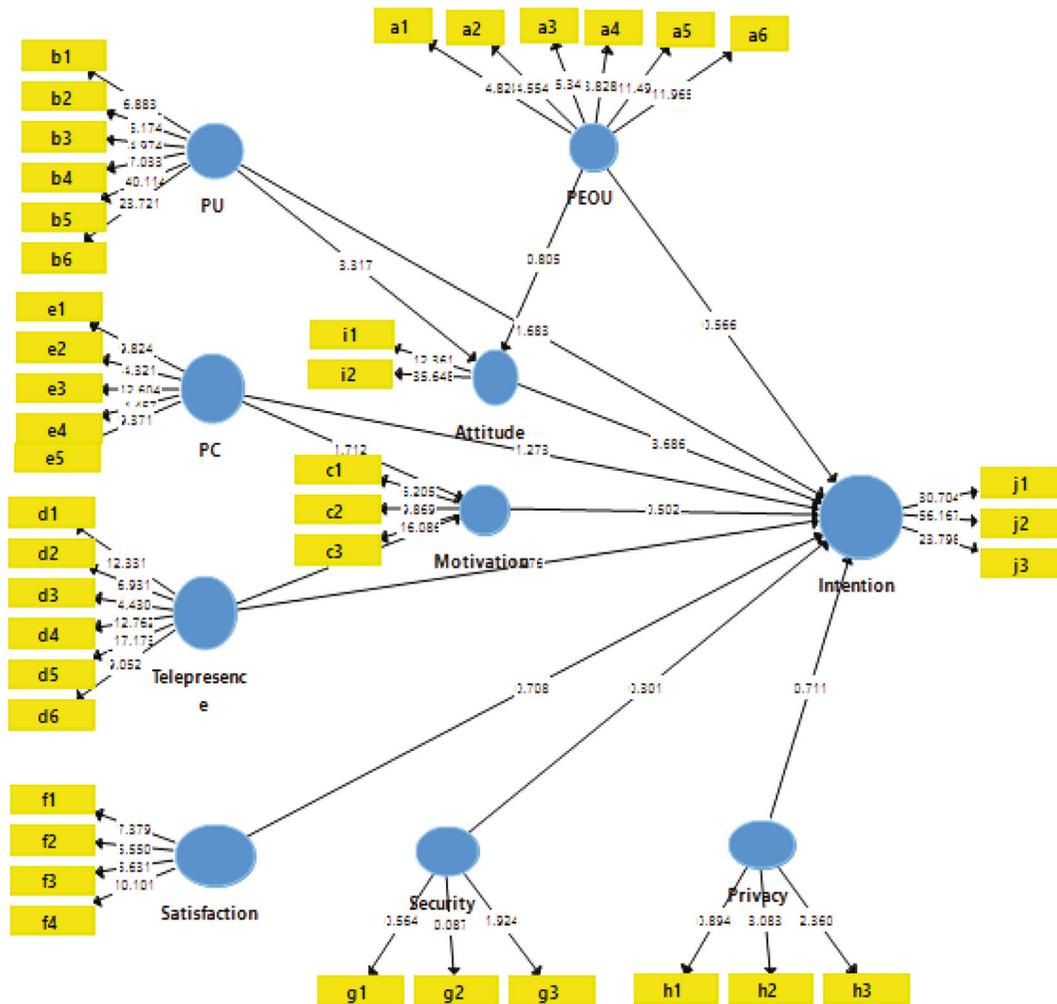


FIGURE 4: SEM.

[85]. The alpha level used for this analysis was $p < 0.05$. The post hoc analyses revealed the statistical power for this study was 0.60 for detecting a small effect for H1a and H1b, whereas the power exceeded 0.91 for the detection of a moderate to large effect size for the rest of the hypotheses from H1d to H1c and H2c, except H7a and H7b which were insignificant (Table 8).

4. Hypothesis Testing Results

4.1. Hypotheses H1a and H1b. A simple linear regression was performed to find support for H1a. The model was fit ($r = 0.310$, $F = 5.108$, $p < 0.05$). The result shows an impact of PEOU on the intention to use ($B = 0.493$, $t = 2.260$, $p < 0.05$), indicating that there is a notable beneficial association

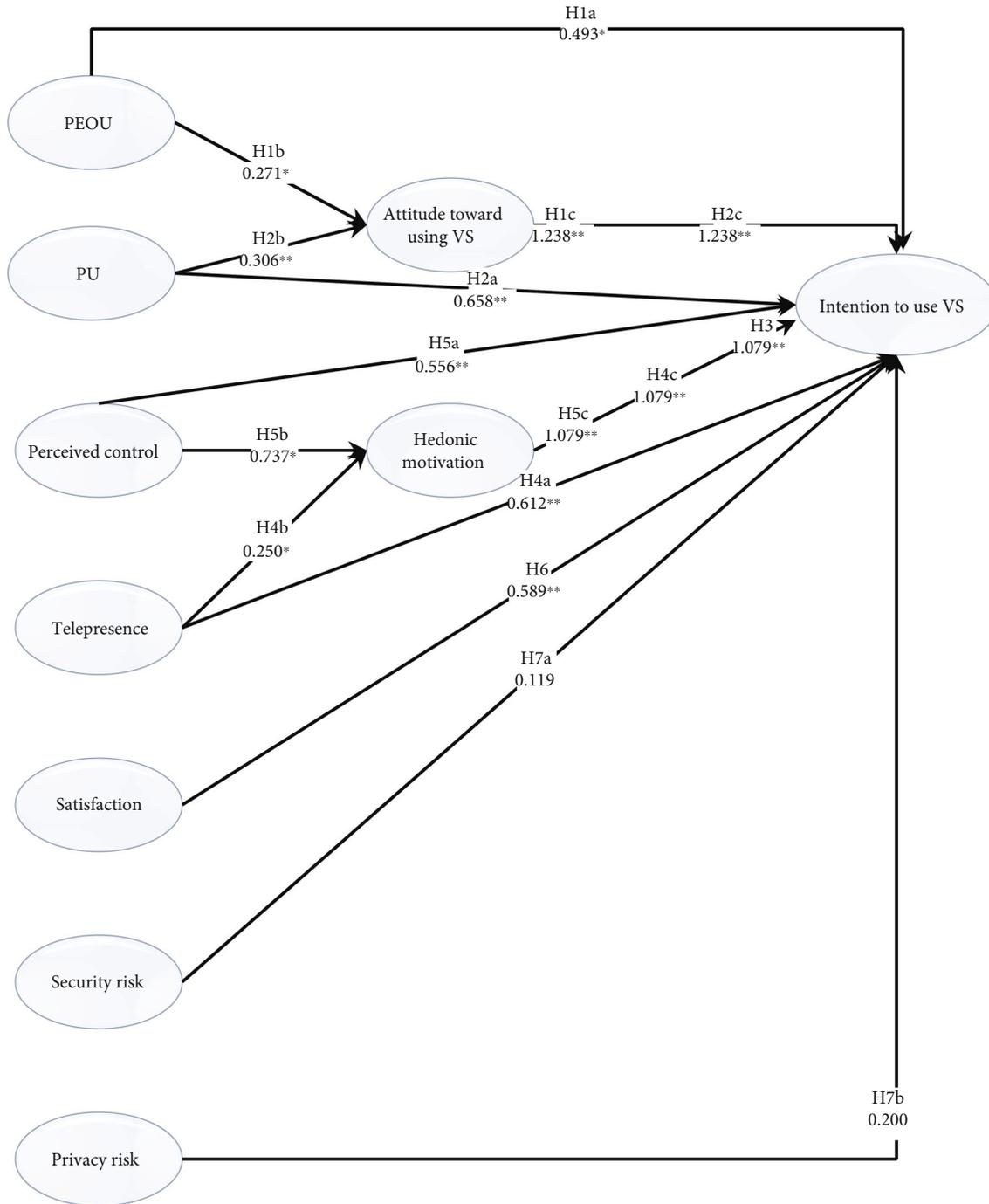


FIGURE 5: Diagram. *: significant at 0.05; **: significant at 0.01.

between PEOU and the intention to use VS, providing support for H1a. A simple linear regression was performed to find support for H1b. The model was fit ($r = 0.303$, $F = 4.849$, $p < 0.05$). The result shows an impact of PEOU on attitude to use ($B = 0.271$, $t = 2.202$, $p < 0.05$). This implies that PEOU and the attitude towards using VS have a positive relationship, providing support for H1b. Although we had a significant outcome, the achieved power was too low, and therefore, we cannot accept these two hypotheses.

4.2. Hypothesis H1d. Multiple linear regression was performed to find support for H1d, retaining PEOU and attitude to use as the independent variables and intention to use as the dependent variable. The model suited well ($r = 0.704$, $F = 23.146$, $p < 0.01$). The result shows no significant effect of PEOU on intention to use ($B = 0.174$, $t = 1.005$, $p > 0.01$). Attitude to use shows a higher significant effect ($B = 1.180$, $t = 6.109$, $p < 0.01$) (i.e., complete mediation), so there is a statistically notable beneficial association between

TABLE 5: Regression model results.

Hypotheses	R	R ²	F value	F-test	Unstandardized beta	T value	p value (t-test)	FIV	Hypothesis results
H1a: PEOU → ITU	0.310	0.0961	5.108	0.028*	0.493	2.260	0.028*	1.000	Unsupported
H1b: PEOU → ATU	0.303	0.0918	4.849	0.033*	0.271	2.202	0.033*	1.000	Unsupported
H1d: PEOU → ATU → ITU	0.704	0.4956	23.146	0.000**	1.180	6.109	0.000**	1.101	Supported
H2a: PU → ITU	0.577	0.3329	23.928	0.000**	0.658	4.892	0.000**	1.000	Supported
H2b: PU → ATU	0.476	0.2266	14.083	0.000**	0.306	3.753	0.000**	1.000	Supported
H2d: PU → ATU → ITU	0.750	0.5625	30.275	0.000**	0.970	4.977	0.000**	1.239	Supported
H3, 4c, 5c: HM → ITU	0.468	0.219	13.459	0.001**	1.079	3.669	0.001**	1.000	Supported
H4a: TEL → ITU	0.454	0.2061	12.469	0.001**	0.612	3.531	0.001**	1.000	Supported
H4b: TEL → HM	0.428	0.1832	10.762	0.002**	0.250	3.281	0.002**	1.000	Supported
H4d: TEL → HM → ITU	0.546	0.2981	.969	0.000**	0.773	2.477	0.017*	1.224	Supported
H5a: PC → ITU	0.506	0.256	16.559	0.000**	0.556	4.069	0.000**	1.000	Supported
H5b: PC → HM	0.351	0.1232	6.732	0.013*	0.737	2.595	0.013*	1.000	Supported
H5d: PC → HM → ITU	0.594	0.3528	12.800	0.000**	0.764	2.642	0.011*	1.140	Supported
H6: SA → ITU	0.432	0.1866	11.041	0.002**	0.589	3.323	0.002**	1.000	Supported
H7a: PISR → ITU	0.088	0.0077	0.377	0.542	0.119	0.614	0.542	1.000	Unsupported
H7b: PIPR → ITU	0.194	0.0376	1.881	0.177	0.200	1.372	0.177	1.000	Unsupported
H1c, 2c: ATU → ITU	0.697	0.0376	45.275	0.000**	1.238	6.729	0.000**	1.000	Supported

*Significant at 0.05. **Significant at 0.01. ITU: intention to use; ATU: attitude to use; PEOU: perceived ease of use; PU: perceived usefulness; HM: hedonic motivation; TEL: telepresence; PC: perceived control; SA: satisfaction; PISR: perceived information security risk; PIPR: perceived information privacy risk; VIF: variance inflation factor.

TABLE 6: Reliability.

Sections	No. of items	Cronbach's alpha
PEOU	6	0.835
PU	6	0.835
HM	3	0.825
Telepresence	6	0.841
PC	5	0.786
Satisfaction	4	0.756
PR		
PISR	3	0.443
PIPR	3	0.594
	6	0.541
Attitude	2	0.775
Intention to use	3	0.897
Overall	41	0.920

PEOU and intention to use VS through attitude, offering support for H1d.

4.3. *Hypothesis H2a.* A simple linear regression was performed to find support for H2a. The model was well fit ($r = 0.577, F = 23.927, p < 0.01$). The result shows a substantial impact of PU on the intention to use ($B = 0.658, t = 4.892, p < 0.01$). This implies that there is a statistically notable beneficial association between PU and the intention to use VS, providing H2a support.

4.4. *Hypothesis H2b.* A simple linear regression was conducted to find support for H2b. The model suited well ($r = 0.476, F = 14.083, p < 0.01$). The result shows a substantial impact of PU on the attitude to use ($B = 0.306, t = 3.753, p < 0.01$). A statistically important beneficial relationship exists between PU and attitude towards use VS, providing support for H2b.

4.5. *Hypothesis H2d.* To find support for H2d, multiple linear regression was conducted, keeping PU and attitude to use as the independent variables and intention to use as the dependent variable. The model was well fit ($r = 0.750, F = 30.275, p < 0.01$). The result shows a notable impact of PU on the intention to use ($B = 0.362, t = 2.889, p < 0.01$), but the attitude to use shows the highest significant effect ($B = 0.970, t = 4.977, p < 0.01$) (i.e., partial mediation). The positive relationship between PU and the intention to use VS by attitude is statistically important, providing support for H2d.

4.6. *Hypotheses H3, H4c, and H5c.* To find support for H3, H4c, and H5c, a simple linear regression was performed. The model was well fit ($r = 0.468, F = 13.45, p < 0.01$). The result shows a notable impact of HM (enjoyment) on the intention to use ($B = 1.079, t = 3.669, p < 0.01$). There is a statistically significant beneficial association between HM (enjoyment) and intention to use VS, offering support for H3, H4c, and H5c.

TABLE 7: Validity.

Statement no.	Statement	Correlation coefficient
PEOU		
1	It is easy to get VS to do something that I request from it.	**0.796
2	Learning how to use VS was easy.	**0.705
3	Dealing with VS was intelligible and comprehensible.	**0.752
4	I considered VS to be flexible to work with.	**0.723
5	It easy for me to become skillful at using VS.	**0.745
6	I have found it easy to use VS.	**0.796
PU		
1	The use of VS in my shopping will allow me to execute tasks faster.	**0.748
2	VS would boost my shopping performance.	**0.664
3	The use of VS in shopping will improve my productivity.	**0.724
4	Using VS would improve my effectiveness in the shopping.	**0.646
5	Using VS would make my shopping easier to do.	**0.899
6	U6: in my shopping, I would consider VS useful.	**0.782
HM		
1	Using virtual store was fun.	**0.832
2	Using virtual store was enjoyable.	**0.923
3	Using virtual store was very entertaining.	**0.845
Telepresence		
1	I felt like I am really in that environment of the virtual store.	**0.743
2	While I was in the experiment, I forgot that I was in the center of the experiment.	**0.781
3	My body was in the room, but my mind was within the world created by the shop.	**0.678
4	I forgot about my immediate surroundings when I was experimenting.	**0.824
5	I felt like I was on a journey and I back to the "real world."	**0.816
6	Virtual store world seemed to me as a place I visited rather than "something I saw."	**0.711
PC		
1	I felt I could deal with the environment and control it easily.	**0.723
2	I felt I could deal with the products and control them easily.	**0.727
3	I felt that the shopping experience was strongly controlled by me.	**0.747
4	I found like I could deal with the products when I used virtual reality glasses.	**0.681
5	I felt that in the virtual shop, I could control my movements.	**0.796
Satisfaction		
1	My interaction with VS is really satisfying.	**0.755
2	I am really delighted with the virtual experience.	**0.746
3	The virtual experience has worked as well as I expected it would.	**0.705
4	This virtual shopping experience was ideal for me.	**0.868
PISR		
1	In the virtual store, I am concerned about security.	**0.790
2	In relation to making purchases through the virtual store, I am concerned about safety.	**0.705
3	I am concerned about having a safe place for shopping in the virtual store.	**0.622
PIPR		
1	Virtual stores need information about their users to market their store to advertisers	**0.758
2	Content providers able to share information about its users with other companies	**0.883
3	A user should have complete control over which store get what personal information.	**0.585

TABLE 7: Continued.

Statement no.	Statement	Correlation coefficient
Attitude		
1	Using a virtual store is a worthy decision.	**0.885
2	I like the concept of shopping in a virtual store.	**0.961
Intention to use		
1	I plan to use a virtual store.	**0.905
2	I plan to use a virtual store to do my shopping.	**0.935
3	I plan to use a virtual store frequently.	**0.910

TABLE 8: Power analysis.

Hypotheses	Effect size f^2	Effect size conventions	Noncentrality parameter λ	Critical F	Power ($1 - \beta$ error prob)
H1a: PEOU \rightarrow ITU	0.11	Small	5.32	4.04	0.62
H1b: PEOU \rightarrow ATU	0.10	Small	5.05	4.04	0.60
H1d: PEOU \rightarrow ATU \rightarrow ITU	0.98	Large	49.13	3.20	0.999996
H2a: PU \rightarrow ITU	0.50	Large	24.95	4.04	0.998
H2b: PU \rightarrow ATU	0.29	Medium	14.65	4.04	0.96
H2d: PU \rightarrow ATU \rightarrow ITU	1.29	Large	64.29	3.20	1.00
H3, 4c, 5c: HM \rightarrow ITU	0.28	Medium	14.02	4.04	0.96
H4a: TEL \rightarrow ITU	0.26	Medium	12.98	4.04	0.94
H4b: TEL \rightarrow HM	0.22	Medium	11.21	4.04	0.91
H4d: TEL \rightarrow HM \rightarrow ITU	0.42	Large	21.24	3.20	0.98
H5a: PC \rightarrow ITU	0.34	Medium	17.21	4.04	0.98
H5b: PC \rightarrow HM	0.34	Medium	17.21	4.04	0.98
H5d: PC \rightarrow HM \rightarrow ITU	0.55	Large	27.26	3.20	0.997
H6: SA \rightarrow ITU	0.23	Medium	11.47	4.04	0.91
H1c, 2c: ATU \rightarrow ITU	0.94	Large	47.24	4.04	0.999999

*Significant at 0.05. **Significant at 0.01.

4.7. *Hypothesis H4a.* To find support for H4a, a simple linear regression was conducted. The model was well fit ($r = 0.454$, $F = 12.469$, $p < 0.01$). The result shows a notable impact of telepresence on the intention to use ($B = 0.612$, $t = 3.531$, $p < 0.01$). The favorable association between telepresence and the intention to use VS is statistically important, providing support for H4a.

4.8. *Hypothesis H4b.* To find support for H4b, a simple linear regression was conducted. The model was well fit ($r = 0.428$, $F = 10.762$, $p < 0.01$). The result shows a notable impact of telepresence on HM (enjoyment) ($B = 0.250$, $t = 3.281$, $p < 0.01$). This implies that telepresence and HM (enjoyment) have a statistically important favorable association, providing help for H4b.

4.9. *Hypothesis H4d.* To find support for H4d, multiple linear regression was conducted, keeping telepresence and HM (enjoyment) as the independent variables and intention to use as the dependent variable. The model was well fit ($r = 0.546$, $F = 0.969$, $p < 0.05$). The result shows a notable

impact of telepresence on the intention to use ($B = 0.419$, $t = 2.298$, $p < 0.05$). HM (enjoyment) shows the highest significant effect ($B = 0.773$, $t = 2.477$, $p < 0.05$) (i.e., partial mediation), so there is a statistically positive beneficial association between telepresence and intention to use VS through enjoyment, offering support for H4d.

4.10. *Hypothesis H5a.* To find support for H5a, a simple linear regression was conducted. The model was well fit ($r = 0.506$, $F = 16.55$, $p < 0.01$). The result shows a significant effect of PC of use on the intention to use ($B = 0.556$, $t = 4.069$, $p < 0.01$). There is a statistically significant positive relationship between PC and intention to use VS, offering support for H5a.

4.11. *Hypothesis H5b.* To find support for H5b, a simple linear regression was conducted. The model was well fit ($r = 0.351$, $F = 6.732$, $p < 0.05$). The result shows a notable impact of PC on HM (enjoyment) ($B = 0.737$, $t = 2.595$, $p < 0.05$). There is a statistically notable beneficial association between PC and HM (enjoyment), offering support for H5b.

4.12. Hypothesis H5d. To find support for H5d, multiple linear regression was conducted. The model was well fit ($r = 0.594$, $F = 12.800$, $p < 0.05$). The result shows a notable impact of PC on intention to use ($B = 0.429$, $t = 3.115$, $p < 0.01$). HM (enjoyment) shows the highest significant effect ($B = 0.764$, $t = 2.642$, $p < 0.05$) (i.e., partial mediation), so there is a statistically notable beneficial association between PC and intention to use VS through HM (enjoyment), offering support for H5d.

4.13. Hypothesis H6. To find support for H6, a simple linear regression was conducted. The model was well fit ($r = 0.432$, $F = 11.04$, $p < 0.01$). The result shows a notable impact of satisfaction on the intention to use ($B = 0.589$, $t = 3.323$, $p < 0.01$). This means there is a statistically notable beneficial association between satisfaction and intention to use VS, offering support for H6.

4.14. Hypothesis H7a. To find support for H7a, a simple linear regression was conducted. The model was well fit ($r = 0.088$, $F = 0.377$, $p > 0.01$). The result shows no notable impact of perceived risk (information security risk) on the intention to use ($B = 0.119$, $t = 0.542$, $p > 0.01$). This means there is no statistically notable negative relationship between perceived risk (information security risk) and intention to use VS, offering no support for H7a.

4.15. Hypothesis H7b. To find support for H7b, a simple linear regression was conducted. The model was well fit ($r = 0.194$, $F = 1.881$, $p > 0.01$). The result shows there is no notable impact of perceived risk (information privacy risk) on the intention to use ($B = 0.200$, $t = 1.372$, $p > 0.01$). This means there is no statistically notable negative relationship between perceived risk (information privacy risk) and intention to use VS, offering no support for H7b.

4.16. Hypotheses H1c and H2c. To find support for H1c and H2c, a simple linear regression was conducted. The model was well fit ($r = 0.697$, $F = 45.275$, $p < 0.01$). The result shows a notable impact of attitude to use on the intention to use ($B = 1.238$, $t = 6.729$, $p < 0.01$). This means there is a statistically significant positive relationship between attitude to use and intention to use VSs, offering support for H1c and H2c.

5. Discussion

5.1. Summary of Results. The objectives of this study are as follows: first, to know the factors that affect the motivation of Saudi consumers to use VSs; second, to determine the factors that will enable the successful implementation of VSs in the KSA; and third, to review the literature in a domain similar to this topic.

5.1.1. Hypothesis H1a. The results confirm that PEOU is associated with the intention to use a VS. This finding implies that there is a positive correlation between PEOU and ITU in the current study. This is consistent with the finding of Fetscherin and Lattemann [17] that PEOU had a positive and direct effect on behavioral intention to use the system. A similar finding was reported by Shang et al. [27],

who studied the motivation of online shoppers and found that PEOU had a positive relationship with online shopping behavior.

Furthermore, this study aligns with evidence from the literature such as a study by Mohd Suki et al. [29] which indicated that PEOU (product search on web and search process on web) had a positive effect on the intention to shop online. In this research, although we had a significant outcome, the achieved power was too low, and therefore, we cannot accept this hypothesis.

5.1.2. Hypothesis H1b. As expected, the quantitative data analysis reveals that perceived ease of use positively influences consumers' attitudes toward using a VS, the results indicating that ease of use can be directly predicted from ATU.

Secondly and most importantly, participants agreed on their responses in relation to ease of use, stating that it was easy for them to become skillful at using the virtual store. Thus, if using VSs does not require specific skills in ICT and if consumers can easily gain the skills needed to interact with VSs, this will in turn affect their attitudes to using them.

This finding is compatible with prior studies that have demonstrated the positive impact of PEOU on attitude; for example, Manis and Choi [18] found that PEOU positively affected attitude toward using VR hardware, while Gillenson and Sherrell [25] confirmed that attitude toward using a virtual store was positively affected by PEOU in a virtual store. In other studies, Chen and Cheng [26] found that PEOU while using a virtual store had a positive effect on attitude to using it and Maditinos et al. [28] found that PEOU had a positive relationship with attitude toward using an e-commerce system. Similarly, Oh et al. [36] report that PEOU while using a virtual store had a positive effect on attitude to its use. In a study of the adoption of product virtualization technology in e-commerce, Kim and Forsythe [30] concluded that PEOU of PVT had a direct positive effect on attitude toward using the technology. Furthermore, Reyes-Mercado et al. [31] report that PEOU influenced participants' attitudes toward adopting online shopping. More specifically, they state that if consumers perceive the technology to be relatively difficult to use, their attitude toward adopting online shopping will be negatively affected. Finally, a study was reported by Hsu et al. [33], who made a study about VR interface and found that PEOU positively influenced the attitude towards using a VR shopping interface. In this research, although we had a significant outcome, the achieved power was too low, and therefore, we cannot accept this hypothesis.

5.1.3. Hypotheses H1c and H2c. The positive correlation between consumers' attitudes toward VSs and their intention to use has been revealed. Consequently, consumers' attitudes are an essential factor for forecast their intention to use such tools. This means that if consumers have positive or negative feelings toward VSs, this will have a major effect on their decision to use a VS in the future. More specifically, in the current study, consumers were more willing to use a VS if they had positive beliefs regarding its PEOU and PU. The findings confirm that positive thoughts and feelings about VSs lead people to favor such tools when shopping.

It can be concluded that consumers prefer integrated online shopping with VR technology.

This finding is consistent with the outcome of a study by Manis and Choi [18], who showed that attitude positively affected intention to use VR hardware. In other studies, Gillenson and Sherrell [25], Chen and Cheng [26], and Oh et al. [36] all found that attitude positively affected behavioral intention to use virtual stores, while Maditinos et al. [28] found that attitude had a positive relationship with intention to transact. Similarly, Kim and Forsythe [30] report that attitude toward using PVT in e-commerce positively affected intention to use it. Finally, both Wu and Liao [37] and Reyes-Mercado et al. [31] concluded that consumers' attitudes to Internet shopping had a positive influence on their behavioral intention to shop online. Finally, a study was reported by Hsu et al. [33], who made a study about VR interface and found that attitude positively influences the purchase intention.

5.1.4. Hypothesis H1d. This hypothesis ascribes to attitude mediating a role between perceived ease of use and ITU. Attitude completely mediates the relationship between PEOU and intention. This implies that perceived ease of use contributes to an increase in consumers' intention to use VSs, via attitude. Consequently, intention to use will be increased as an indirect effect of perceived ease of use. This indicates that in order to predict the strength of intention to use, it is not sufficient to measure PEOU, as we also need to investigate the indirect effect of PEOU on intention via attitude.

This finding is consistent with the outcome of the study by Manis and Choi [18], namely, that PEOU positively affected attitude toward using VR hardware, which in turn positively impacted intention to use it. Similarly, Gillenson and Sherrell [25], Chen and Cheng [26], and Oh et al. [36] all found that PEOU while using a virtual store had a positive effect on attitude toward using the VS and that attitude positively affected behavioral intention to use it. It is also consistent with the finding of Kim and Forsythe [30] that the PEOU of PVT in e-commerce had a direct positive effect on attitude to using the technology, which in turn positively affected intention to use it, and with similar conclusions by Reyes-Mercado et al. [31] with regard to PEOU, attitude, and behavioral intention to adopt online shopping. Finally, a study was reported by Hsu et al. [33], who made a study about VR interface and found that PEOU positively influences the attitude towards using a VR shopping interface. In turn, attitude positively influences the purchase intention.

5.1.5. Hypothesis H2a. The results of the present study confirm a positive correlation between consumers' intention to use a VS and its PU. The support for hypothesis 2a suggests that consumers who believe that using a virtual store will enhance their shopping performance are likely to use VSs in the future.

It may be concluded that if consumers believe that the use of VS in shopping would enable them to accomplish their tasks more quickly, increase their productivity and effectiveness in shopping, and make their shopping easier

and more useful, then a decision to use VSs will be more likely and they may recommend the use of VSs to others.

This finding is consistent with the outcome of a number of earlier studies. Chen and Cheng [26], Purosothuman [35], Wu and Liao [37], Phosaard [19], Reyes-Mercado et al. [31], Han and An (2019), and Han et al. [34] variously investigated consumers' perceptions regarding VR stores and Internet shopping and all found a significant direct and positive relationship between PU and intention to use VSs, to shop online, or to adopt VR technology. Finally, Tom Dieck et al. [32] also indicated that PU influences VR adoption.

5.1.6. Hypothesis H2b. The findings indicate that most consumers surveyed had strongly positive attitudes to using VSs and that they considered virtual shopping to be quick and easy to do, helping to enhance their productivity and effectiveness, so they found the use of a VS to be a good idea and stated that they liked it. This shows that as their perceptions of usefulness increased, their attitude to using VSs became more positive. Thus, PU alone cannot be relied upon to determine consumers' intentions; their attitudes should also be taken into consideration.

Referring once again to the effect of perceived usefulness on consumers' attitude toward VSs, this finding supports hypothesis 2b, confirming that PU is an important factor in configuring a positive attitude. Furthermore, as shown in Table 5 perceived usefulness helps to form positive attitudes toward VSs and has a greater effect on consumers' attitudes than PEOU. This last finding is consistent with Davis [24], who found that the correlation of usefulness was greater than the correlation of ease of use, which he explains by asserting that "no amount of ease of use can compensate for a system that does not perform a useful function."

The positive relationship between PU and attitude is supported by numerous relevant studies, including that of Verhagen et al. [20] into motivations to engage in a VW, concluding that PU had a positive impact on attitude to using the VW. Similarly, Manis and Choi [18] found that PU positively affected attitude toward using VR hardware. Of more direct relevance are the studies of Gillenson and Sherrell [25], Oh et al. [36], Wu and Liao [37], and Reyes-Mercado et al. [31], all of whom found a positive influence of PU on ATU in the contexts of online and virtual shopping. Furthermore, J. Kim and Forsythe [30] found that PU directly and positively affected attitudes to the adoption of PVT in e-commerce. Finally, a study was reported by Hsu et al. [33], who made a study about VR interface and found that PU positively influences the attitude towards using a VR shopping interface.

5.1.7. Hypothesis H2d. Our results allow us to conclude, based on the work of Baron and Kenny [86], that attitude partially mediates the relationship between PU and intention. In other words, there is a positive correlation between PU and intention to use through attitude, which means in the current study that consumers' perceptions of usefulness contributed to a strengthening of their intention to use the VS, via a more positive attitude. Consequently, intention to use will be increased as an indirect effect of perceived

usefulness. Another explanation of the result is that when levels of PU and attitude increase, then the intention to use the VS will also increase. It follows that, in order to predict intention to use, we need not only to know about PU but must also investigate the effect of PU on intention via attitude.

Support for this hypothesis is consistent with the finding by Manis and Choi [18] that PU positively affected attitude toward using VR hardware, which in turn had a positive influence on intention to use that hardware. Kim and Forsythe [30] drew a similar conclusion regarding PU, ATU, and ITU in the context of the adoption of PVT in e-commerce. Our finding is also consistent with those of Gillenson and Sherrell [25] and Oh et al. [36], who both found that PU while using a virtual store had a direct positive effect on attitude toward using the VS, which then positively affected behavioral intention to use it. Similarly, Wu and Liao [37] and Reyes-Mercado et al. [31] have reported the indirect effect of PU on behavioral intention to use Internet shopping via attitude. Finally, a study was reported by Hsu et al. [33], who made a study about VR interface and found that PU positively influenced the attitude towards using a VR shopping interface. In turn, attitude positively influences the purchase intention.

5.1.8. Hypotheses H3, H4c, and 5c. The findings indicate that HM remains an important predictor of intention to use a VS, as many past studies have shown. Moreover, most of the consumers surveyed agreed that shopping using the virtual store was fun, enjoyable, and very entertaining, consistent with Lee and Chung [87], who found that VR shopping significantly improved enjoyment in comparison with a real-world shopping mall. In related research, Nah et al. [42] compared a 3D VW environment with a 2D virtual environment and found that enjoyment was greater in the 3D case.

Support for these three hypotheses means that when HM increases, then the intention to use a VS will also increase. It reflects a positive correlation between HM and intention to use in the current study.

This result is consistent with the conclusion of Nah et al. [42] that enjoyment positively affects behavioral intention. Thombre [43] found that shopping enjoyment experienced in a Second Life store had a positive effect on consumers' purchase intention, while Guo and Barnes [44], Guo and Barnes [88] found that perceived enjoyment had a positive effect on purchase behavioral intention in virtual worlds. A positive relationship between enjoyment and purchase intention in an online VR store was detected by Phosaard [19]. Furthermore, Domina et al. [45] showed that perceived enjoyment positively influenced the intention to shop in a VW. Moreover, Papagiannidis et al. [46] confirmed that hedonic experience values affected participants' level of engagement with a simulated retail environment. In later work, Papagiannidis et al. [47] tested a model of the determinants of engagement in driving a simulated car, including enjoyment, and found that as the hedonic experience was enhanced, users' engagement strengthened. Additionally, Pookulangara et al. [48] confirmed that enjoyment positively affected intention to purchase from a Second Life store. Papagiannidis et al. [49] found hedonic experience to have a direct positive relationship with engagement with a simu-

lated retail environment, while Figliozzi [4] confirmed that perceived enjoyment positively affected the intention to use VR purchasing technology. Han et al. [21] also found a positive relationship between playfulness and behavioral intention in VR shopping, consistent with the findings of Avcilar and Ozsoy [51], An et al. [52], and Tandon et al. [40] that hedonic value or motivation significantly and positively affected behavioral intention to shop online. When Peukert et al. [12] studied shopping in virtual reality stores, they found that enjoyment positively influenced the intention to reuse the shopping environment. Finally, Han et al. [34] found that perceived playfulness was positively associated with behavioral intention to adopt VR shopping technology.

5.1.9. Hypothesis H4a. The finding that TEL has a direct positive relationship with the intention to use a VS reflects the fact that most of the consumers surveyed agreed that, while shopping in the VS, they felt themselves to be present in the virtual store environment and forgot that they were actually engaged in an experiment. They also tended to agree that, although their bodies were in the room where the study was being conducted, their minds were within the world created by the VR system. Then, when the experiment ended, they felt as if they had returned to the real world after a journey, describing the VS as somewhere they had visited, rather than something they had seen. The fact that their perception of telepresence was associated with a strengthened intention to use VSs may be due to their ability to move and view the product images and prices. Another possible explanation is that the sense of telepresence in a 3D virtual world environment is stronger than in a 2D virtual environment, as reported by Nah et al. [42].

Referring once again to the effect of telepresence on consumers' intention to use VSs, the findings are consistent with the expectations of the hypothesis, confirming that telepresence is an important factor in configuring positive intention. This positive relationship between telepresence and intention is in accordance with previous studies by Nah et al. [42], who found that TEL positively affected behavioral intention, by Papagiannidis et al. [46], who found that telepresence positively influenced user engagement, by Papagiannidis et al. [49], who found TEL to positively affect simulated experience, and by Martínez-Navarro et al. [10], who showed that sense of presence had a positive effect on purchase intention in virtual stores.

Moreover, the findings of Song et al. [55] confirmed a positive relationship between telepresence and willingness to purchase from a website, while Algharabat [56] found that TEL had a positive relationship with user engagement in online retail and with brand engagement.

5.1.10. Hypothesis H4b. The finding that TEL has a direct positive relationship with enjoyment reflects the positive correlation between telepresence and enjoyment reported in the current study, which means that when the perception of telepresence is stronger, enjoyment increases.

Referring once again to the effect of telepresence on consumers' enjoyment, the findings confirm that TEL is an important factor in configuring enjoyment and fun.

Furthermore, Table 5 shows that telepresence helps to create positive enjoyment and has a greater effect on enjoyment than PC. The result of the greater effect of TEL on enjoyment ($t = 3.281$) than PC ($t = 2.595$) is consistent with the findings of Han et al. [21]. Thus, the author concludes that a stronger feeling of telepresence leads to a higher level of enjoyment.

This result is consistent with the findings by Song et al. [55], Nah et al. [42], and Phosaard [19] of a positive relationship between TEL and shopping enjoyment. Furthermore, Tussyadiah et al. [57] proved that sense of presence in VR experience positively affect enjoyment. Similarly, Peukert et al. [12] found that perceived telepresence in VR stores had a positive influence on shoppers' perceived enjoyment. Finally, Han et al. [21] and Han et al. [34] identified a positive association between TEL and playfulness or perceived playfulness in the VR shopping experience.

5.1.11. Hypothesis H4d. Having a sense of telepresence not only enhances virtual shoppers' perceptions but also influences their ITU through the positive feelings that are generated by TEL. Thus, consistent with Baron and Kenny [86], the author concludes that enjoyment partially mediates the relationship between telepresence and intention. This conclusion emerges from the current study's finding of a positive correlation between telepresence and intention to use via enjoyment. In other words, telepresence contributes to a strengthening of consumers' intention to use VSs, via their enjoyment of the experience, meaning that ITU will be increased as an indirect effect of telepresence. Another explanation of this result is that when telepresence and enjoyment both increase, then the intention to use the VS will also increase.

This finding is consistent with numerous studies which have demonstrated the indirect impact of telepresence on intention via enjoyment. For instance, Song et al. [55] and Phosaard [19] found that telepresence had a positive relationship with shopping enjoyment, which in turn had a positive effect on intention or willingness to purchase from a website. Similarly, Nah et al. [42] identified a positive influence of TEL on enjoyment, which then positively affected behavioral intention, while Han et al. [21] and Han et al. [34] found a positive association in a VR shopping environment between telepresence and perceived playfulness, which in its turn was positively related to behavioral intention. Furthermore, Peukert et al. [12] found that perceived telepresence had a positive influence on perceived enjoyment in virtual reality stores and that higher levels of enjoyment then positively influenced participants' intention to reuse the shopping environment.

5.1.12. Hypothesis H5a. The finding that perceived control has a direct positive relationship with the intention to use a VS reflects the positive correlation between PC and ITU in the current study, where most of the consumers surveyed agreed that shopping in a VS allowed them to feel that they could easily control and interact with the environment and the products. They also felt that they had a lot of control over the shopping experience and that they could control their movements. In particular, they agreed that using VR

glasses allowed them to interact with the products in the VS. Importantly, this strengthened their intention to use VSs. Thus, perceived control is a predictor of intention to use a VS.

These findings regarding the effect of perceived control on consumers' intention to use VSs support hypothesis 5a and confirm that perceived control is an important factor in configuring positive intention. They are consistent with several prior studies of the role of control factors in predicting consumer intention. Lee et al. [59] and Domina et al. [45] proved that the level of perceived control in virtual shopping had a positive effect on intention to shop in a VW, while Ashraf et al. [62] concluded that perceived behavioral control positively affected the intention to shop online, Hongyao [61] found that perceived behavioral control had a positive relationship with purchase intention in e-commerce, and George [60] confirmed that perceived behavioral control had a direct effect on online purchase behavior. Finally, Papagiannidis et al. [49] established a direct positive relationship between level of control and level of simulation experience.

5.1.13. Hypothesis H5b. The finding of a positive correlation between PC and enjoyment in the current study implies that perceived control has a direct influence on enjoyment, such that when PC increases, then enjoyment will also increase. This provides support for hypothesis 5b and confirms perceived control as an important factor in configuring positive enjoyment. However, as shown in Table 5, while PC has a positive relationship with consumers' enjoyment, this is less strong ($t = 2.595$) than the effect on enjoyment of telepresence ($t = 3.281$).

The positive relationship between perceived control and enjoyment is consistent with the findings by Han et al. [21] and by Han et al. [34] that perceptions of control were positively associated with those of playfulness in a VR shopping experience.

5.1.14. Hypothesis H5d. Having control not only enhances virtual shoppers' perceptions but also influences their intention to use the VS via the positive feelings generated by that control. Thus, adopting the distinction of Baron and Kenny [86] between moderator and mediator variables, the author concludes that enjoyment partially mediates the relationship between perceived control and intention. This finding implies that there is a positive correlation between PC and ITU via enjoyment in the current study. This means that perceived control contributes to an increase in consumers' intention to use the VS, via enjoyment. Consequently, intention to use will be positively but indirectly influenced by the level of perceived control. Another explanation of the result is that when PC and enjoyment increase, then the intention to use the VS will also increase.

Some prior studies have found that control had an indirect relationship with other factors. For example, Han et al. [21] and Han et al. [34] identified perceived playfulness as mediating the relationship between PC and behavioral intention in a VR shopping experience.

5.1.15. Hypothesis H6. The finding of a positive correlation between satisfaction and intention to use in the current study implies that satisfaction with the virtual environment will influence the intention to use a VS. The author concludes that satisfaction is an essential predictor of behavioral intention. The results show that most participants agreed that their interactions with the virtual store were very satisfying, that they were satisfied with the virtual experience, that it had worked as well as they expected it would, and that the virtual shopping experience was ideal for them. These feelings of satisfaction resulted in a strengthened intention to use VSs.

This finding that satisfaction affects consumers' intention to use a VS supports hypothesis H6 and confirms that satisfaction is an important factor in configuring positive intention. It is consistent with the outcome of many past studies into the relationship between satisfaction and intention. For example, Papagiannidis et al. [46] and Papagiannidis et al. [49] found that satisfaction resulting from the experience in a simulated retail environment had a positive effect on intention to purchase items, while Chen and Cheng [26], Belanche et al. [64], and Avciar and Özsoy [51] all conducted studies of online shopping which concluded that consumers' satisfaction positively influenced their intention to shop in that medium.

5.1.16. Hypotheses H7a and H7b. Interestingly and contrary to the predictions of this current research, the quantitative results provide no evidence of a relationship between perceived risk, regarding either information security or privacy, and intention to use a VS. There is thus no support for the hypothesis of such a relationship. Most survey participants agreed that they were interested in security and privacy, but Table 5 shows lack of evidence for any significant effect of either form of PR on consumers' intention to use a VS. One possible explanation for this result is that the novelty of the virtual shopping idea may have led participants to disregard the security and privacy of their information, even if it was important to them. Another possible explanation is that shoppers felt the need to keep up with the technological revolution and enhance their shopping experience.

This negative finding is consistent with the studies of Iqbal et al. [89], An et al. [52], and Jarvenpaa and Todd [90], who found no significant influence of PR on online shopping intention, and with the finding of Dai et al. [91] that perceived privacy risk did not impact shoppers' online purchase intention.

Conversely, many previous empirical studies have reported results which would support H7. For instance, Liu and Wei [68] found that perceived risk had a negative impact on consumer's intention to adopt e-commerce, while Pavlou [69] showed that PR had a negative effect on consumers' intention to transact online. The empirical analysis by Zhang [92] confirmed a negative relationship between perceived risk and online shopping adoption in China. Mandilas et al. [70] also found that PR negatively influenced customers' intention to shop online. A more detailed study of PR types by Masoud [71] concluded that financial risk, product risk, delivery risk, and information security risk all

had negative effects on online shopping intention, whereas time risk and social risk had no effect. Similar work by Thakur and Srivastava [73] supported the hypothesis of a negative effect of PR in the form of time risk, performance risk, social risk, security risk, and privacy risk on online shopping intention, while Tandon et al. [40] obtained the same outcome regarding financial risk, product performance risk, social risk, security risk, and time risk.

This study has different practical implications; the first one is that VSs will enhance the process of e-commerce in the KSA. Furthermore, this study's findings help gather knowledge about the factors affecting the intention to use VSs from the consumer perspective. This enhances the chance for VS success there through understanding the consumers and providing what they want. Moreover, online shopping companies, businesses, and technical specialists can use the results of this study to determine what features will enable the successful implementation of virtual stores.

6. Conclusion

Our paper identifies the factors affecting consumers' intention to use VSs by answering the following research question: "What are the factors affecting the intention to use virtual stores from a consumer perspective in Saudi Arabia?"

The purpose of this research has been to identify the factors affecting consumers' intention to use VSs in Saudi Arabia. The study has identified nine factors: five have a direct influence: attitude, perceived usefulness, hedonic motivation, satisfaction, and perceived ease of use.

The results discussed above show that the factors which have a direct positive relationship with intention to use VSs are attitude, perceived usefulness, hedonic motivation, and satisfaction. These findings are consistent with a considerable body of prior research (e.g., Mutlu Yüksel [10, 12, 17, 19, 21, 27, 29, 31, 34, 49, 51]).

Factors found to have an indirect positive relationship with intention to use VSs are perceived usefulness, perceived ease of use, perceived control, and telepresence. PU and PEOU were found to exert their indirect positive influence on ITU via a direct positive relationship with attitude, which in turn affected intention to use the VS. As to PC and TEL, these variables were found to have a positive relationship with enjoyment, a form of hedonic motivation, which then positively affected ITU. These findings are again consistent with previous research (e.g., [13, 18, 21, 28, 31, 34]).

However, no evidence was found for the hypothesized relationships of perceived information security risk and perceived information privacy risk with intention to use a VS. These findings are inconsistent with much published research, including Liu and Wei [68], Pavlou [69], and Mandilas et al. [70], but there are other researchers (e.g., [52, 89, 90]) who also failed to find a relationship between PR and ITU in the context of online shopping.

6.1. Practical/Social Implications. This study has different practical implications: the first one is that VSs will enhance the process of e-commerce in the KSA. Furthermore, this study's findings help gather knowledge about the factors

affecting the intention to use VSs from the consumer perspective. This enhances the chance for VS success there through understanding the consumers and providing what they want. Moreover, online shopping companies, businesses, and technical specialists can use the results of this study to determine what features will enable the successful implementation of virtual stores. Specifically, online shopping companies can refer to the following suggestions. (a) If merchants wish to ensure that consumers have positive attitudes to using VSs, they need to take into consideration PU and PEOU. (b) On the other hand, if VS operators seek to augment their customers' enjoyment of the virtual shopping, which means letting consumers feel able to control experience, it is important for them to take telepresence and perceived control into consideration and interact with the environment and products easily, in addition to feeling that they have visited the virtual world in person, rather than merely seeing it from the outside. (c) More broadly, if merchants wish to influence consumers to make them more likely to use VSs, they should consider seven factors, which are perceived ease of use, attitude, perceived usefulness, enjoyment, telepresence, perceived control, and satisfaction. In particular, they need to develop virtual stores that can be used by anyone without needing any specific skills in ICT and which will work as well as consumers expect them to. (d) Moreover, shopping in such a VS must enhance consumers' perceptions of productivity and effectiveness while giving them the impression of exercising considerable control over the shopping experience and of then returning to the real world after a pleasant journey. (f) Consumers who have positive thoughts and feelings about virtual stores will tend to favor such tools when shopping, so the experience should be fun, enjoyable, and entertaining.

The study lies in its ability to help businesses and technical specialists to determine what features will enable the successful implementation of virtual stores.

This study has made two categories of contributions: practical and theoretical. On the theoretical side, it extends the literature on consumer intention to use VSs, while on the practical side, this study's findings help to gather knowledge about the factors affecting the intention to use VSs from a consumer perspective in Saudi Arabia. This enhances the chances of the successful implementation of VS technology, through an improved understanding of consumers' requirements and how to satisfy them.

6.2. Limitation and Future Research. This study has several limitations. First, the study was conducted using a convenience sample, making it difficult to generalize the results to the whole population. In terms of method, the study was entirely quantitative, using a questionnaire entirely consisting of close-ended questions, so participants were limited in their response options. The final limitation is in the scope of the research, which covered the perceptions of consumers only, while employees' and ICT experts' perspectives were not considered. In light of the above limitations, this study allows some suggestions for future research directions to be made. (a) The perspectives of employees and ICT experts could be included so that more factors will be generated.

(b) Future research could use different methodologies such as mixed methods to gain a deeper understanding of the responses. (c) A longitudinal study could be designed to address any developments occurring in VS features, as e-commerce is continually being developed.

Data Availability

The data used to support this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest regarding the publication of this paper.

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