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E-Journal of
Tourism
p-ISSN 2541-0857 # e-ISSN 2407-392X Volume 12, Number 1, March 2025

The Utilisation of Virtual Reality as a Recovery Strategy to Stimulate Travel Intentions amidst the COVID-19 Pandemic in South Africa

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DOI: https://doi.org/10.24922/eot.v12i1.101147

Article Info

Submitted:
May 15th 2023
Accepted:
March 20th 2025
Published:
March 30th 2025

Abstract

The COVID-19 pandemic has had a devastating impact on tourism, making it difficult to predict demand. Researchers and policymakers are exploring ways to forecast tourism's recovery from the pandemic. The tourism industry could utilise virtual reality (VR) in addressing the negative effects of such pandemics. Despite the widespread interest in virtual reality, there are gaps in the empirical data on its acceptance as a recovery strategy. In particular, limited research exists on the perceptions and adoption of virtual reality tourism tools among young travellers in emerging economies such as South Africa, highlighting a regional and demographic gap in the literature. This study aims to identify the key factors that influence the acceptance of virtual reality as a recovery strategy for tourism post-COVID-19. A quantitative survey was conducted with 349 young travellers in Johannesburg, South Africa. Partial least squares structural equation modelling (PLS-SEM) using SmartPLS 3 was utilised to analyse the relationships between perceived usefulness, ease of use, credibility, attitudes, and actual use of virtual reality while the sample profile was generated through SPSS 26. The findings revealed a strong association between attitudes toward using virtual reality for travel planning and the intention to adopt virtual reality for identifying travel destinations.

Keywords: virtual reality; COVID-19; recovery; technology acceptance model; destination marketing

INTRODUCTION

Background

Virtual reality (VR) is gaining popularity in industries such as gaming, movies, and theme parks, and is also being used in tourism contexts. Despite tourism's traditional focus on physical locations and authenticity, modern tactics like VR, augmented reality (AR), 3D virtual worlds,

immersive media, and gamification have been utilized in the industry before the pandemic (Bafadhal & Hendrawan, 2019). The most common use of VR in tourism marketing is to showcase a destination and provide potential tourists with a virtual experience (Loureiro, Guerreiro, & Ali, 2020). These technologies are transforming the way people interact with travel-related products and services. Virtual tourism, also known as virtual experience, refers to the practice of visiting simulations of real places (Beck & Egger, 2018; Tussyadiah, Wang & Jia, 2017). This technique has been utilized by tourism sites as a strategic business decision to inspire emotion and drive intention towards the actual location. However, the concern of authenticity remains a challenge (Rauscher, 2021).

Despite this, virtual reality (VR) in tourism is gaining popularity, and the COVID-19 pandemic has further increased the demand for virtual tourism places (Lee & Kim, 2021). Virtual experiences have been successfully employed by museums (Lee & Kim, 2021; Trunfio, Lucia, Campana & Magnelli, 2022) during the pandemic, VR was seen as a safer, more cautious, and affordable alternative to traditional travel (Schiopu et al., 2021; Merkx & Nawijn, 2021). As a result, advertising has shifted to virtual platforms, offering new experiences and opportunities for participation (Rahim, Nasaruddin, Shah, Halim, Samah, Saman & Rum, 2021). Recent data supports the expanding uptake of VR in tourism. For instance, a report by Statista (2022) stated that the global market size of VR in travel and tourism was around USD 5 billion with potential to continue growing.

Tourism destinations have employed diverse techniques to engage visitors, including 360 videos, virtual tours of venues, mixed reality experiences, drone flyovers, and behind-the-scenes films, across different contexts like museums, zoos, and theme parks (El-Said & Aziz, 2022; Luo, Shi, Lu & Furuya, 2022). Amidst the pandemic, virtual tourism has emerged as a safe and accessible alternative that can keep tourism destinations in people's minds and potentially aid in post-pandemic tourism recovery. It is important to note that while virtual reality has the potential to provide valuable insights into tourism, there are still gaps in the existing empirical literature on the use of virtual reality in tourism, which highlights the need for further research in this area.

Previous studies have primarily been conducted in countries such as Indonesia, the United Kingdom, China, and the United States of America. For example, Gegung (2021) explored how virtual reality can enhance the sustainability of tourism destinations and how users perceive the authenticity of VR experiences in Indonesia. Meanwhile, Alyahya and McLean (2021) investigated the attitudes of consumers in the United Kingdom towards virtual reality experiences in tourist destinations and the role of sensory information in shaping these attitudes. Zhao, de Pablos, and Tenysson (2011) examined virtual tourism functions, profit modes, and practices in China, while Chang (2019) studied the marketing effects of virtual reality experiences on promoting tourism destinations among tourism managers in China. Additionally, Tussyadia et al. (2017) surveyed the attitudes of 202 Americans towards virtual reality in tourism destinations.

Given the aforementioned circumstances, there is a paucity of knowledge on this topic in developing regions of the world. Although some research has been conducted in South Africa, it has been limited in scope. For example, Chirisa, Mutambisi, Chivenge, Mbasera, Sidambe, Muchenje, Mukwashi, Mabaso, Ncube and Zengeni (2020) examined the potential of virtual tourism in South Africa during the COVID-19 pandemic, while Woyo and Nyamandi (2022) explored the use of virtual reality in the Comrades Marathon as a response to the pandemic. In addition, Madzunye (2020) assessed the

applicability of virtual reality technology attributes in the City of Tshwane, the capital of South Africa. Nonetheless, more research is needed to bridge the gap in empirical literature on virtual reality usage in developing countries, including South Africa. Although previous studies have examined virtual reality's use in various contexts, they have not explored the impact of perceived usefulness, ease of use, and credibility of virtual reality on attitudes towards its use, intention to use, and actual use in identifying tourist destinations.

Therefore, it would be inappropriate to assume that findings from developed countries can be applied in developing nations like South Africa without empirical evidence. This research gap needs to be addressed, and the proposed conceptual model in this study aims to fill this gap. By testing the proposed model in a developing nation, this study contributes to the literature and provides a unique perspective on virtual reality's use in tourism. The paper is structured as follows: first, the study context and literature review are provided, followed by the conceptual model and hypotheses. The research design and methodology are then presented, followed by the results and discussions. Finally, the implications, limitations, and future research directions are discussed.

Understanding virtual reality

Scholars often use the term virtual reality to describe people's desire to escape from the real world and engage in any activity or experience they desire (Blackwell et al., 2019; Bailenson, 2018). Desai, Desai, Ajmera and Mehta (2014) define VR as a computer-simulated 3D environment that creates a sense of presence for the user. Therefore, it can be argued that VR provides an escape sensation to users. According to Chen and Kent (2020), virtual reality not only allows users to escape their mundane lives but also stimulates their senses and facilitates virtual engagement. Virtual reality is built on the concepts of immersion and presence, which serve to differentiate it from other forms of media (Slater & Sanchez-Vives, 2016). In tourism, this capacity to create vivid, life-like simulations offers potential not only as a marketing tool but also as a recovery strategy in the aftermath of disruptions such as the COVID-19 pandemic. VR enables travellers to preview destinations safely, satisfy wanderlust during lockdowns, and build confidence to book future travel, making it a compelling innovation for rebuilding travel intention and industry resilience (Chen & Kent, 2020).

The term immersion relates to the physical characteristics of the technology, while presence is a subjective experience (Slater and Sanchez-Vives, 2016; Van Damme et al., 2019). Beck, Rainoldi & Egger, 2019).) provides a four-part definition of immersion as it relates to display technology, including inclusivity, surroundingness, extensiveness, and vividness. On the other hand, presence is a psychological state that describes the sensation of "being there" (Flavián, Ibáñez-Sánchez & Orús, 2019). To achieve presence, users must mentally enter the virtual environment and ignore the physical world (Paes, Arantes & Irizarry, 2017). The degree of immersion and presence is positively correlated with the level of technological advancement in virtual reality (Makransky & Lilleholt, 2018; Mütterlein, 2018; Selzer et al., 2019). Therefore, immersion and participation within the virtual environment are critical components of presence (Jensen & Konradsen, 2018; Makransky et al., 2019; Snelson & Hsu, 2020).

Thematic Synthesis: Utilisation of Virtual Reality as a Recovery Strategy in Tourism

Virtual reality (VR) offers diverse applications in the tourism industry that have become especially relevant in the context of post-COVID-19 recovery. Through synthesising its use across planning, engagement, marketing, entertainment, and education, this section highlights how VR serves as a critical tool to

stimulate travel intentions and promote industry resilience.

VR for Tourism Planning and Policy

VR supports strategic tourism planning by enabling stakeholders to visualise and assess potential developments in simulated environments. As virtual reality technologies advance, the possibilities for using VR in the tourism sector will expand. Regardless of how VR technology evolves, there are already a plethora of immediate applications for VR in the tourism industry. Through examining several of these applications within several primary areas of tourism, it becomes evident that VR has a significant impact on tourism as it offers prospects for recovery by stimulating travel intentions amidst the COVID-19 pandemic. Virtual reality is particularly useful in visualizing spatial environments (Vince, 2004) and is commonly used in urban, environmental, and architectural planning (Wiltshier & Clarke, 2017; Grittner & Burns, 2021). Gandy, Baker, and Zeagler (2017) suggest that VR could also be an invaluable tool in the formulation of tourism policy and the planning process.

Virtual reality technology enables the creation of realistic, navigable virtual environments (VEs) for tourism planners to analyze potential developments, which offers numerous advantages over two-dimensional blueprints or fixed three-dimensional models. For instance, planners can view an environment from an infinite number of perspectives and quickly visualize potential changes that can then be assessed (Chang, 2019; Lütjens, Kersten, Dorschel & Tschirschwitz, 2019; Baik, 2021; Li & Hou, 2021). The use of VR in the tourism industry can stimulate travel intentions amidst the COVID-19 pandemic and offer prospects for recovery.

Virtual reality can be used as a tool for destination marketing, and this potential has been recognized by numerous authors (Hassan and Ramkissoon, 2016; Gibson & O'Rawe, 2018; Peceny, Urbančič, Mokorel, Kuralt & Ilijaš, 2019.; Lacka, 2020; Akhtar et al., 2021; Yung, et al., 2021). One of the primary advantages of VR in tourism marketing is its ability to provide prospective tourists with a rich sensory experience. This feature is particularly beneficial for tourism products, which are often "confidence goods" that cannot be tested beforehand, leaving consumers to rely solely on descriptive information (Wiltshier & Clarke, 2017; Pasanen, et al., 2019).

As a result, internet marketing is critical to the tourism industry, and VR's experiential nature makes it an ideal tool for providing rich data to potential tourists seeking destination information. For example, Guttentag, Griffin, and Lee (2018) suggested that a person interested in visiting an island destination could use VR to experience virtual island destinations like Hawaii, the Virgin Islands, Seychelles, the Maldives, and Jamaica, allowing tourists to make more informed decisions and have more realistic expectations, potentially leading to a more enjoyable vacation experience (Benur & Bramwell, 2015; Monaco, 2018).

VR for Community Engagement

Community involvement is essential for sustainable tourism recovery, and VR offers a powerful platform for participatory planning. Utilizing virtual reality (VR) can serve as a valuable tool in conveying tourism plans to local communities and engaging them in the planning process. It has been widely acknowledged that involving local communities in tourism planning is crucial for the success of the destination (Haywood, 1988; Simmons, 1994; Dodds, Ali & Galaski, 2018; Lewis, 2019). VR technology provides an advantage in participatory planning as it allows individuals from different backgrounds to communicate through a visual language that imitates their interaction with the real-world environment (Al-Kodmany, 2002).

There are several ways to employ VR in communicating tourism plans. For instance, one strategy is to present the

plans at community meetings attended by relevant authorities, professionals, and experts who can answer questions and seek input from the community. This approach was effectively implemented in Sweden when planning two roads passing through cultural heritage areas (Hartwell, 2016). Another approach is to create a video exhibition that depicts specific tourism plans and make it accessible to the public online. In Italy, transportation hub plans were communicated to the public through a virtual environment where users could interact with each other and access project information (Della Corte, D'Andrea, Savastano & Zamparelli, 2017; Belli, Cilfone, Davoli, Ferrari, Adorni, Di Nocera, Dall'Olio, Pellegrini, Mordacci & Bertolotti, 2020). Lastly, augmented reality systems can be used to superimpose planned developments onto the existing landscape, allowing community members to visualize the changes almost realistically (Haywood, 1988).

In addition, VR technology's distinct testing capabilities can be advantageous in tourism planning and management (Cucculelli & Goffi, 2016; Gunn & Var, 2020). For instance, Hu and Roberts (2020) conducted an experiment in which participants navigated a virtual environment simulating a Scottish landscape and selected various paths based on their preferences for the landscape characteristics. The researchers discovered that subjects' preferences for virtual environments often reflected their real-world preferences for specific landscapes, as determined through a follow-up questionnaire. Conversely, Gimblett, Richards, and Itami (2001) used surveys and interviews to study the behaviours of hikers, mountain bikers, and jeep tour passengers in an Arizona recreation area. They then used the data to program virtual agents representing different user groups in a VE recreation of the site. By using virtual reality, they could determine the frequency and location of encounters between conflicting user groups and the effectiveness of potential new trials in reducing such conflicts. Apart from simulating and testing user behaviour, virtual reality programs like those used in these two examples could be employed for a variety of other testing purposes. For example, museums can test the potential popularity of a proposed exhibit, tour companies can examine the preferences of a target demographic for certain attractions, or site managers can evaluate different pricing and scheduling strategies to mitigate congestion at overcrowded locations. Furthermore, VR technology can simulate environmental impacts, such as soil erosion, to aid in land use planning in tourism destinations (Toimil et al., 2018; Efthimiou, Psomiadis & Panagos, 2020).

There is a growing use of virtual reality and similar technologies in various tourism products to entice visitors, including virtual tours offered by hotels and destinations through the internet. Although these virtual tours may not always allow independent navigation and are not genuine virtual reality, they demonstrate a keen interest in VR-related technologies (Krasnov, 2018; Ballina, Valdes & Del Valle, 2019; Altun, 2019). Interactive features on tourism websites, including virtual experiences, have been shown to be more effective in advertising theme parks and natural parks than brochures, and virtual tours of panoramic photographs on a hotel website may provide psychological comfort to travellers experiencing travel anxiety (Disztinger, Schlögl & Groth, 2017; Prideaux, Lee & Tsang, 2018).

Wen, Kozak, Yang and Liu (2021) further argue that sites featured in films experience an increase in tourism, and visiting a museum's website can boost one's interest in visiting the actual museum, providing indirect evidence that visiting tourism destinations in VR may encourage actual visitation (Bąkiewicz, Leask, Barron & Rakić, 2017). Numerous researchers have recommended the inclusion of such interactive features on tourism websites (Kapoor, Tamilmani, Rana, Patil, Dwivedi & Nerur, 2018; Matikiti, Mpinganjira, &

Roberts-Lombard, 2018; Nusair, Hua, Ozturk & Butt, 2017), indicating that virtual reality and related technologies are becoming an increasingly integral part of tourism marketing.

Conversely, virtual reality offers a unique platform for tourist-to-tourist communication. According to Minazzi (2015), online travel communities that facilitate information exchange through forums, chat rooms, and other tools are increasingly influential in the tourism industry as consumers tend to rely more on peer opinions than advertising. Additionally, tourism businesses can take advantage of creating their own online travel communities (Popp & McCole, 2016; Sangchumnong, 2019). Currently, most online travel communities do not use VR, but the increasing popularity of virtual worlds such as Second Life (Vickers, Istance & Bates, 2008) suggests that these technologies may eventually be adopted by online travel communities, potentially making virtual worlds an essential component of tourism marketing.

In addition to being utilized for tourism marketing, virtual reality technology can also be used as a marketable and enjoyable tourist attraction. As virtual reality technology has progressed, the entertainment industry, particularly the video game industry, has played a crucial role in its development (Marzouk, Maher & Mahrous, 2019). While several virtual reality entertainment applications are designed for home use, some have already been established as tourist attractions in popular destinations, such as the Rewind Rome 3D 'edutainment' show. Other examples include Las Vegas's Cyber Speedway, which features a replica racecar with a 20-foot wraparound screen, allowing users to navigate virtual speedways or roadways (Pestek & Sarvan, 2020).

VR as a Tourist Attraction

Virtual reality systems can serve as marketable, enjoyable tourist attractions in addition to being a tourism marketing tool. The entertainment industry, particularly the video game industry, has played a crucial role in the evolution of virtual reality technology (Marzouk, 2019). Although several virtual reality entertainment applications are created for home use, others are developed as tourism attractions in major tourist destinations. For example, Las Vegas's Cyber Speedway allows users to explore a virtual speedway or roadway while seated in a replica racecar with a 20-foot wraparound screen, and Australia's Dreamworld theme park features a 'V8 Supercars RedLine' attraction (Pestek & Sarvan, 2020; Senita, 2017).

Similarly, Disney established a virtual reality development studio in 1992, resulting in the creation of a variety of attractions, including 'Aladdin's Magic Carpet Ride' and 'Pirates of the Caribbean: The Battle for Buccaneer Gold,' for the DisneyQuest Indoor Interactive Theme Park in Orlando (Sherman & Craig, 2018). Theme parks are an ideal location for VR entertainment, and VR entertainment is now available in a variety of theme parks around the world (Baker, 2018). For instance, France's Futuroscope theme park features an attraction called 'The Future Is Wild,' which uses augmented reality technology to project futuristic animals onto a real-world environment. Unlike traditional theme park attractions, the small size of VR attractions allows VR theme parks to be located in urban areas (Duan, Chan & Marafa, 2019).

Virtual reality has significant potential for educational purposes. Researchers have recognized the teaching potential of VR for several years (Diegmann et al., 2015; Wang et al., 2018), and studies have found that VR is an effective tool for educating students in a range of subjects, such as history (Muijs & Reynolds, 2017), science (Collins & Halverson, 2018), and mathematics (Duncan & Bell, 2015). VR's ability to communicate a large amount of information efficiently may be attributed to its use of natural spatial perception abilities (Jacobson & Holden, 2005). Furthermore, VR's sense of presence may aid the

learning process (Moreno & Mayer, 2002). Interactive learning is a crucial aspect of educational technology, and VR provides significant interaction opportunities, such as through games or challenges (Kamińska et al., 2019). Additionally, a VE can embed diverse multimedia information, allowing users to access a variety of resources through a single application (Hansen, Shneiderman & Smith, 2010). It is essential to recognize the entertaining qualities of VR and learning because they may help users remain engaged (Selwyn, 2009; Hirsh-Pasek et al., 2015).

Virtual reality has significant educational potential that can be utilized in museums, heritage sites, and other tourist destinations (Serravalle et al., 2019). For instance, the Hellenic World Foundation, a Greek cultural heritage institution, established a VR department in 1998 and has been offering various educational VR exhibits in its Cultural Center, which are some of the Centre's most popular attractions. These exhibits enable users to explore the ancient city of Miletus, reassemble ancient vases as archaeologists from virtual shards of ceramic, conduct virtual experiments related to some of Archimedes' discoveries, dress in period-appropriate attire that transports them to VEs representing the relevant eras, and assist an ancient sculptor in creating a statue of Zeus (Serravalle et al., 2019).

Another example of VR's educational potential is the 'Virtual Reality Gorilla Exhibit' at Zoo Atlanta, which allowed users to become a young gorilla and explore a virtual gorilla habitat filled with various educational multimedia content (Maple & Perdue, 2013). Yeager et al. (2019) evaluated the educational efficacy of this exhibit among university students and found that the VE aided learning and served as an effective supplement to a subsequent lecture on the information covered in the VE. Therefore, VR exhibits in museums, heritage sites, and tourist destinations can serve as engaging and effective educational tools.

LITERATURE REVIEW

There are numerous models for predicting and explaining human behaviour. The research is based on the technology acceptance model as it pertains to the specified constructs and their relationships. The TAM model is discussed in the following sections.

The technology acceptance model (TAM)

The model proposed by Davis in 1989 has become widely used to explain the acceptance of new technology (Matikiti, Mpinganjira, & Roberts-Lombard, 2018). The Technology Acceptance Model (TAM) is based on the Theory of Reasoned Action developed by Fishbein and Ajzen in 1975, and it provides a framework for tracking how internal influences affect emerging systems. TAM suggests that the actual usage of a new technology is determined by the user's attitude towards the technology, the perceived ease of use, and the perceived benefits that may be obtained from using it (refer to Figure 1). Therefore, perceived ease of use and perceived usefulness are two variables used to predict behaviour (Fishbein & Ajzen 1975). The model predicts that when a person believes that using a particular technology will help them enhance efficiency or provide benefits, they will be more likely to adopt it.

The model has been proven accurate in describing acceptance behaviour in several information systems sectors (Matikiti et al., 2018). Other models such as the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh, Morris, Davis and Davis (2003) and the Diffusion of Innovations (DOI) theory by Rogers (2003) could have been considered. However, the TAM was deemed more appropriate for its ability to anticipate technology acceptance within a post-COVID-19 environment’s context. Moreover, TAM is particularly appropriate when the focus is on individual perceptions of a specific technology rather than broader

organisational or societal adoption patterns, as is the case with UTAUT or DOI. Dixit and Prakash (2018) suggest that TAM can also be utilized as a model for social networking behaviour.

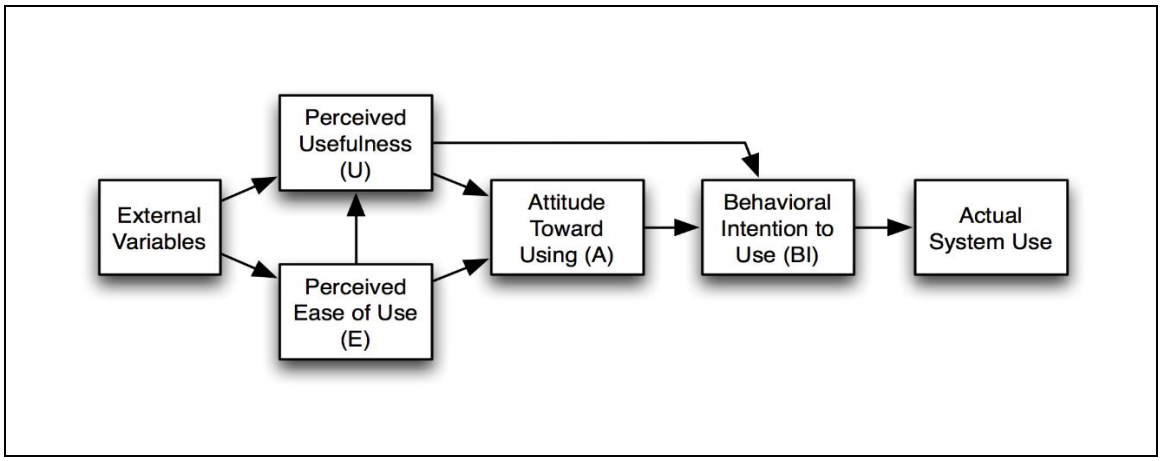


Figure 1. The Technology Acceptance Model
(Source: Adapted from: Davis, 1989)

Theoretical model and hypothesis formulation

The diagram in Figure 2 illustrates the theoretical model, which illustrates the interrelationships between the variables under investigation. Subsequently, the hypotheses for the present study will be formulated in the subsequent sections.

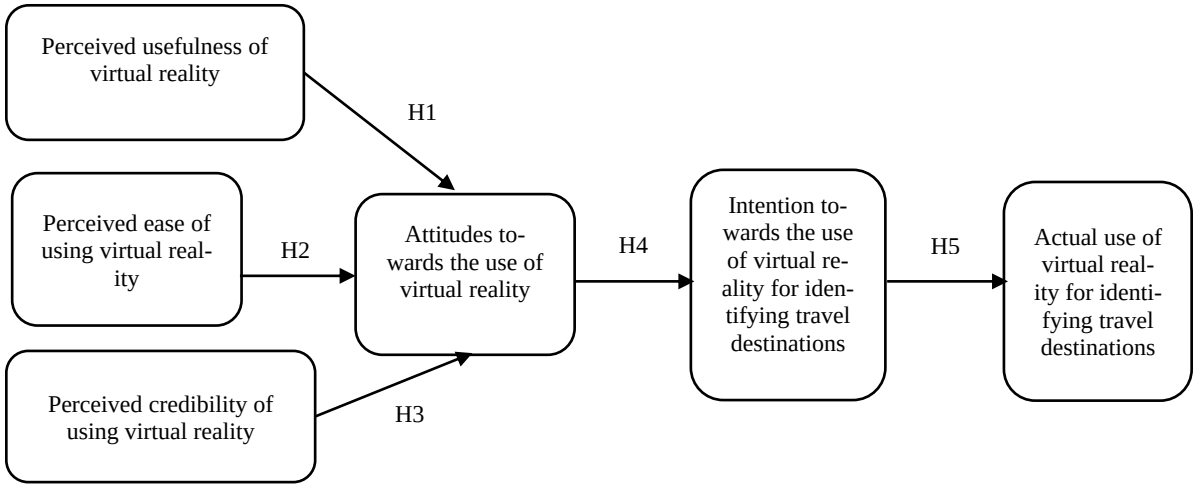


Figure 2. Conceptual Framework
(Source: The Authors, 2023)

Perceived usefulness, perceived ease of use, perceived credibility of virtual reality and attitudes towards the use of virtual reality

Studies in the consumer behavior literature on information technology use have investigated the relationship between perceived usefulness and perceived ease of use, as well as behavioral intentions (Lee, Lee & Jeon, 2017). These constructs are associated with the acceptance of information technology by online consumers, as well as customer motivations and behavioral intentions. Moussawi, Koufaris, and

Benbunan-Fich (2021) applied the TAM to examine consumers' emotional and cognitive responses to visiting a Web-based store in the context of virtual reality technology in tourism marketing. Veeramootoo, Nunkoo, and Dwivedi (2018) discovered that perceived ease of use and usefulness could be used to predict consumer attitudes and contentment in Web settings. Tsankova and Pervan (2020) utilized the TAM framework to understand how travelers use information technology in their trip decision-making processes and travel intentions.

Based on previous research on online tourism experiences and behavioral intentions, the conceptual framework of this study posits that exposure to a tourist site in a 3D virtual world has an impact on individuals' travel intentions. This fundamental premise is supported by several lines of reasoning. First, virtual reality literature suggests that virtual experience in an immersive 3D virtual world can influence customer purchase intention (Barnes, Mattsson & Hartley, 2015). Martínez-Navarro et al. (2019) also found that technological and spatial environmental aspects in the 3D virtual world can influence an individual's virtual experience and purchase intentions.

Dassanayake (2017) similarly argued that extrinsic motivators such as perceived credibility and performance expectation can influence purchase intentions and actual purchase behavior in 3D virtual worlds. Moreover, consumer perceptions of ease of use when navigating the virtual site were found to influence purchase intentions (Tobias-Mamina, Maziriri & Kempen, 2021). Singh and Rana (2017) discovered that perceptions of the utility of mobile technology were positively linked to consumers' intention to purchase a product after using mobile applications to obtain product information. Kang, Shin and Ponto (2020) also found that exposure to virtual stores in virtual social environments has a positive impact on real-world brand attitude and purchase intent, indicating that online experiences can translate to offline behavior.

In the realm of tourism and virtual reality, research has shown that exposure to engaging and informative settings within a virtual environment can influence tourists' information-seeking behavior and decision-making processes. Chung et al. (2015) found that perceived usefulness in Web-based tourism was a significant predictor of travelers' intention to visit a destination. Meanwhile, Mäntymäki and Salo (2011) investigated hotel user purchasing behavior in a social virtual world using TAM and motivational models and discovered that perceived ease of use and usefulness indirectly influenced consumer purchase intention. Tandon, Ertz, and Bansal (2020) also revealed that perceived credibility and ease of use are predictors of consumers' travel intentions when it comes to destination selection.

Chuang et al. (2016) explained that perceived credibility is the extent to which a potential user believes that the service will be safe and secure. In the context of virtual reality, the lack of perceived credibility may cause consumers to worry that their personal information will be transferred to another site without their knowledge (Aguirre et al., 2015). Prior studies have shown that perceived credibility has a significantly favorable impact on customers' attitudes and willingness to adopt virtual reality (Rauschnabel, Rossmann, and tom Dieck, 2017; Balaji et al., 2018; Vishwakarma et al., 2020). Consequently, this study proposes that attitudes towards the use of VR in tourism are influenced by perceived ease of use, perceived usefulness, and perceived credibility, which may also be affected by the COVID-19 pandemic. The pandemic has forced governments and societies to rely heavily on digital technology to respond to the crisis, mitigate its effects, and envision long-term solutions. In light of these circumstances, the following hypotheses were developed:

H_1: Perceived usefulness of virtual reality has a positive and significant impact on attitudes towards use of virtual reality.
H_2: Perceived ease of use of virtual reality has a positive and significant impact on attitudes towards use of virtual reality.
H_3: Perceived credibility of virtual reality has a positive impact on attitudes towards use of virtual reality.

Attitudes towards use of virtual reality and Intention towards use of virtual reality

To begin with, the Technology Acceptance Model (TAM) suggests that perceived ease of use has a direct effect on both behavioral intention and actual use of a system, and these two variables are influenced independently (Baby & Kannammal, 2019). Intention to adopt technology is influenced by attitude, however this relationship depends on the complexity of the technology (Venter de Villiers, Chuchu & Chavarika, 2020). Additionally, perceived credibility has been found to be a significant predictor of behavioral intention, as customers are more likely to adopt and continue using products or services with higher perceived credibility (Cohen, Pham & Andrade, 2018; Ponte, Carvajal-Trujillo, & Escobar-Rodríguez, 2015). Ng, Shroff, and Lim (2013) applied TAM to investigate users' adoption or rejection of information technology and found that attitude toward use was strongly linked to behavioral intention.

In the context of tourism, Swart, Sotiriadis, and Engelbrecht (2019) argue that attitude, together with influence, is a crucial factor in shaping tourists' behavioral intentions. Specifically, attitude refers to consumers' evaluation and reaction towards a product (Boyer, Van Slyke, & Rogers, 2016) and can be positive or negative. Hence, consumers' favorable attitudes toward virtual reality can lead to a higher intention to use VR. For instance, Salehzadeh and Pool (2017) found that positive attitudes have a positive effect on perceived value, which is a combination of economic, social, personal, and functional characteristics. Therefore, this study proposes the following hypothesis:

H_4: Attitudes towards use of virtual reality has a positive and significant impact on intention towards use of virtual reality.

Intention towards use of virtual reality and actual use of virtual reality

Understanding the relationship between intention to use and actual use is crucial, as previous research has demonstrated a connection between these two variables. Natasia, Wiranti, & Parastika (2022) suggest that actual use of technologies is positively and directly influenced by the user's intention to adopt that technology. For instance, Cheung and Vogel (2013) found that the intention to use technology positively affects the actual adoption or use of that technology. Intention towards certain behaviours result in the actual use of services. Additionally, Mun and Hwang (2003) found a significant and direct relationship between behavioral intention and actual utilization of web-based environments. The intention to pay for social networking is believed to be closely associated with perceived usefulness and perceived utility of social networks (Sin, Nor & Al-Agaga, 2012). Therefore, this study aims to investigate the following hypothesis:

H_5: Intention towards use of virtual reality has a positive and significant impact on actual use of virtual reality.

METHOD

The research philosophy for this study was positivism. Quantitative research is to be based on a positivist paradigm of measuring variables (Rehman, & Alharthi, 2016). Hence, for this study a quantitative research approach was utilised. The design was suitable to solicit the required information relating to perceived usefulness, perceived ease of use, perceived credibility, attitudes, and actual use of virtual reality.

Sample

The data for this research were collected from students studying at a university within the Johannesburg metropolitan area. These students were conceived as potential users of virtual reality because they were exposed to virtual reality technology. Students from the Management Faculty at the university in South Africa constituted the sampling frame. With the end goal of this examination, the researchers chose university students as their sample claiming they have not been researched that much in the current literature and in terms of virtual reality as well as destination marketing, rather general tourists are the typical group researchers focus their attention on or individuals in a more general sense. The students had completed a preliminary subject in destination marketing and digital marketing.

In terms of the sampling frame, a list of registered students within the database of the university was used as a sampling frame. Thus, a simple random sampling technique was used in this study because each element of the population had an equal and known chance of being selected as part of the sample (Weideman 2014), for instance every name within the list of students registered within the database of the university had an equal chance of selection. The questionnaires clearly stated that the anonymity of the respondents would be guaranteed and that the study was purely for academic purposes. The Raosoft calculator for sample size was used to calculate the size of the sample (Raosoft, 2004). The calculation considered the total enrolment of the student population, which was of approximately 33 346, a 5% margin of error, 90% confidence interval and the recommended 50% distribution and returned a minimum sample size of 377 respondents. Of the 377 questionnaires distributed, 349 returned questionnaires were usable, yielding a response rate of 93%.

Measuring instrument

Research scales were operationalised based on extant work. Proper modifications were made to fit the current research context. Perceived usefulness, perceived ease of use, attitudes towards use behavioural intention and actual use were measured through questions adapted from Davis, (1989). Moreover, Questions on perceived credibility were measured from items adapted from Adesina and Ayo, (2010). All measurement items were measured on a five-point Likert-scale and the scale indicators were affixed to a strongly disagree (1) to strongly agree (5) Likert-scale continuum.

Data analysis

The gathered data was recorded on an Excel spreadsheet after screening returned questionnaires. The data were analysed using software for descriptive statistics, Cronbach Alpha values and correlations, and the Statistical Package for Social Sciences (SPSS version 25.0). To evaluate the psychometric properties of the measurement scales, and the hypotheses, the SMART-PLS software version 3.2.7.

RESULTS AND DISCUSSION

Respondent profile

Table 1 displays the depiction of the participants. The respondents were requested to report their demographic data, including gender, age, economic status based on respondents' monthly allowance and ethnicity. The respondents were mainly males (54.4%). Most of the respondents indicated that they were between 18-22 years (79.9%). In addition, most on the respondents reported that they have an average economic status (57.6%). Moreover, in terms of ethnicity, most of the respondents reveal that there were blacks (62.8%).

Table 1. Sample Demographics

Gender			Age		
	Frequency	**Percentage**		**Frequency**	**Percentage**
Female	159	45.6	18-22 years	279	79.9
Male	190	54.4	23-27 years	70	20.1
Total	349	100.0	Total	349	100.0

Economic status			Ethnicity		
Monthly allowance	**Frequency**	**Percentage**		**Frequency**	**Percentage**
R1000	20	5.7	White	53	15.2
At least R2000	49	14.0	Black	219	62.8
More than R2000 but less than R4000	201	57.6	Coloured/ Mixed	13	3.7
Between R4000 and R5000	54	15.5	Indian/Asian	53	15.2
More than R5000	13	3.7	Other	1	0.3
No response	12	3.4	Prefer not to say	10	2.9
Total	349	100.0	Total	349	100.0

Statistical analysis procedure

The investigator used the Statistical Package for Social Science (SPSS) version 26 to evaluate the data pertaining to the demographical profile of the respondents, while on the other hand, the latest software version of SMART-PLS 3.2.7 was used to analyse the data captured. PLS SEM was preferred to covariance-based SEM because of its improved statistical power in parameter estimates and the maximization of understood variance (Tajvidi, Wang & Hajli, 2018). Less compatible than competitive relatives are PLS SEM and CB SEM (Sarstedt, Marko, Ringle, Christian Hair & Joseph, 2014; Rigdon, 2014). Nevertheless, PLS SEM is originally known for its higher prediction over CBSEM (Hair, 2017), although the approximate gaps between the two techniques are quite different. PLS-SEM is analogous to a multiple regression analysis and is considered suitable for simultaneous estimation of relationships between one or more independent and dependent variables. This feature makes PLS-SEM especially valuable for research purposes in exploration (Henseler, 2017).

PLS-SEM incorporates path coefficients, multi-linear regression, and CFA (confirmatory factor analysis) which is a multivariate research technique of the second generation. This describes the variability in dependent variable by using structural template analysis (Hair, 2017; Hair et al., 2016). Partial Least Squares Structural Equation Modeling (PLS-SEM) works for complex models involving moderation, small samples and less prone to ordinary multivariate data (Vlajčić et al., 2018). This research study adopted a reflective measurement model in which measurements represent latent variables, and the direction of the connection is from the construct or latent variable to the measure (Diamantopoulos & Winklhofer, 2001). The statistical analysis performed in this study includes measures such as: (1)

Measurement model- testing of reliability analysis and validity analysis and (2) Structural model analysis-examining the path coefficients between observed coefficients.

Reliability analysis

Table 2 specify the different measures that were used to assess the reliability and validity of the constructs for the study.

Table 2. Psychometric Properties of Measurement Scales

Research constructs		Mean Value	Scale mean	SD	Scale SD	Cronbach's test		CR	AVE	Factor loadings	VIF (outer) values
						Item total	α				
PU	PU1	5.628	5.695	1.344	1.236	0.765	0.740	0.766	0.453	0.633	1.567
	PU2	5.634		1.364		0.717				0.578	1.633
	PU3	5.619		1.360		0.587				0.763	1.672
	PU4	5.732		1.147		0.617				0.704	1.983
PEOU	PEOU1	5.576	5.518	1.276	1.145	0.649	0.727	0.855	0.672	0.926	1.524
	PEOU2	5.713		1.094		0.589				0.573	1.570
	PEOU3	5.647		1.180		0.606				0.911	1.745
PC	PC1	3.928	4.230	1.477	1.450	0.572	0.777	0.774	0.534	0.666	1.943
	PC2	3.713		1.593		0.888				0.792	1.892
	PC3	4.195		1.425		0.657				0.730	1.794
ATT	ATT1	5.582	5.456	1.163	1.226	0.716	0.737	0.755	0.509	0.808	1.782
	ATT2	5.748		1.075		0.755				0.710	1.778
	ATT3	5.630		1.328		0.852				0.609	1.657
BI	BI2	5.513	5.461	1.261	1.299	0.721	0.859	0.904	0.703	0.834	1.937
	BI3	5.822		1.168		0.737				0.874	1.948
	BI4	5.226		1.431		0.695				0.825	1.956
	BI5	5.152		1.437		0.759				0.820	1.987
AU	AU1	5.670	5.497	1.188	1.247	0.734	0.799	0.792	0.565	0.782	2.258
	AU2	5.464		1.168		0.830				0.860	2.161
	AU4	5.547		1.232		0.816				0.586	1.988

Note: PU = Perceived Usefulness; PEOU = Perceived Ease of Use; PC = Perceived Credibility; ATT = Attitude; BI = Behavioural Intentions; AU = Actual Use. SD= Standard Deviation; CR= Composite Reliability; AVE= Average Variance Extracted.

Measurement model assessment

The outer model was assessed first by values of composite reliability (to assess internal consistency), outer loadings (to assess indicator reliability), and average variance extracted (to assess convergent validity). Composite reliability is an appropriate measure of internal consistency reliability because it accounts for the different outer loadings of the indicator variables, whereas Cronbach's alpha assumes all indicators to equally reliable (Hair et al., 2016). Item loadings surpassed the recommended value 0.5 for each relevant research construct (Aldalaigan & Buttle, 2002; Anderson & Gerbing 1988). This means that the items loaded on their respective variables. As shown in Table 2, the item loadings ranged from 0.573 to 0.926. The results also show acceptable convergent validity of individual items, as over 50 percent of the variance of each item was shared with a respective construct. The results imply that the items measured converged well to measure what they are supposed to measure and therefore the presence of convergent validity was confirmed. It is imperative to note that AU3, BI1, ATT4, PC4 and PEOU4 and PEOU5 items have been removed because the item loads were less than 0.500

and thus, less than 50 percent of variance was explained and the thresholds of equivalent or higher than 0.500 did not reach.

To evaluate the internal consistency of each variable, the Cronbach alpha coefficient value was used. As shown in Table 2 the Cronbach's alpha test results ranged between 0.727 and 0.859, which is above the 0.70 benchmark for acceptable internal-consistency reliability (Field, 2013). As revealed in Table 2 results, the lowest composite reliability (CR) value of 0.755 is well above the suggested value of 0.6 (Hulland, 1999), while the lowest obtained average variance extracted (AVE) value of 0.453 is also above the recommended value of 0.4 (Anderson & Gerbing, 1988). However, Hair et al. 2019 recommend an AVE of greater than 0.5. Even if this value falls below their recommended threshold they suggest that it's acceptable in the event that the CR is above 0.6. This shows the accomplishment of convergent validity, and this further confirms the excellent internal consistency and reliability of the measuring instruments used. As such, a sufficient level of discriminating validity was revealed by all the variables. Table 3 below presents the results of the discriminant validity analysis.

Table 3. Discriminant Validity

Variables	PU	PEUOU	PC	ATT	BI	AU
PU	1.000	-	-	-	-	-
PEOU	0.567	1.000	-	-	-	-
PC	0.543	0.724	1.000	-	-	-
ATT	0.437	0.713	0.487	1.000	-	-
BI	0.654	0.538	0.433	0.375	1.000	-
AU	0.567	0.679	0.417	0.354	0.643	1.000

Note: HTMT=Hetero-trait-Monotrait-ratio, PU = Perceived Usefulness; PEOU = Perceived Ease of Use; PC = Perceived Credibility; ATT = Attitude; BI = Behavioural Intentions; AU = Actual Use.

In terms of discriminant validity, all the correlation coefficients of this study fell below 0.70, thereby confirming the theoretical uniqueness of each variable in this research (Field, 2013). In addition, discriminant validity was evaluated using the Hetero-Trait-Monotrait Ratio (HTMT) criterion (Table 3), despite recommendations from previous studies (Henseler, Hubona & Ray, 2016; Verkijika & De Wet, 2018) indicating that HTMT is more suitable to evaluate discriminant validity than Fornell-Larcker's commonly used criteria. When taking a more conservative position, discriminant validity is reached when the HTMT value is below 0.9 or 0.85 (Verkijika & De Wet, 2018, Neneh, 2019). Table 4 reveals that the highest obtained HTMT value is 0.724, which is below the conservative value of 0.85. As such, all the constructs meet the criteria for discriminant validity.

Structural model assessment

Inner model structural model (Figure 2) was assessed to test the relationship between the endogenous and exogenous variables. The path coefficients were obtained by applying a non-parametric, bootstrapping routine (Chin & Dibbern, 2010), with 261 cases and 5000 samples for the non-return model (two-tailed; 0.05 significance level; no sign changes). The fitness of the model was assessed using the standardized root mean square residual (SRMR) based on the criteria that a good model should have an SRMR value < 0.08 (Henseler et al., 2016). In the context of Partial Least Squares Structural Equation Modelling (PLS-SEM), traditional fit indices such as CFI or TLI are not applicable due to the method's composite-based nature (Hair et al., 2019) hence the use of only the SRMR. The structural model in figure 2 had an SRMR of 0.057, thus

suggesting an adequate level of model fitness. Although cross-validation techniques such as PLSpredict were not implemented in this study, model adequacy was assessed through the R^2 values of the endogenous constructs. In the model, the two endogenous variables (Attitudes towards the use of virtual reality, Intention towards the use of virtual reality for identifying travel destinations and Actual use of virtual reality for identifying travel destinations) had R^2 values of 0.858, 0.170 and 0.141, respectively, suggesting sufficient predictive accuracy of the structural model (Figure 2).

Assessment of the goodness of fit (GoF)

Overall, R^2 for attitudes towards the use of virtual reality, intention towards the use of virtual reality for identifying travel destinations and actual use of virtual reality for identifying travel destinations in Figure 2 indicate that the research model explains 85.8%, 17% and 14.1% respectively, of the variance in the endogenous variables. The following formulae given by Tenenhaus, Vinzi, Chatelin and Lauro (2005) the global GoF statistic for the research model was calculated using the equation:

$$\text{Goodness of Fit} = \sqrt[2]{(\text{average of all AVEs values} * \text{average of all } R^2)}$$

$$= \sqrt[2]{0.573 * 0.390}$$

$$= 0.47$$

where AVE represents the average of all AVE values for the research variables while R^2 represents the average of all R^2 values in the full path model. The calculated global GoF is 0.47, which exceeds the threshold of GoF > 0.36 suggested by Wetzels, Odekerken-Schröder and Van Oppen (2009). Therefore, it can be concluded that the research model has a good overall fit.

Multicollinearity assessment of the outer model

For PLS-SEM, common method bias (CMB) is detected through a full collinearity assessment approach (Kock, 2015). VIF values should be lower than the 3.3 threshold (Hair et al., 2011, Kock, 2015). This is indicative that the model is free from common method bias. Any value greater than 3.3 means the model is affected by CMB. Therefore, upon following standard procedures in business research, the variance inflation factor (VIF) values were computed in lieu of reporting the collinearity issues in this work. The SMART PLS 3 output reports the following: VIF (outer) values for Perceived Usefulness (1.567 to 1.983), Perceived Ease of Use (1.524 to 1.745), Perceived Credibility (1.794 to 1.943), Attitudes (1.657 to 1.782), Behavioural Intentions (1.937 to 1.987), Actual Use (1.988 to 2.258).

Path Model

The PLS estimation path coefficients values as well as the item loadings for the research construct are shown in Figure 3.

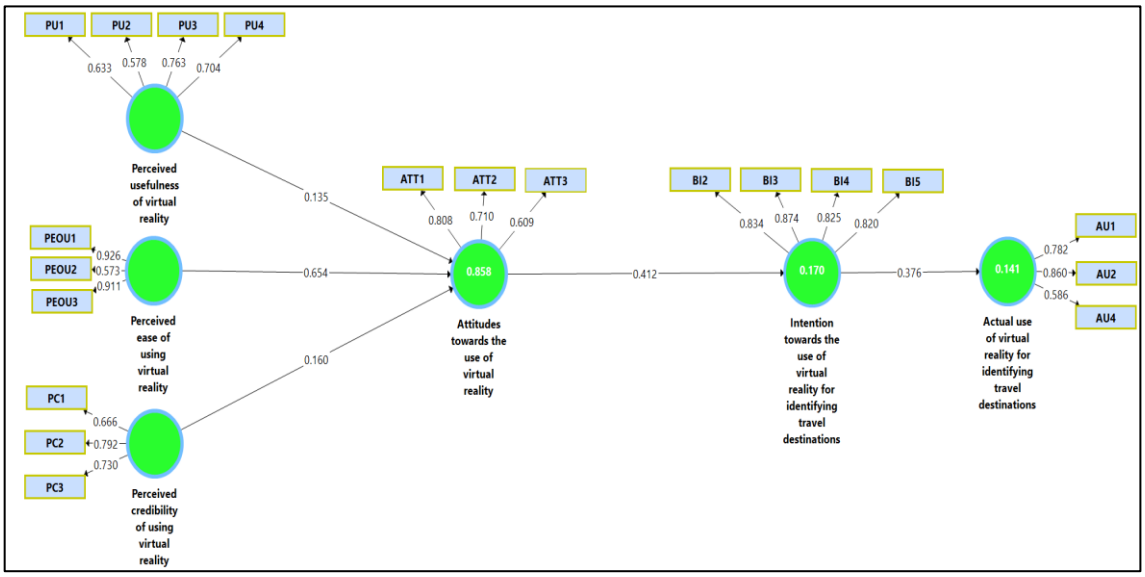


Figure 3. Path Model
(Source: The Authors, 2023)

Table 4. Results of Structural Equation Model Analysis (Hypotheses Testing)

Hypothesis	Proposed hypothesis relationship	Beta coefficients (β)	T-statistics	P-values	Decision
H_1	PU → ATT	0.135	1.987	0.020	Supported
H_2	PEOU → ATT	0.654	10.280	0.000	Supported
H_3	PC → ATT	0.160	2.201	0.000	Supported
H_4	ATT → BI	0.412	7.427	0.000	Supported
H_5	BI → AU	0.376	5.937	0.000	Supported

Source: Calculated from survey results. Note: Arrows signify the relationships between each construct to indicate the proposed hypothesis.

Outcome of hypotheses testing

In this study, hypotheses testing was conducted by path coefficient values, as well as the t-values for the structural model obtained from the bootstrapping algorithm. The results from hypotheses testing are presented in table 4 above. According to Beneke and Blampied (2012), t-values indicate whether a significant relationship exists between variables in the model and path coefficients, demonstrating the strength of the relationships in the model. A statistically significant relationship is expected to have a t-value that exceeds 1.96 at a 5% level of significance (Chin, 1998). The structural model test outcome showed that all the five hypotheses (H1, H2, H3, H4 and H5) were supported by the study data (see Table 4). The first hypothesis, (H1), perceived usefulness of virtual reality influences attitudes toward virtual reality. This relationship had an estimate of (β=0.135) and was statistically significant (t=1.987).

The second hypothesis, (H2), perceived ease of use, directly and positively affects consumer attitudes toward the use of virtual reality. This relationship had an estimate of (β=0.654) and was statistically significant (t=10.280). The first two hypothesis outcomes suggested that the more consumers perceived virtual reality as useful and easy to use the more positive their attitudes toward virtual reality would become. The third hypothesis, (H3), the perceived credibility of virtual reality impacts consumer attitudes toward its use.

The outcome confirmed this hypothesis suggesting that perceptions toward virtual reality's credibility indeed mattered to consumers as this was evident through a positive estimate (β=0.160) and was statistically significant (t=2.201). The fourth hypothesis, (H4), consumer attitudes toward virtual reality and intention to use virtual reality. This was observed to be the strongest relationship with an estimate of (β=0.412) and was statistically significant (t=7.427). Lastly, the fifth hypothesis, (H5), intention to use virtual reality was positively associated with actual use of the application. This assumption was supported by the outcome as it was revealed that the relationship had a positive estimate of (β=0.376) and was statistically significant (t=5.937). This possibly suggested that consumers who intended to use virtual reality ended up using it.

Discussion of Results

Based on the findings it was established that perceived usefulness of virtual reality and its perceived ease of use directly influences consumer attitudes toward virtual reality. This suggested that the more virtual reality users appreciated the advantages of using virtual reality the more inclined they would be in using it. This finding is in line with Dixit and Prakash (2018) who established that attitudes toward the use of a social networking site were indeed directly and positively impacted by both the perceived use and perceived ease of using that site. One of the strongest relationship attitudes and intention which produced an estimate of 0.412 and with a T value of 7.427 suggested that if consumers viewed virtual reality positively, their intention to use virtual reality would increase exponentially.

This finding was in line with Rauniar, Rawski, Yang and Johnson (2014) who established that intention to use a social networking site (in their case Facebook) and actual use were the most closely associated constructs of the TAM. With an estimate of 0.5, intention and actual usage of a social networking site was the strongest relationship in (Rauniar et al., 2014). The statistical analysis exposed that perceived usefulness of virtual reality has a positive impact on attitudes towards use of virtual reality. The results obtained in this study are line with the findings of Van De Bogart and Wichadee (2015) who found out that students' perceived usefulness of LINE positively influence their attitude toward usage. In addition, the findings from this research also confirmed that there is a positive association between perceived easy of use of virtual reality and attitudes towards use of virtual reality. This is congruent with Suki and Suki (2011) assertion that consumers who find the usage of technology to be effortless (both mentally and physically) are likely to have a greater propensity to rely heavily on the usage of m-commerce transactions rather than traditional brick-and-mortar purchases.

Furthermore, the statistical analysis showed that perceived credibility of virtual reality has a positive impact on attitudes towards use of virtual reality. These findings are in accord with Mir and Zaheer (2012) who proved that perceived credibility of user-generated content on social media sites affects the attitude toward product related user-generated content positively. Additionally, the statistical analysis exposed that attitude towards use of virtual reality has a positive impact on intention towards use. These results agree with the works of Kanchanatanee, Suwanno and Jarernvongrayab (2014) who found out that attitude toward using E-Marketing to be significant determinant of small and medium sizes businesses (SMB) owners' intention to use E-Marketing. Moreover, it was found that intention towards use of virtual reality has a positive impact on actual use of virtual reality. These findings reinforce the results obtained by Wu, Tao and Yang (2008) who established that behavioural intention of 3G mobile telecommunication services, has positive influence towards actual use behaviour.

CONCLUSION

The study's findings have led to several implications, including theoretical, practical, and policy implications. The theoretical implications suggest that customers' attitudes are positively influenced by the perceived usefulness, credibility, and ease of use of virtual reality. Therefore, tourism organizations such as Destination Marketing Organizations (DMOs) should consider leveraging virtual reality technology, such as VR glasses and headsets, to influence travelers' decision-making processes when choosing a tourism destination. As for policy implications, governments should implement regulations that ensure virtual reality is a secure and trustworthy source of tourism data. This necessitates businesses to implement safety measures to ensure that customers can experience tourism destinations in a unique and immersive way.

As for policy implications, the findings have practical implications for South Africa's digital tourism development. Specifically, for the Department of Tourism's draft National Tourism Sector Strategy (NTSS) and the Digital Economy Masterplan. The integration of digital technologies such as virtual reality to enhance marketing and customer engagement would be a key consideration. Policymakers could leverage these insights to develop targeted digital tourism strategies that align with South Africa's Fourth Industrial Revolution (4IR) objectives and the Tourism Sector Recovery Plan.

Limitations and suggestions for future research

Limitations are inherent in empirical research, and the present study is no exception. One of the limitations of this research is that it was conducted only in the Gauteng province of South Africa, excluding other provinces. Therefore, future studies should aim to replicate these findings in other South African provinces and other developing countries to provide comparative results. Furthermore, the quantitative approach employed in this study may have limited the depth and richness of the data collected, and a qualitative methodology could have produced more illuminating and elaborate information. These qualitive approaches such as in-depth interviews and focus groups may be able to capture individual's tourism experiences in more depth as compared to a survey when it comes to emotions associated with virtual reality. In this study all hypotheses were supported, while this provides theoretical consistency, it also raises a critical consideration regarding model parsimony and hypothesis design. Specifically, the comprehensive support for all paths may suggest that the model is somewhat confirmatory in nature. This therefore potentially restricts its ability to reveal divergent relationships or unexpected behaviours.

Future research may explore similar topics using a mixed-methods approach to enhance the breadth of the study's outcomes. Additionally, due to the relatively small sample size of university students in a single institution, the findings of this study may not be generalizable to students at other South African institutions of higher learning. Therefore, future studies should include students from other institutions to increase the representativeness of the sample. Furthermore, focusing exclusively on university students limits the generalizability of the findings to other virtual reality users. Therefore, future studies should include students from different institutions and other training academies to obtain a more comprehensive understanding of virtual reality use.

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