The borders are re-opening! Has virtual reality been a friend or a foe to the tourism industry so far?

Abstract

Purpose – Leveraging the technology acceptance model (TAM) and the stimulus-organism-response (S-O-R) theory, this paper aims to investigate how the utilitarian and hedonic factors in VR technologies affect consumers' intention to travel in the endemic phase of COVID-19. At the same time, the study incorporated emotional engagement and two forms of trust as possible organisms for this model.

Design/methodology/approach – Through snowball sampling, data collected from 263 respondents were analysed using the partial least square structural equation modelling.

Findings – The findings revealed that among the different forms of hedonic and utilitarian factors, all but perceived entertainment has a significant positive relationship to emotional engagement. Additionally, emotional engagement positively influences trust in the product and seller. However, the results show that only trust in the seller has a significant relationship with travelling intention. Predictive analysis shows that the model displays a strong predictive power.

Originality/value – This study differentiates from the existing literature by investigating the effect of VR technologies on the two different forms of trust and emotional engagement on travelling intention. This study extends earlier studies by supplementing the explanatory perspective with a predictive focus, which is particularly important in making sound recommendations on managerial decision-making.

Keywords
Virtual reality, Travelling intention, Emotional engagement, Endemic tourism

Introduction

Virtual Reality (VR) is gaining popularity in consumer marketing. Scholars such as Lo and Cheng (2020) have suggested that the importance of VR is comparable to social media and that it is likely to become an essential medium in consumer marketing. Global communications firms have invested significantly in VR technologies over the last few years (Lo and Cheng, 2020). To this end, VR has been found to play a more prominent role in digital marketing (Tawira and Ivanov, 2022). According to Yuan *et al.* (2022a), VR has created a more diverse and effective consumer shopping experience, such as using virtual actors to interact with consumers. In this regard, VR has expanded dramatically under strong digital marketing growth, highlighting its enormous future development potential. Through VR, it provides an "immersive experience to users through computer simulation, that induced graphics with a multi-dimensional framework, complemented by a display technology that provides end user with model integration" (Yuan *et al.*, 2022a, p. 1). Given its potential, it is not surprising that the VR industry is expected to grow at a fast pace with the market size projected to increase from less than five billion U.S. dollars in 2021 to more than 12 billion U.S. dollars by 2024 (Alsop, 2022).

VR tourism is a virtual representation of actual attractions, destinations, or visitor experiences (Pestek and Sarvan, 2020). It has been used mainly to preview attractions (Merkx and Nawijn, 2021). For instance, VR tourism has been used to educate consumers, primarily to protect environmentally sensitive sites by acting as a substitute for visitation (Lo and Cheng, 2020). It has also been used to provide a deeper appreciation of environmental challenges (Merkx and Nawijn, 2021). At the same time, VR is also increasingly being adopted and implemented in diverse tourism and hospitality areas. For instance, the German National Tourist Board used VR technology to introduce viewers to different parts of Germany, including parts of the Baltic and the North Sea coasts (Debusmann, 2020). The Tourism Board in Singapore worked with nightspots to introduce virtual parties (Singapore Tourism Board, 2020). Abu Dhabi's Department of Culture and Tourism leveraged VR technologies to introduce artists' performances, Formula 1 rides and to conduct virtual tours (Prati, 2020). These instances illustrated the potential of VR technologies in removing physical barriers and allowing individuals to gain knowledge of a destination before actual visitation (Pestek and Sarvan, 2020). Given the potential, it is not surprising that the World Economic Forum has estimated that VR tourism will be worth 200 billion U.S. dollars by 2027 (World Economic Forum, 2017).

In tandem with these developments, there has been an increase in the literature examining the impact of VR tourism. For instance, Flavián *et al.* (2019a) offer a better understanding of these concepts and integrate technologically (embodiment), psychological (presence), and behavioural (interactivity) perspectives to propose a new taxonomy of technologies. At the same time, Flavián *et al.* (2019b) extended their earlier works where they investigated tourists' attitudinal and behavioural changes as a result of VR tourism by

comparing different technologies such as desktop PCs, mobile phones and VR head-mounted displays. Huang *et al.* (2016) examined the adoption of VR technologies to plan travelling agendas through self-determination theories and the technology acceptance model. Manchanda and Deb (2021) further expanded the scope, where they adopted an inductive approach, analysing reviews and blog content, and consequently uncovered a temporary sense of isolation and the addictive nature of VR as hidden themes within VR tourism experiences. Despite these developments, this paper identifies three main gaps in the existing literature.

Firstly, given the limited number and exploratory nature of studies such as Flavián *et al.* (2019b), Flavián *et al.* (2019a), Oncioiu and Priescu (2022) pointed out that there is still confusion about what factors are influencing consumer behaviour and experience involving VR. According to Yung *et al.* (2021), empirical studies have not yet sufficiently explored how VR affects behavioural intention, leading to various calls for substantive theory-based VR research to bridge the gaps in tourism literature. Besides, Yung *et al.* (2021) further argued that many of the recent works of VR are based on the notions developed in the 1980s, demonstrating an urgent need for more substantive and theory-based research in this field.

Secondly, literature on how VR tourism leads to emotional engagement and trust is conspicuously missing. VR tourism can stimulate positive emotions among tourists (Yung *et al.*, 2021). Oncioiu and Priescu (2022) highlighted that tourist services are primarily shaped by visual experiences and the transmission of emotions. Therefore, the effectiveness of VR technology in tourism can be surmised by its ability to evoke emotional engagement among consumers. When a consumer uses VR technology to choose a tourist destination, it is based mainly on trust in the contents and the experience one goes through in that environment (Oncioiu and Priescu, 2022). While there have been preliminary results on this, there is still a lack of studies identifying the specific factors resulting in emotional engagement and how they influence trust (Yung *et al.*, 2021). Moreover, many existing works, such as Zhong *et al.* (2022), often conceptualise trust as a unidimensional construct which over-simplified the results and ignores the effect of the different dimensions (Brenninkmeijer and VanYperen, 2003). In that respect, understanding the nuanced differences between the different forms of trust is essential in developing a more detailed understanding of how the different factors lead to emotional engagement and trust.

Finally, many existing studies adopted the explanatory modelling technique (Shmueli, 2011). The focus of these studies was to assess the relationships between the variables in the model and whether it aligns with the hypothesised direction and outcomes. However, such an approach has been criticised as inadequate as it did not provide any certainty about the future and could only make limited recommendations for the future (Sarstedt and Danks, 2021). As such, this study addresses a methodological gap by performing a

predictive analysis where the objective is to understand what has happened in the past and to provide an accurate prediction of what will happen in the future.

Therefore, this study will answer the key research question of this study – whether VR technology has been a friend or foe to tourism. In this regard, there are differing views. Scholars such as Beck *et al.* (2019), Mura *et al.* (2016) suggested that VR tourism is inferior and less authentic than the actual travel experience. On the other hand, Florek and Lewicki (2022) argued otherwise, saying that VR tourism is a substitute for physical tourism. As the borders are reopening and soon the COVID-19 pandemic becomes endemic, the tourism industry urgently needs to know tourists' perspectives towards VR tourism for making managerial and operational decisions in the post-COVID-19 era (Lo and Cheng, 2020). Therefore, our study will provide a perspective to examine the different forms of hedonic and utilitarian factors on the effect of trusts that lead to their eventual decision to travel.

Literature Review

Theoretical foundation

According to Do *et al.* (2020), recent studies on consumer behaviour involving new technology are often explained using the technology acceptance model (TAM). TAM is based on innovation diffusion theory and aspects of social psychology and provides a useful tool for exploring the communication and adoption of innovations and ideas (Davis *et al.*, 1989). In exploring users' reasons for accepting (or rejecting) new technologies, TAM primarily uses two measures, perceived ease of use and perceived usefulness, to examine users' final decisions. However, TAM has been criticised for inadequacy, and scholars such as Schierz et al. (2010) have called for extensions of the model by integrating variables from related theoretical aspects to explain consumer behaviour more. In other words, TAM is too parsimonious and should be expanded by including factors particularly relevant to the specific technology under investigation (Leong *et al.*, 2020). To this end, Talafubieke *et al.* (2021) have pointed out that interactivity and entertainment are essential in shaping people's perception experience in the virtual world. In the same spirit, Luna-Nevarez and McGovern (2021, p. 175) have suggested extending the TAM to incorporate enjoyment, which they defined as "…an online shopper perceives fun, pleasure and attractiveness in the online store" as part of examining consumers' attitudes towards VR technologies. By doing this, this paper contributes to knowledge by placing TAM as a starting point of the research and extending it with additional constructs important to VR technology in the tourism industry.

However, TAM alone is insufficient to describe the phenomenon of VR in the tourism industry (Do *et al.*, 2020). This study will integrate the TAM with the stimuli-organism-response (S-O-R) model to develop a research model (see Figure 1) to holistically explain and predict how the acceptance of VR would lead to

one's desire to travel to the destination post-COVID. The S-O-R model is an environmental psychology framework widely adopted as a guiding theoretical foundation in explaining individuals' behaviour (Mehrabian and Russell, 1974). This model comprises three main components: Stimuli (S), Organisms (O) and Behavioral Responses (R). According to the S-O-R model, stimulus (S) would affect individuals' organisms (O), which would subsequently translate into behavioural responses (R).

It is well suited to serve as the theoretical foundation of this study for several reasons. First, prior studies in the area of consumer behaviour frequently draw upon the concept of the S-O-R model in understanding the determinants of different behaviours, including VR tourism (Kim *et al.*, 2018), green consumption (Le *et al.*, 2021), students' behaviour during the pandemic (Pandita *et al.*, 2021) and e-retailing (Peng and Kim, 2014). Second, the S-O-R model provides great flexibility that enables one to assess different types of stimuli, organisms and responses, including internal and external stimuli; tangible and intangible stimuli; experiential and non-experiential organisms, and various coping responses such as intention, behaviour or avoidance (Jacoby, 2002). Third, in VR research, a sematic analysis of 150 articles from 115 journals revealed that the S-O-R model acted as the primary theoretical underpinning (Loureiro *et al.*, 2019). Likewise, Loureiro *et al.* (2020) studied immersive technologies such as VR and identified the S-O-R framework as one of the most widely adopted theories (Loureiro *et al.*, 2019). Considering the above, it is evident that adopting the SOR model is suitable.

The first component of the S-O-R model, Stimulus, refers to the various aspects of atmospheric or environmental factors that stimulate an individual's internal states (Jacoby, 2002). As highlighted earlier, VR tourism is about leveraging technologies to provide an immersive experience to the users (Yung *et al.*, 2021). The artificial environment is experienced through sensory stimuli involving sights and sounds generated by the system. Travellers would rely on such stimuli to enjoy virtual travel experiences and obtain information on the destination. Following Stanovich and West (2000) work of dual-process theory, we also understand that an individual's cognitive processes can be influenced by two aspects: rational cognitive and irrational emotional. Putting these perspectives into consumer marketing means that unilateral focus on only one of these factors may leave meaningful and valuable differences unexplored (Yuan *et al.*, 2021). Therefore, there is a need for studies involving service products to examine the influence of the hedonic perspective as it could "make users have a more positive attitude or behavioral tendency toward the product" . Building on this, it is natural that our research examines VR marketing from two perspectives - hedonic aspects and utilitarian aspects

The above discussion brings us to the second component of the S-O-R model – Organisms. Organisms can be explained as the changes in one's affective and cognitive internal states resulting from exposure to stimuli (Jacoby, 2002). For instance, Le *et al.* (2021) contextualised organism as the changes in one's attitude towards the product due to exposure to the sellers' green images. Tak and Gupta (2021) identified customer engagement as another form of an organism. Wong *et al.* (2019) studied online shopping and argued that the generation of trustworthiness is the organism that reflects the presence of privacy and security. These viewpoints suggested that two forms of organism, emotional engagement and trust, could evolve in the context of VR tourism. Emotional engagement encompasses the affective factors such as enjoyment, sense of belongingness and positivity towards a particular product (Talafubieke *et al.*, 2021). Trust consists of two aspects, trust in the product and trust in the seller, which, according to Shiau and Luo (2012), is a belief that the product will be delivered as it is (trust in the product), and the seller honours the commitments that have been made in the process of selling (trust in seller).

In the S-O-R model, the response is defined as the final action or decision of consumers, which could be a resulting approach or avoidance behaviour (Jacoby, 2002). Consumers' positive responses towards specific settings, such as positive communications and purchasing, are reflected in approach behaviours. In contrast, the opposite responses, such as negative communications and no intentions to purchase, are reflected in avoidance behaviours (Jacoby, 2002). Aligned with many other studies, such as Lee and Chen (2021), Le *et al.* (2021), it is natural to consider travel intention as a response in the S-O-R model.

Putting these together, the current study (see Figure 1) aims to examine the influence of VR technologies on individuals' trust and travel intention through emotional engagement. As presented in Figure 1, this study proposes a research model to examine how the hedonic and utilitarian attributes of VR technologies (Stimulus) influence customers' emotional engagement (Organism) and their trust (Organism) towards seller and product, and travel intention (Response).

Insert Figure 1

Hypothesis Development

Perceived ease of use and perceived usefulness of emotional engagement

Based on the S-O-R model, this study contends that the VR attributes of utilitarian aspects (perceived easiness, perceived usefulness) and hedonic aspects (perceived enjoyment, perceived interactivity) can foster emotional engagement. Utilitarian values comprise efficiency, rational and effort-related desires (Babin *et al.*, 1994). O'brien (2010) further explained that utilitarian motivation is driven by one's goal,

mission, or rational decision. Such motivation directs utilitarian-focused individuals to engage in activities to complete tasks and achieve goals rather than to experience and enjoy the process. Therefore, utilitarian-focused individuals often aim to search for time-saving convenience and easy information access (Kwon and Jain, 2009).

In this respect, two attributes of utilitarian values, perceived ease of use and perceived usefulness, have been constantly highlighted by literature such as Leong *et al.* (2020). Perceived ease of use refers to the degree to which the users believe a specific system is free from effort to use (Davis, 1989). It is the critical component affecting an individual's intention to use information technologies (Venkatesh, 2000). On the other hand, perceived usefulness can be defined as the extent to which an individual perceives the usage of a specific system would improve the performance of a specific function (Davis, 1989).

From the context of VR technology in tourism, Kim and Hall (2019) found that perceived easiness and perceived usefulness impacted users' state of emotions. Huang *et al.* (2012) also found similar results where users navigating in a 3D virtual world with ease experience a much more emotional evoking experience. Virtual tourists will get emotionally involved in their experience if virtual tourism sites give visitors the chance to improve their impressions of ease of use and if the virtual world is regarded as a valuable resource of information important for trip preparation (Beck *et al.*, 2019). This perspective was further confirmed in an experimental study of virtual reality travel, which shows that VR videos evoked arousals and positive emotions (Huang *et al.*, 2021). Following these studies, it is evident that ease of use and usefulness are vital aspects that generate travellers' emotional engagement with the destination. Therefore, this study offers the following two hypotheses:

H1: Perceived ease of use of VR tourism positively influences consumers' emotional engagement with the destination
H2: Perceived usefulness of VR tourism positively influences consumers' emotional engagement with the destination

Perceived entertainment and perceived interactivity on emotional engagement

Unlike utilitarian values, hedonic values focus on the significance of experience (Babin *et al.*, 1994). According to Kim and Hall (2019), hedonic values can be characterised by a tendency driven by individuals' search for enjoyment, sensuality and happiness. In other words, individuals would focus on seeking pleasure in the process instead of the outcomes of the process. As the virtual world crafts, the imaginative and interactive aspects that may influence the user experience and user satisfaction, Kim and Hall (2019)

identified two hedonic values that VR researchers should pay more attention to perceived entertainment and perceived interactivity.

Perceived entertainment is the extent to which an individual perceives the entertainment value of the system (Kim and Hall, 2019). Like perceived ease of use and perceived usefulness, the influence of perceived entertainment and perceived interactivity on travellers' emotional engagement have been empirically validated in different literatures. For instance, Huang *et al.* (2012) explained that perceived interactivity focuses on the extent of allowing users to modify the form and content of the virtual environment, which has been gaining significant attention in technology studies. A review of studies published in 2017-2019 on VR tourism also indicated that interactivity and entertainment are the key differentiators compared to traditional media, as it generates a sense of spatial presence that positively impacts post-VR attitude change towards tourism destinations (Beck *et al.*, 2019).

Outside the tourism literature, similar arguments further enhanced the importance of these constructs. Yang and Coffey (2014) found that perceived entertainment is the strongest predictor of the intention of engagement in gamification. Yang *et al.* (2017) observed a positive relationship between the features of interactive use and consumers' engagement level. Recent studies such as Chopdar and Balakrishnan (2020) have also observed similar results. Building onto the above literature, this study contends that the hedonic attributes of perceived entertainment and perceived interactivity of VR tourism can promote emotional engagement in the destination, leading us to this pair of hypotheses:

H3: Perceived entertainment of VR tourism positively influences consumers' emotional engagement with the destination.
H4: Perceived interactivity of VR tourism positively influences consumers' emotional engagement with the destination.

Emotional engagement on trust in the seller and trust in the product

Different literature on consumer behaviour gravitates toward the common point that trust is an essential element for any transaction to take place, both in online and offline environments (see Hidayat *et al.*, 2021, Wongkitrungrueng and Assarut, 2020, Agyei *et al.*, 2020, Wong *et al.*, 2019, Yen, 2019). Trust is defined as optimism about the honesty and reliability of a transaction between two parties, without having to worry about nefarious thoughts of the other party acting opportunistically (Gefen *et al.*, 2003). In the tourism industry, trust plays another level of importance. Unlike other consumer goods that one can see, touch, test and try on before making a purchase, trust in the tourism context is built on the premise of "seeing is

believing" (UNWTO, 2022). As Çanakkale and Özkul (2016) pointed out, consumers tend to disbelieve unusual claims without supporting evidence. However, the COVID-19 pandemic that discouraged face-to-face interaction added a layer of complexity to the establishment of trust. Given the temporal and spatial separation between the seller and the buyer, trust is even more critical in VR tourism (Zhong *et al.*, 2022).

Many studies, such as Luna-Nevarez and McGovern (2021), attempted to understand the role of trust in VR tourism and many operationalised trust as a unidimensional construct. According to scholars such as Shankar and Balasubramanian (2009), trust should be seen from different perspectives to provide a holistic appreciation of its role in a buyer-seller relationship. Studies have further shown that different forms of trust produce dissimilar effects in different contexts. For instance, Chen (2013) studied consumer perceptions of food safety and found that trust in manufacturers and trust in retailers are more influential than trust in farmers in enhancing food safety. Hsu *et al.* (2014) examined trust from four perspectives: trust in the website, the vendor, the auction's initiator, and in-group members. These four perspectives influenced one's perceived risks and attitudes towards online shopping. Jiang and Lau (2021) examined the influences of platform-based trust and driver-based trust on consumers' intention to use ride-sharing services, where it was found that platform-based trust was more significant than the other in influencing consumer behaviour.

From these literatures, two conclusions about trusts were drawn. First, examining trust as a unidimensional construct would result in considerable loss of information. Second, there is no agreeable list of different forms of trust. Different contexts require different forms of trust (McKnight and Chervany, 2001). On this basis, this study will adopt two forms of trust commonly involved in VR tourism, namely trust in the seller and trust in the product. According to the existing literature, positive and engaging interactions provided by sellers strengthen consumers' attachment and trust in the brand (Singh and Sinha, 2020). Such forms of engagement, as noted by Islam *et al.* (2020), create a positive effect on consumer trust in their bank's products. As further demonstrated by Zhong *et al.* (2022), when individuals are engaged in the buyer-seller process, their confidence in the seller's capability to provide the promised services and their perception of the products' trustworthiness increases. In the context of VR tourism, the technologies can provide a rich customer experience that enhances their engagement level (Oncioiu and Priescu, 2022). However, few studies have empirically tested the relationship between emotional engagement and trust in VR tourism, representing a noticeable gap in the current literature. This study argues that consumer emotional engagement would increase the two forms of trust, hence the following hypotheses:

H5: Emotional engagement with the destination positively influences trust in the seller.
H6: Emotional engagement with the destination positively influences trust in the product.

Emotional engagement on travel intention

Behavioural intention is the "extent to which a consumer has made up the thoughts for indulging and performing future action" (Warshaw and Davis, 1985, p. 214). It is commonly adopted as the proxy indicator of actual potential behaviour, considering that positive intention leads to actual action (Ajzen, 2020). Several studies, such as Tak and Gupta (2021), have documented the positive relationship between emotional engagement, consumer purchase intention, and intention to use mobile applications. As a result of engaging experiences, consumers are more likely to buy and respond further depending on the inputs shared (Clement Addo *et al.*, 2021). In the same vein, this study argues that the emotional engagement created in VR tourism would positively influence consumer travel intention to a destination during the endemic phase of Covid-19. Hence, the following hypothesis is offered:

H7: Emotional engagement positively influences travel intention.

Trust in product and trust in seller on travel intention

Trust is essential in reducing the perception of risk and uncertainty (Hidayat *et al.*, 2021). In the tourism industry, trust is even more critical, as travel is an experience consumers cannot touch, taste or try out before deciding to buy (Williams and Baláž, 2020). Many consumers make their travelling decisions based on their trust in what they hear from the seller and what they see from the publicity materials. Abubakar and Ilkan (2016) reported that destination trust positively affects individual intentions to travel. Zhong *et al.* (2022) also found that trust in sellers enhances consumer decisions to purchase the products during live-streaming sessions. Similar results have been obtained in online shopping (Wong *et al.*, 2019) and offline shopping (Le *et al.*, 2021). Aligned with these arguments, this study postulates that consumers are more likely to visit a place if they trust (1) the sellers who use VR and (2) that the tourism destination they would be visiting will be the same as those shown on VR. Therefore, the following hypotheses are offered:

H8: Trust in the seller positively influences travel intention.

H9: Trust in the product positively influences travel intention.

Mediating effect of trust in the product and trust in the seller

Based on the S-O-R theory, this study postulates that both forms of trust play the mediating role that links the exogenous constructs to the endogenous constructs. This postulation aligns with different literature. For instance, Alagarsamy *et al.* (2021), Singh *et al.* (2020), Wongkitrungrueng and Assarut (2020) discovered that the attitude of sellers, reliability of products, as well as engagements positively enhance customer trust levels trust. Likewise, studies such as Hidayat *et al.* (2021), Guo *et al.* (2021), Jiang and Lau (2021) concluded that the presence of trust builds purchase intention. These pieces of evidence demonstrated that

trust is a key underlying construct that needs to be present in the buyer-seller relationship to build purchase intention. However, there is a lack of studies examining the mediating effect of trust in VR tourism, far lesser for the two forms of trust. Based on the above, the final set of hypotheses are:

H10a: Trust in the seller mediates the relationship between emotional engagement and travel intention.

H10b. Trust in the product mediates the relationship between emotional engagement and travel intention.

Methodology

Participants and procedures

The snowball sampling technique was used to select the sample, as finding participants with prior VR tourism experience can be quite challenging. Data collection was conducted over three months, from January to March 2022. This period was chosen as many destinations were easing or lifting their travel restrictions, which contributed to the increase in travel demand (UNWTO, 2022). For the safety of our researchers, data collection was done via an online survey platform – *SoGoSurvey*. This platform has been recognised for its flexibility in design and user-friendliness, which has been widely used in different studies such as Tan *et al.* (2022b), Tan and Yeap (2021), Tan *et al.* (2020b), Tan *et al.* (2020c). Through this platform, a web link to the survey was created and sent, together with a cover page, to the respondents, promising data anonymity and confidentiality. A screening question regarding the experience of VR tourism was included to ensure that only bona fide respondents participated in the study. The questions were in English, and the researchers encouraged respondents to send out the survey through their social networks to generate more responses. As such, the response rate cannot be determined. However, 263 valid responses were received, representing 99.99% power, meaning analysis can proceed. This has also exceeded the minimum number of respondents recommended by Kock and Hadaya (2018) required for PLS-SEM analysis.

Instruments

The items in the questionnaire are adopted from established studies. The respondents were asked to rate their perceptions on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). A five-point scale rather than a seven-point scale was chosen for several reasons. One is that it became possible to compare reliability coefficients with other research using five-point Likert Scales (Saleh and Ryan, 1991). At the same time, Babakus and Mangold (1992) found that the five-point scale tends to reduce respondents' frustration, thus improving the response rate.

To this end, perceived easiness (five items), perceived usefulness (five items) and perceived entertainment (five items) were adapted from Kim and Hall (2019). Perceived interactivity (three items) was adapted from

Jang and Park (2019). Trust in the seller (four items), trust in the product (three items) and emotional engagement (eight items) were adapted from Wongkitrungrueng and Assarut (2020). Finally, the four items on behavioural intention were adapted from Kim *et al.* (2020). To ensure contextual consistency and to fit the VR marketing context of this study, we have adapted the items by providing a focus on VR marketing (see Table 2). For instance, items measuring trust in the seller, trust in the product and emotional engagement were initially developed in the context of live streaming. We have replaced the word "live streaming" with "VR". Studies such as Tan *et al.* (2022c) have adopted a similar approach, where items have been adapted to ensure that they fit the research context.

Controlling common method bias

As this is a cross-sectional study, Podsakoff *et al.* (2003) procedural remedies were implemented to control common method bias. First, the survey was pre-tested by three experts in consumer behaviour studies to ensure that any ambiguity in the questions was addressed and the responders could understand and answer the questions as intended (Memon *et al.*, 2017). Second, the demographic questions were placed in-between predictor and criterion questions to create a perspective of temporal separation (Podsakoff *et al.*, 2003). The promise of anonymity and confidentiality was highlighted throughout the data collection period. Statistically, the Harman single factor test score was 30.41%, meaning that common method bias was not a concern in this study.

Control variables

To minimise the confoundment of results that could limit the model's explanatory power, age and gender were controlled in this model. Research evidence from Stanney *et al.* (2020) has suggested that men and women perceive virtual environments quite differently, with men preferring more interactivity than women. Hong *et al.* (2018) also found that age is a significant factor when operating VR equipment that involves spatial ability. In sum, controlling these two variables allowed the researchers to identify if the variables extraneously affected the relationships that were being investigated. In this regard, the results in Table 4 show that neither of the two control variables display any form of significant relationship with the endogenous variable.

Analytical method

To achieve the research objectives, structural equation modelling (SEM) was deployed with the partial least squares (PLS) approach, using the SmartPLS version 3.28 (Sarstedt and Cheah, 2019). PLS-SEM is the appropriate method given that it is more inclined to social sciences research that is largely composite in nature (Ringle *et al.*, 2020). It also allows for a complex configurational method that supports synergistic

results through the higher-order constructs that are not found in covariance-based SEM (Ringle *et al.*, 2020). At the same time, this study performed advanced statistical analysis of predictive analytics, making PLS-SEM a recommended method. Lastly, PLS-SEM has been deployed across a wide variety of work, including tourism (Fam *et al.*, 2020), events (Tan *et al.*, 2020c), human resources (Tan and Yeap, 2021, Tan *et al.*, 2020d, Tan *et al.*, 2020a, Tan *et al.*, 2019a, Shahzad *et al.*, 2019, Tan *et al.*, 2022a), education (Tan *et al.*, 2020b, Sim *et al.*, 2020), and information technology (Tan *et al.*, 2022b, Wong *et al.*, 2019, Tan *et al.*, 2019b).

Among the different software available for PLS-SEM analyses, SmartPLS is currently the most comprehensive software (Henseler, 2017). Not only does it have a user-friendly interface, it is regularly updated to be aligned with the rapid pace of development in methodological research on PLS-SEM (Sarstedt and Cheah, 2019). For instance, PLS-SEM offers numerous extensions such as confirmatory tetrad analysis, measurement invariance assessment, prediction techniques and multigroup analysis. Besides, SmartPLS is the most often-used PLS-SEM software, as revealed by several review studies of the method's application (Cepeda-Carrion *et al.*, 2019, Ali *et al.*, 2018, Ringle *et al.*, 2020, Hair *et al.*, 2017).

Results

Respondents profile

As shown in Table 1, there is an even distribution of genders among the respondents. Most respondents are 21-30 years old (54.0 %), followed by 31-40 years old at 31.2%. Most respondents are full-time employees (42.6%), followed by students (39.9%). Regarding current education level, 54.0% are bachelor's degree holders, with the remaining distributed among master's degree (33.8%), junior college (6.8%), doctorate degree (4.6%) and below secondary level (0.8%).

*** Insert Table 1***

Measurement model

As this study adopted PLS-SEM and not covariance-based-SEM, Hair *et al.* (2017) cautioned researchers in reporting model fit indexes. According to Ringle *et al.* (2020), fit indexes are in their early research stage, so they are not fully understood (e.g., the critical threshold values) and are often not useful for PLS-SEM. These criteria usually should not be reported and used for the assessment of the PLS-SEM results (Ramayah *et al.*, 2018)

The measurement model was assessed with the Cronbach alpha score, composite reliability, average variances extracted (AVE) and discriminant validity. Table 2 shows that the Cronbach alpha, composite

score and AVE exceeded the threshold value of 0.80, 0.70 and 0.50, respectively (Sarstedt *et al.*, 2022). The outer loadings of the indicators are above 0.708, indicating that indicator reliability has been achieved.

*** Insert Table 2 ***

The discriminant validity of the model was examined with the heterotrait monotrait ratio of correlations (HTMT) technique. Henseler *et al.* (2015) showed through a simulation study that earlier approaches such as Fornell and Larcker (1981) do not detect the lack of discriminant validity in common research situations. In determining the interpretation of HTMT, this study referred to the seminal work by Henseler *et al.* (2015) and Hair *et al.* (2017), where all values within the table should be lower than the threshold value. In this regard, Table 3 shows the HTMT values for all pairs of constructs in a matrix format. As can be seen, all HTMT values are lower than the threshold value of 0.90, indicating that discriminant validity has been achieved (Henseler *et al.*, 2015). Similar methods of detecting discriminant validity have been adopted in other papers, such as Fam *et al.* (2020) and Tan *et al.* (2022b).

*** Insert Table 3 ***

Structural model

Following the above, the structural model was examined by first assessing the variance inflation factor (VIF). The purpose is to ascertain if multicollinearity exists. Table 4 shows that multicollinearity does not exist as the VIF score is less than 5. Table 4 also demonstrates the strength of the relationship between the exogenous and endogenous constructs, R^2 values that indicate how much variance is explained by the independent constructs and finally, the f^2 values, which indicate the effect of the independent constructs in producing the R^2 values.

Table 4 shows that among the four determinants, perceived easiness of use (H1: $\beta = 0.298$, $p<0.001$), perceived usefulness (H2: $\beta = 0.175$, $p<0.01$) and perceived interactivity (H4: $\beta = 0.418$, $p<0.001$) display a positive significant relationship with emotional engagement. However, perceived entertainment did not display any significant relationship with emotional engagement (H3: $\beta = 0.020$, $p=0.395$). Hence, H1, H2 and H4 are supported.

On the effect of emotional engagement on both forms of trust and intention to travel, results show that being engaged emotionally leads to trust in the seller (H5: $\beta = 0.792$, $p<0.001$) and trust in the product (H6: $\beta = 0.817$, $p<0.001$). At the same time, emotional engagement encourages one's intention to travel during the endemic (H7: $\beta = 0.606$, $p<0.001$). All three hypotheses (H5, H6 and H7) are therefore supported. However, it is trust in the seller (H8: $\beta = 0.298$, $p<0.01$), but not trust in the product (H9: $\beta = -0.082$, $p=0.190$), that leads to the intention to travel. In other words, H8 is supported, but not H9. Mediation results also show

that trust in seller displays a complementary mediation effect (H10a: $\beta = 0.171$, $p<0.01$), while trust in product displays a non-significant relationship (H10b: $\beta = -0.067$, $p=0.191$). Hence, H10a is supported.

*** Insert Table 4***

Table 4 shows that the R^2 value of emotional engagement is 0.645, indicating that the four determinants account for 64.5% variance in emotional engagement, which according to Cohen (1992), is considered substantial. Similarly, substantial models are observed in emotional engagement, which accounted for 62.7%, 66.8% and 51.6% of the variance in trust in the seller, trust in the product and behavioural intention, respectively. On effect sizes (f^2), Table 4 shows that most effect sizes are considered small to medium, ranging from 0.027 to 0.218 (Cohen, 1988). The effect sizes of perceived entertainment on emotional engagement and trust in the product on behavioural intention are negligible, which aligns with its non-significant results. Finally, emotional engagement displayed substantial effects in producing the outcomes of trust in seller ($f^2 = 1.678$) and trust in product ($f^2 = 2.010$).

Predictive analysis

Predictive analysis was conducted to ascertain the likelihood of future outcomes based on historical data. The goal of predictive analysis is to go beyond knowing what has happened to provide the best assessment of the happenings in the future (Shmueli *et al.*, 2019). In this regard, this study used the PLS predict technique to examine the predictive power of this model. Compared to the linear regression model (LM) results, all the indicators belonging to the key constructs in the PLS-SEM results offer a lower prediction power in root mean square error (RMSE). The indicators show that this model offers a high predictive power (Sarstedt and Danks, 2021).

*** Insert Table 5 ***

Discussion

To recapitulate, this study seeks to examine two aspects of VR tourism. First, identifying the utilitarian and hedonic factors leading to an emotionally engaging VR experience, and second, whether it supports the intention to visit a particular destination in the endemic phase.

The results show that among the four predictors, perceived ease of use, perceived usefulness and perceived interactivity established significant positive relationships with emotional engagement. These results align with existing studies such as Zhang *et al.* (2022), Adegoke *et al.* (2021). There are three probable reasons leading to these results. First, VR tourism is a relatively new technology introduced in the past two years (Alsop, 2022). Unlike other communication media, such as websites and social media, operating VR technologies is more complex and requires a different set of skills (Manchanda and Deb, 2021). On a similar

note, Pestek and Sarvan (2020) found that the navigation of a 3D environment induced positive emotions, flow and emotional involvement, which resulted in positive effects on behavioural intentions, further extending the engagement that enhances the tourist experience. Taken together, it is unsurprising that they would be less engaging if the respondents feel it is challenging to operate VR technologies.

Another aspect worth considering is the nature of the transaction. As highlighted earlier, tourism products are not subject to physical scrutiny and cannot be touched, smelled, felt or tasted. Often, the decision to purchase tourism products depends on the information one receives in the search process (Meng *et al.*, 2021). Consumers must obtain sufficient information about a destination to make an informed choice (Abraham *et al.*, 2020). In an endemic, the information consumers wish to obtain goes beyond the traditional domain of a destination's transportation network as well as the history and culture of a locality (Mckinsey, 2021). Suhartanto *et al.* (2021) highlighted that today's consumers, when making their travelling decisions during an endemic, put a higher priority on other aspects of information, such as the local regulatory requirements of vaccination, lockdown procedures, and quarantine requirements. Given such expectations, it is natural that the perceived usefulness of the VR technology in providing the relevant information remains crucial in engaging the consumers.

Our results indicated that perceived interactivity was the strongest antecedent of emotional engagement among the four determinants. This is particularly relevant in the context of VR. As highlighted earlier, the main feature of VR is to provide a high level of experience immersion that includes sights and sounds. Additionally, VR gives the user a certain degree of freedom where one can control the learning experience through handheld controllers. As highlighted by Godovykh *et al.* (2022), any user who uses VR technology would expect to have some form of interaction with the contents presented in it. Therefore, consumers involved in interactive marketing tend to play a more proactive role in creating content with the brand, such as through gamification (Yang *et al.*, 2017). In VR, interactivity goes beyond this. The immersive space perception allows consumers to view the destination and interact with the immersive space that creates the brand. For instance, advanced features such as wayfinding allow consumers to travel between spaces in a destination, enhancing their virtual experiences and deepening their understanding of the destination. The results of this study align with studies such as Yang and Coffey (2014), who highlighted that incorporating interactivity in marketing campaigns often creates emotions of curiosity, excitement and fun that often reside longer in consumers' minds.

At the same time, our results showed that perceived entertainment was insignificant in influencing consumers' emotional engagement in VR tourism. The non-significant relationship implies that our respondents place little emphasis on this aspect. A probable reason could be that consumers are more concerned about the information they can obtain through VR technology. After all, travelling is an

investment where one must set aside time and financial resources. For travel after the COVID-19 pandemic, individuals would be even more cautious given the different COVID-19 travel restrictions, which include respective destinations' vaccinated travel framework, mandatory quarantine requirements, COVID-19 insurance, as well as the processes associated with COVID-19 treatment and recovery should one is infected during the trip (IATA, 2020). As a result, it is natural to see that travellers would prioritise the information obtained from VR technology as opposed to the entertainment aspect of it.

The direct and mediating results also show that emotional engagement enhances trust in the product and seller. These results are not surprising as they reflect the dynamic landscape of the tourism industry, where creating products that enhance engagement is key to survivability (Flavián *et al.*, 2019b). However, our results found that only trust in the seller has a significant relationship with travelling intention in the endemic. In other words, even if the destination is attractive, the service is good, and the price is right, the intention to visit is low if the consumers do not trust the seller. According to Williams and Baláž (2020), trust in the seller means that the consumers of tourism products generally believe in the seller's capability to provide sound advice to the consumers' needs. This result also echoes sentiments from scandals involving United Airlines, demonstrating that a lack of seller trust can lead to a drop in sales despite being a reputable brand (Matousek, 2018). In the same sense, these results further reinforced the notion that in the endemic, consumers' expectations of customer experience have shifted significantly and industry players who can prioritise customers experience can gain consumers' trust and future-proof their businesses (Mckinsey, 2021)

Theoretical implications

This study carries important theoretical implications. First, it verifies the impact of COVID-19 on both VR tourism and physical tourism, thereby reducing the fragmentation of the tourism research landscape (Manchanda and Deb, 2021). Besides, Bausch *et al.* (2020) recommended re-examining VR tourism in light of the COVID-19 pandemic, as pre-COVID research on it could have had a validity issue. As highlighted earlier, many existing works, such as Oncioiu and Priescu (2022), mainly focused on travelling behaviour during the pandemic, which according to Aris (2022), is no longer relevant. Consumers' concerns in the endemic phase differ from earlier phases, with additional considerations such as pre-departure requirements and procedures in case of being infected while travelling (Aris, 2022). In responding to this call, we have presented a comprehensive framework based on the TAM and S-O-R model, thereby supporting researchers and practitioners to better understand tourists' behavioural intentions. At the same time, no study, to the best of our knowledge, has combined emotional engagements and the two forms of trust (trust in product and trust in seller) in the same framework. In this regard, this study extends earlier work such as Hidayat *et*

al. (2021), demonstrating that trust in the seller is a critical construct that drives business success in the tourism industry.

Next, the findings of this study propose an answer to a question suggested in extant research (see Beck *et al.*, 2019, Yung *et al.*, 2021, Lee *et al.*, 2020) on VR tourism – Do VR experiences complement or substitute for physical travel? Our evidence suggests that for the hedonic and utilitarian factors to translate to intention to visit, respondents much experience emotional engagement and must trust the seller. Thus, with these novel insights, the study contributes to the VR tourism literature.

Following Sarstedt and Danks (2021), this paper extends other studies by performing predictive analysis. The ability of empirical papers to perform the predictive analysis is especially critical for social science studies, as it would support practitioners in developing sound recommendations (Shmueli *et al.*, 2019). From a consumer marketing perspective, predictive analysis helps to determine consumers' responses that would support businesses to improve their business planning to entice, maintain and develop their most profitable business segments.

Managerial implications

This study provides several managerial implications to tourism industry players. First, managers need to understand that other than sensory enhancement, virtual tourists still require the utilitarian aspects of the tourism product. For instance, any virtual reproduction project with historical allusions should enhance tourists' learning experiences through the output of cultural knowledge. Similarly, industry players should provide essential information to increase consumers' confidence in the product. Other than purely focusing on destination attractiveness, the consumers could be shown health and safety measures, the check-in process at a hotel in the endemic, or the new requirements of the boarding process. Content demonstrating these properties drives emotional engagement that enhances the trust in both the seller and the product.

This study recommends reskilling in the tourism industry, where resources should be dedicated to developing content creators and VR designers to develop easy-to-use, practical, and interactive content. Therefore, managers should take a proactive role by engaging with employees to understand their learning needs. Concomitantly, senior management should support the creation of a culture of learning, which in the long-term, supports the organisation's growth, and acts as a tool for attracting and engaging talent (Barclay *et al.*, 2021).

Third, this study shows that industry players should focus more on enhancing consumer trust. Among the two forms of trust, trust in the seller is the key construct that drives the intention to visit the destination. In this regard, industry players should offer verbal explanations and provide immediate responses to customer questions about product information and non-verbally (e.g., acting and emotion expressed facially)

expressing sensory information about products. At the same time, industry players should leverage data analytics to collect customer feedback and address their concerns. The ability to do so should further increase their trust with the consumers, thereby cultivating an organisation's growth.

Limitations and future research directions

This study's cross-sectional nature makes it incapable of capturing perception changes over time. With the further relaxation of the travel restrictions of COVID-19, some responses are likely to change over time. In addition, some respondents may provide socially desirable responses. Though efforts have been made to control CMB, questions that respondents could not entirely relate to may choose to provide a "middle ground" answer. Furthermore, this study does not include other variables, such as sense of fear, subjective norms and other social psychological factors, that could affect behavioural intention. Future researchers might conduct a longitudinal study. Future studies might also include other variables, such as household transaction data, that could provide a deeper insight into respondents' behavioural intentions. Finally, this is a survey-based study that focuses on multiple destinations. While this approach is similar to some of the existing studies, such as Oncioiu and Priescu (2022), it nonetheless can be improved to increase its precision. On this issue, future researchers could consider segmenting the tourists into categories to examine if different profiles of tourists would yield different findings. Likewise, travel destinations need to be categorised based on which target group should be served with virtual reality to provide more meaningful insights.

Conclusion

VR technology has been developed as part of smart tourism to provide different experiences for consumers. The ever-evolving COVID-19 situation continues to pose challenges for the tourism industry, making VR technology relevant in the foreseeable future. With vaccinations on the rise, infections are declining, and more countries reopening, many consumers look forward to travelling again, albeit with different considerations. Tourism industry players must, therefore, think about how best to balance supply with demand in the wake of nuanced consumer considerations. During the endemic, enticing and retaining consumers is not about just providing a low-price package or an out-of-this-world experience. It is about reassuring them that all aspects of their travelling experience are taken care of.

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Figure 1. Conceptual model

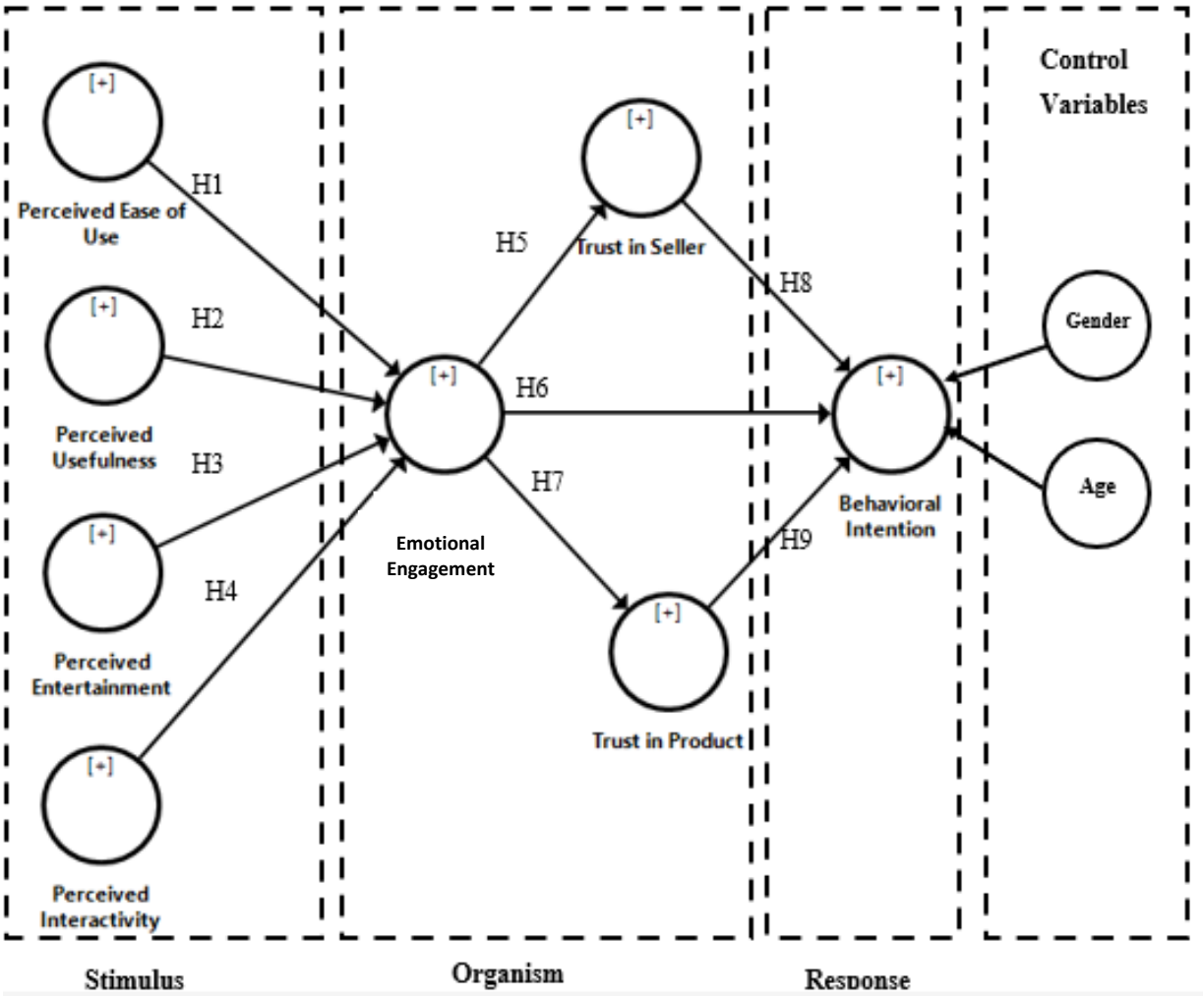

Table 1. Respondents' profile

Characteristics		Frequency (n=263)	Percent	Cumulative Percent
Gender	Male	128	48.7	48.7
	Female	135	51.3	100.0
Age	20 years old and below	20	7.6	7.6
	21-30 years old	142	54.0	61.6
	31-40 years old	82	31.2	92.8
	41-50 years old	17	6.5	99.2
	51 years old and above	2	0.8	100.0
Current Education level	Secondary and below qualification	2	0.8	0.8
	Junior college	18	6.8	7.6
	Bachelor's degree	142	54.0	61.6
	Master's degree	89	33.8	95.4
	Doctorate degree	12	4.6	100.0
Employment	Student	105	39.9	39.9
	Part-time employee	35	13.3	53.2
	Full-time employee	112	42.6	95.8
	Unemployed	11	4.2	100.0

Table 2. Measurement model

Item	Measurement	Outer Loading	CA	CR	AVE
BI1	I am planning to visit the place that I observed in the tourism-related VR activity.	0.873	0.913	0.938	0.792
BI2	I intend to visit the place that I saw in the tourism-related VR activity in near future.	0.909			
BI3	I am willing to visit the place that I saw in the tourism-related VR activity soon.	0.891			
BI4	I intend to invest money and time to visit the place that I observed in the VR tourism.	0.887			
ENG1	I spend more time on VR activities.	0.870	0.958	0.965	0.775
ENG2	I would become a fan and a follower of a seller that uses VR activities.	0.905			
ENG3	I would be likely to try and keep track of the seller that uses VR activities.	0.891			
ENG4	I am likely to revisit the seller's page to experience new VR activities.	0.897			
ENG5	I am likely to recommend sellers that use VR activities to my friends.	0.856			
ENG6	I encourage friends and relatives to buy tourism products with a seller that uses VR.	0.894			
ENG7	In the near future, I will definitely buy tourism products from a seller that uses VR.	0.872			
ENG8	I consider a seller that uses VR to be my first choice when buying tourism products.	0.854			
PI1	Tourism-related VR activity are highly interactive.	0.832	0.844	0.906	0.763
PI2	The interaction in tourism-related VR activity is efficient and clear.	0.895			
PI3	Using tourism-related VR activity fits well with my needs.	0.891			
PEAS1	It is easy for me to understand how to manipulate the tourism-related VR activity.	0.818	0.838	0.891	0.671
PEAS2	Using the tourism-related VR activity does not require a lot of mental effort.	0.791			
PEAS3	I think that using the tourism-related VR activity is simple.	0.853			
PEAS4	I find that it is easy to get what I want when I am using the tourism-related VR activity.	0.814			
PENT1	Using the tourism-related VR activity is enjoyable for me.	0.897	0.929	0.949	0.823
PENT2	Using the tourism-related VR activity is pleasurable for me.	0.904			
PENT3	Using the tourism-related VR activity is fun for me.	0.909			

PENT4	Using the tourism-related VR activity keeps me happy.	0.918			
PU1	I gain knowledge from using the tourism-related VR activity.	0.806	0.847	0.897	0.685
PU2	Using the tourism-related VR activity is useful to collect information.	0.871			
PU3	Using the tourism-related VR activity is beneficial.	0.822			
PU4	Using the tourism-related VR activity allows me to form friendships with other users.	0.810			
TP1	I think the tourism experience will be as I experienced in VR activity.	0.915	0.902	0.938	0.836
TP2	I believe that I will be able to enjoy the tourism products like those demonstrated on VR.	0.896			
TP3	I trust that the tourism products I receive will be the same as those shown on VR.	0.931			
TS1	I believe in the information that the seller provides using VR.	0.897	0.923	0.945	0.812
TS2	I can trust sellers that use VR.	0.916			
TS3	I believe that sellers who use VR are trustworthy.	0.922			
TS4	Sellers who use VR would NOT take advantage of me.	0.869			

Note: BI: Behavioral intention; ENG: Emotional engagement; PI: Perceived interactivity; PEAS: Perceived ease of use; PEN: Perceived entertainment; PU: Perceived usefulness; TP: Trust in product; TS: Trust in seller; CA: Cronbach alpha; CR: Composite reliability; AVE: Average variance extracted

Table 3. Discriminant validity

	BI	ENG	PEAS	PENT	PI	PU	TP	TS
BI								
ENG	0.758							
PEAS	0.617	0.754						
PENT	0.668	0.713	0.701					
PI	0.728	0.818	0.718	0.899				
PU	0.684	0.741	0.782	0.847	0.799			
TP	0.650	0.879	0.641	0.587	0.757	0.581		
TS	0.683	0.841	0.731	0.600	0.764	0.600	0.890	

Note: BI: Behavioral intention; ENG: Emotional engagement; PI: Perceived interactivity; PEAS: Perceived ease of use; PENT: Perceived entertainment; PU: Perceived usefulness; TP: Trust in product; TS: Trust in seller; HTMT achieved at $HTMT_{0.90}$

Table 4. Structural model

	Hypotheses	Standard beta	Standard error	t-value	5.00%	95.00%	VIF	f^2	R^2	Q^2
H1	PEAS -> ENG	0.298	0.061	4.874***	0.195	0.396	2.019	0.123	0.645	0.492
H2	PU -> ENG	0.175	0.068	2.581**	0.067	0.289	2.768	0.031		
H3	PENT -> ENG	0.020	0.077	0.267(NS)	-0.104	0.148	3.675	0.000		
H4	PI -> ENG	0.418	0.074	5.619***	0.288	0.538	3.035	0.162		
H5	ENG -> TS	0.792	0.032	24.563***	0.733	0.840	1.000	1.678	0.627	0.503
H6	ENG -> TP	0.817	0.028	29.436***	0.770	0.859	1.000	2.010	0.668	0.554
H7	ENG -> BI	0.606	0.083	7.321***	0.470	0.741	3.475	0.218	0.516	0.400
H8	TS -> BI	0.215	0.083	2.590**	0.082	0.353	3.553	0.027		
H9	TP -> BI	-0.082	0.093	0.879(NS)	-0.235	0.075	3.993	0.003		
10a	ENG -> TS -> BI	0.171	0.067	2.533**	0.064	0.284				
10b	ENG -> TP -> BI	-0.067	0.077	0.875(NS)	-0.193	0.061				

Note: BI: Behavioral intention; ENG: Emotional engagement; PI: Perceived interactivity; PEAS: Perceived ease of use; PENT: Perceived entertainment; PU: Perceived usefulness; TP: Trust in product; TS: Trust in seller; NS – not significant, *p < 0.05 **p < 0.01 and ***p < 0.001

Table 5. PLS Predict

	PLS		LM		PLS-LM	
	RMSE	Q²_predict	RMSE	Q²_predict	RMSE	Q²_predict
BI1	0.767	0.301	0.811	0.219	-0.044	0.082
BI2	0.753	0.368	0.789	0.305	-0.036	0.063
BI3	0.741	0.378	0.763	0.340	-0.022	0.038
BI4	0.796	0.337	0.799	0.332	-0.003	0.005

Note: BI: Behavioral intention