International Journal of Innovative Research and Scientific Studies, 7(2) 2024, pages: 330-342

ISSN: 2617-6548

URL: www.ijirss.com

Research on factors influencing tourists' adoption of virtual reality technology based on VAM

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Abstract

The present study utilizes the Value-based Adoption Model (VAM) to examine the determinants that influence the adoption of Virtual Reality (VR) technology for virtual tourism among domestic visitors. The focus is on perceived value, considering both benefits and costs. Data was collected from 238 visitors at a VR theme park. A questionnaire measured perceived value, benefits (novelty, visual appeal, usefulness), costs (expenses, discomfort, complexity), and hedonic motivation. Structural equation modeling was used to analyze the relationships between variables. Perceived novelty, visual appeal, and usefulness positively influence perceived value, while perceived discomfort and complexity negatively impact it. Hedonic motivation also has a positive influence. Perceived cost doesn't significantly impact perceived value. To promote VR adoption in tourism, attractions should enhance perceived benefits (novelty, visual appeal, usefulness) and reduce perceived costs (discomfort, complexity). Interactivity and entertainment elements can enhance enjoyment and value. Visual content should be realistic and appealing. The comfort of VR devices is crucial, and complex usage should be avoided. Future research can explore gender and age differences and rural adoption intentions. This study contributes to the literature by providing insights into the factors driving VR adoption for virtual tourism. It underscores the role of perceived value and hedonic motivation in shaping consumers' intentions to use VR technology for tourism experiences. Moreover, the findings offer practical guidance to marketers in promoting VR adoption within the tourism context.

Keywords: Immersive experiences, Perceived benefits, Perceived costs, Perceived value, Technology acceptance, VR technology adoption.

DOI: 10.53894/ijirss.v7i2.2625
Funding: This study received no specific financial support.
History: Received: 12 July 2023/**Revised:** 15 August 2023/**Accepted:** 6 December 2023/**Published:** 24 January 2024

Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.
Transparency: The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Institutional Review Board Statement: The Ethical Committee of the International College, Krirk University, Thailand has granted approval for this study on 14 February 2022 (Ref. No. 2022-0214).
Publisher: Innovative Research Publishing

1. Introduction

Virtual reality (VR) technology has become increasingly prevalent in the past few years, particularly in the gaming industry, where it offers players immersive virtual spaces and enhances their overall experience. However, its potential in the tourism industry is even more significant. The tourism industry has recently harnessed cutting-edge VR technology to develop Virtual Reality Tourism, enabling individuals to explore far-off destinations and immerse themselves in cultural experiences, all from the comfort of their homes. Consequently, concerns about overcrowding and the phenomenon of focusing on people rather than scenery are alleviated. VR tourism is primarily achieved through VR panoramic displays, utilizing virtual reality technology to create vivid and realistic tourism landscapes; thereby, users will then have access to an immersive, interactive world where they may move about and engage with nearby people or items. This technology has brought about a significant transformation in the way users travel. By creating virtual reality environments for tourist attractions, users can have immersive experiences before their actual trips, enabling them to make informed travel plans [1, 2].

Without a doubt, the utilization of VR technology has not only granted individuals wholly fresh travel encounters but also presented an innovative marketing and service paradigm for tourist enterprises. According to the World Tourism Organization [3], currently, tourism products in various regions are accelerating their resumption of work and production, and the online travel market is experiencing a turning point. The development of VR technology has changed the traditional marketing methods of online travel products. The characteristic of virtual tourism is to provide consumers with an immersive and authentic experience, satisfying their desire to explore the world without leaving their homes. By providing a unique audio control system and a closed environment within which the user's visual and auditory senses are engaged, and when the environmental humidity is activated, the user interacts with the system through specific devices such as spatial position trackers and glove data. Relevant instructions and data analysis are provided, and the computer system detects the user's body movements and postures based on this data, forming reactions within the virtual environment and allowing people to become engaged and have a greater sense of involvement.

The emergence of immersive virtual reality technology has fundamentally changed the user experience. According to Liu [4], VR technology offers tourists a superior tourism experience compared to traditional methods, allowing for the presentation of a positive destination image. As a result, it effectively contributes to the growth and development of the tourism industry. Therefore, strengthening the utilization of virtual reality technology within the tourism industry not only helps improve the service quality and market share of tourism products but also greatly enhances the development of the online travel market in China [4]. Currently, virtual reality technology has experienced rapid development. With the integration of internet technology into the traditional tourism industry, an increasing number of tourism companies are applying virtual reality technology in museums, amusement parks, cultural heritage tourist sites, and more. Moreover, more domestic and foreign scholars are focusing their attention on researching virtual tourism.

With the aim of harnessing the potential of virtual reality technology, many scholars in China are actively exploring its application within the tourism industry. Most scholars focus on studying the concept, characteristics, and the analysis of the advantages and disadvantages of virtual tourism. To gain a comprehensive understanding of the potential of this technology, it is necessary to conduct preliminary research that examines users' inclination towards adopting or rejecting it, as well as their acceptance and experiences in the realm of virtual tourism. This information can then be used to innovate and develop tourism products such as museum visits, cultural heritage tourism, and amusement park experiences, and to implement appropriate marketing strategies.

2. Literature Review and Hypothesis

2.1. Related Literature Research

The term Virtual Reality was first introduced by the French playwright Antonin Artaud during the 1930s. In the early 1980s, the American researcher Jaron Lanier proposed the initial definition of VR. With the rapid advancement of technology, people's understanding of it has become increasingly profound. [5] Currently, there is no unified standard for defining virtual reality as a scientific technology, and there are various different definitions, generally categorized into narrow and broad definitions.

The narrow definition considers virtual reality technology as a sophisticated form of human-computer interaction. Marie Laure Ryan provided a narrow definition of virtual reality from this perspective, stating that if a device can offer users an immersive experience, then it can be referred to as virtual reality [6]. Subsequently, scholars have increasingly incorporated technological elements into defining virtual reality. Limniou, et al. [7] defined VR as a computer-generated virtual environment where users perceive stimuli and engage in interaction and experiences, thereby immersing themselves in virtual reality [7].

According to the scholarly work of Wu and Ying [8] VR can be defined as the process of simulating human sensory systems through computer technologies. This simulation aims to create a virtual space that closely resembles reality, allowing users to engage in interactions with other individuals or things and fully immerse themselves in the virtual environment Wu and Ying [8] . Zhao and Ping [9] definition of virtual reality is similar to this. In her article, she points out that virtual reality technology relies on computer software and hardware resources to provide users with a realistic and real-time three-dimensional virtual environment, allowing users to immerse themselves and engage in human-computer interaction [9]. This is also the widely accepted definition currently, where virtual reality is a computer-generated three-dimensional virtual environment that allows users to navigate and experience the sensory stimulation offered by the virtual

environment [7]. Based on the differences in user participation types, virtual reality service systems can be classified into the following five types: immersive, desktop, distributed, augmented, or mixed reality systems [10].

Virtual reality technology is characterized by three key aspects: immersion, interaction, and imagination [11]. Perry Hobson and Williams [12] theorized that with the help of virtual reality technology, people would be able to have a complete travel experience without leaving their homes. However, the time it takes to achieve this depends on the development speed of the technology and the level of societal adoption. They further highlighted that virtual reality technology has the potential to revolutionize the tourism industry, propelling it into a new era of information known as the virtual tourism era, according to Perry Hobson and Williams [12]. Boorstin [13] says in an article that the era of mass tourism, where people pursue authentic travel experiences, is slowly changing. The emergence of virtual tourism has brought corresponding changes to the nature of contemporary tourism and the demands of tourists Boorstin [13]. Book [14] provided a detailed explanation in an article on how virtual reality technology transforms the virtual world into a tourist destination, how real tourism influences virtual tourism, and the virtual travel experiences and destination marketing in virtual tourism [14]. Witmer and Singer proposed that, in an ideal scenario, virtual environments could replace real environments, allowing users to disconnect from the physical world's stimuli and become fully immersed in the virtual world Witmer and Singer [15]. Sussmann and Vanhegan [16] also believe that virtual reality technology offers limitless potential for large-scale virtual tours of real-world tourist destinations. Given its remarkable ability to recreate complex real-life situations and environments, virtual reality (VR) is frequently considered a practical alternative to traditional travel [16].

Wang [17] argues that in the Technology Adoption Model (TAM), the emphasis is primarily placed on perceived usefulness as a key component of perceived benefits. However, this model may overlook other critical factors, such as perceived costs and perceived risks, both monetary and non-monetary, that play a significant role in users' decisions to adopt information services [17]. On the other hand, VAM takes into account both benefits and losses beyond TAM. Meuter, et al. [18] conducted an empirical test of the Technology Adoption Model (TAM) and obtained inconsistent and uncertain results, which cast doubt on its effectiveness [18]. Previous research has also suggested that a positive attitude towards new technology may not always be a reliable predictor of consumer intention to use it. In comparison to attitude, value may be a fundamental driver of usage intention [19]. Additionally, users perceive usage costs as a loss when voluntarily adopting information and communication technology (ICT), and costs are one of the most crucial and decisive factors in technology adoption Wang, et al. [20]. The study by Sohn and Kwon [21] compared various models for understanding the adoption of artificial intelligence products and found that the VAM was the most appropriate. This research integrates perceived usefulness and perceived complexity within the VAM framework to explore how user perceptions impact the intention to adopt virtual reality technology.

VR offers more effective advertising compared to traditional methods due to its immersive nature. The hospitality and tourism industries have widely adopted VR applications, enriching consumer experiences and yielding commercial benefits. VR has attracted significant attention from tourism professionals and researchers, with studies examining its impact on behavioral intentions in diverse contexts [22, 23]. Its effects on user experiences in museums, national parks, shopping centers, and art galleries have also been extensively explored [24, 25].

Cheong [26] and Wang and Wang [27]introduced the concept of the "mirror experience" using VR technology, enabling tourists to virtually explore destinations and make informed travel decisions based on this immersive encounter. This concept considers tourists' perceptions as an ideal model and is supported by the notion that VR can vividly depict spatial environments, providing detailed information to enhance tourists' understanding of destinations [28].

Lee, et al. [29] conducted a study on experiential quality in virtual tourism, emphasizing the significant impact of realism, novelty, and richness on the quality of the virtual tourism experience Lee, et al. [29]. Hyun and O'Keefe [30] introduced a virtual destination model image focusing on presence, suggesting that networked perceptual images and information in virtual tourism lead to immersion, shaping emotional imagery, and influencing user intentions Hyun and O'Keefe [30]. Huang, et al. [31] found that immersive experiences and interactivity enhance the willingness to gather information and visit real destinations, with immersive experiences mediating engagement and behavior Huang, et al. [31]. Huang, et al. [32] integrated TAM and hedonic theory, discovering positive relationships between ease of use, usefulness, and intention, along with the influence of positive emotions and flow experience Huang, et al. [32]. Tussyadiah, et al. [33] explored attitudes towards VR devices in virtual tourism, enhancing understanding of presence and its determinants and linking spatial presence to interest and preference for the destination. Similarly, Jung, et al. [34], qualitatively studying VR360° content in national parks, concluded that virtual reality positively impacts tourists' destination preferences [34]. These studies collectively illuminate the positive influence of virtual reality technology adoption on tourism destination choices.

2.2. Theoretical Analysis and Hypothesis

2.2.1. Dimensions of Perceived Benefits

Deci [35] defined motivation in cognitive evaluation theory as two types: intrinsic motivation and extrinsic motivation [35]. They play important roles in both perceived value and behavioral intention. External factors are utilitarian in nature, while internal factors refer to the enjoyment experienced by the individual.Rogers [36] discovered that both external and internal factors influence behavior and perceived value. Rogers [36] and Davis, et al. [37] concluded that perceived usefulness primarily constitutes the extrinsic benefits, while perceived enjoyment forms the intrinsic benefits Davis, et al. [37]. Simonson and Schmitt [38] pointed out that in an increasingly competitive market, designing or altering the appearance of a product can stimulate consumer demand [38]. Many studies on products and services have focused on the

perceptual behaviors resulting from visual effects. Expanding upon the aforementioned basis, our research not only examines the perceived worth of VR but also underscores its aesthetic gratification. The entire perceived value is influenced by the perceived visual appeal and perceived enjoyment.

2.2.2. The Influence of Perceived Benefits on Tourists' Perception of Value

Disztinger, et al. [39] defined perceived enjoyment as the pleasure or satisfaction experienced during the utilization of a specific system or service [39]. Perceived enjoyment, within the context of the Technology Acceptance Model, signifies the pleasure users derive from using the internet. Wang, et al. [40], in their research, highlighted the connection between using GPS navigation applications and perceived enjoyment, a crucial factor for predicting perceived value [40]. Similarly, investigations within the hotel and tourism industry regarding the adoption of virtual reality technology have underscored the pivotal role of enjoyment in shaping perceived value [41]. Thus, engaging in immersive experiences through digital technology is perceived as an enjoyable pursuit, offering users distinctive perceptual realms. Consequently, we propose the following hypothesis:

H1: Perceived enjoyment of using VR technology positively influences perceived value.

In the realm of Information and Communication Technology (ICT), "visual appeal" refers to the aesthetic design achieved through elements such as shape, color, material, and user interface. Research indicates a positive link between visual appeal and the perceived value of enjoyment. Wang, et al. [42], and Verhagen, et al. [43] also affirmed this connection, with Verhagen emphasizing visual appeal's importance in virtual worlds and hedonic value. As VR involves hardware and IT services, this study proposes the following hypothesis:

H_2: Perceived visual appeal has a positive impact on perceived value.

This study suggests that perceived usefulness posits that utilizing virtual reality devices for experiential purposes enhances the decision-making capability of selecting a travel destination.

The study by Kim, et al. [44] demonstrated that “perceived benefits” are a combination of intrinsic and extrinsic motivations. They stated in their study that in virtual experiences, users' perceptual factors are one of the main determinants of travel intentions [44]. Consequently, the utilization of VR as a means to immerse oneself in various places contributes to an enhanced comprehension of those destinations, thereby facilitating the decision-making process of individuals. Therefore, the subsequent hypothesis is postulated:

H_3: Perceived usefulness of virtual reality technology has a positive impact on perceived value.

2.2.3. Construction of the Perceived Loss Dimension

Spreng, et al. [45] proposed that perceived losses consist of two major factors: monetary (product price) and non-monetary. From the consumer's perspective, adopting VR technology incurs additional costs and may cause certain harm to oneself. Some travelers may perceive potential health-related issues associated with engaging in virtual reality through head-mounted displays (HMDs) [45]. Therefore, consistent with prior research, this study takes into account perceived costs as monetary losses and perceived discomfort and complexity as non-monetary losses.

2.2.4. The Impact of Perceived Losses on Tourists’ Perceived Value

Machogu and Okiko [46] argue that new technologies incur high costs, which act as barriers in terms of perceived costs. Wearable devices are products of high technology and come with a hefty price tag, but they are a crucial component of virtual perception. From the consumer's perspective, Machogu and Okiko [46] argue that high-cost virtual reality technologies act as barriers in terms of perceived costs [46]. The aforementioned literature indicates that the perceived cost of any technology use can, in turn, affect its perceived value. Therefore, we hypothesize:

H_4: Perceived cost of using VR technology has a negative impact on perceived value.

VR’s greatest feature is its ability to provide users with a sense of presence, or immersion. An immersive experience is an objective description of the experience, allowing users to perceive their location and who they are engaging with, similar to real-life scenarios. Virtual reality technology immerses users in a virtual realm where the perspective and content closely resemble the real world. Xu [47] pointed out that if nausea, dizziness, and similar phenomena occur frequently during virtual tourism, it directly reduces tourists’ level of experience and satisfaction, leading to a lack of immersive experience Xu [47]. Yim, et al. [48] also found in their research that while most participants found VR applications comfortable to use, virtual environments can elicit negative emotions and physical discomfort due to the characteristics of the virtual reality devices, which can undermine the overall experience Yim, et al. [48]. Bonetti, et al. [49] further underscored the significance of ensuring consumer comfort as a crucial element for the successful implementation of VR in the retail sector [49]. In conclusion, we believe that if consumers experience discomfort during the VR experience, it will, in turn, affect their perception of value. Therefore, we make the following hypothesis:

H_5: Experiencing discomfort during virtual tourism has a negative impact on the sense of presence.

In studies pertaining to the internet, Chuang, et al. [50] found that when innovation is perceived as challenging to comprehend and utilize, it can exert a detrimental influence [50]. Recent literature concerning technological innovation also reveals a noteworthy inverse relationship between technology and perceived value [40]. In China, the development of virtual reality technology has been slower compared to Western countries, and its integration with the tourism industry is also a relatively new phenomenon. Consequently, if users feel that experiencing a destination through VR requires a significant amount of cognitive effort, it may lead to a decrease in their perceived value of VR. In such scenarios,

consumers may consider the learning process of using VR complex, which diminishes its perceived value and reduces their willingness to adopt VR technology. Consequently, we propose the following hypothesis:

H_6: Perceived complexity in the use of virtual reality technology has a negative impact on perceived value.

2.2.5. The Impact of Perceived Value on Tourists' Adoption of Virtual Reality Technology

Perceived value is extensively studied in the literature as a predictor of user behavior. It encapsulates consumers' assessments of product benefits and rewards, encompassing an overall utility evaluation. Various studies have attempted to categorize perceived value into different dimensions. Sweeney and Soutar [51] proposed four dimensions, while Petrick and Backman [52] expanded it to five, and Hsiao, et al. [53] suggested three aspects. Kim, et al. [54] propose that perceived value, following the value-attitude-behavior model, represents the holistic evaluation of benefits and sacrifices tied to a product [54]. Numerous studies underscore the significant influence of perceived value on online travel purchases. For example, Wang, et al. [40] revealed in their study that perceived benefits and costs significantly shape perceived value, subsequently impacting consumer inclination towards adopting virtual navigation applications [40]. Given VR's status as a high-tech product, this study posits that consumers' heightened perceived value of VR usage is likely to drive its adoption. Consequently, the following hypotheses are presented:

H_7: Perceived value of VR technology has a positive impact on the intention to use VR.

2.2.6. The Influence of Sensation Seeking Behavior on Tourists' Adoption of VR Technology

Numerous academics have studied the idea of sensation-seeking. Zuckerman [55] suggested that sensation-seeking behavior is characterized by actively seeking new and complex experiences and willingly embracing physical, social, and other risks in pursuit of these experiences. Zuckerman [55] and Arnett [56] proposed that sensation-seeking behavior is not only a form of adventurous behavior but also a psychological inclination for individuals to seek sensory experiences in various domains Arnett [56]. Kim, et al. [54] showed that people who pursue high sensory seeking are more inclined to adopt new technologies and means [54]. According to Zhang, et al. [57], there is a noteworthy positive association between sensation-seeking behavior and the utilization of autonomous vehicles [57]. Currently, VR is regarded as a novel technological innovation that constructs virtual environments for users, facilitating immersive experiences within these environments. We believe that travelers with a sensation-seeking inclination exhibit a positive willingness to use VR for tourism. Based on the discussion above, we can propose the following hypothesis:

H_8: Sensation-seeking behavior positively influences the intention to use virtual reality.

The study investigates the impact of perceived benefits and costs on individuals' perceived value and their subsequent adoption intention. Based on the aforementioned hypotheses, the structural model of the study is illustrated in Figure 1.

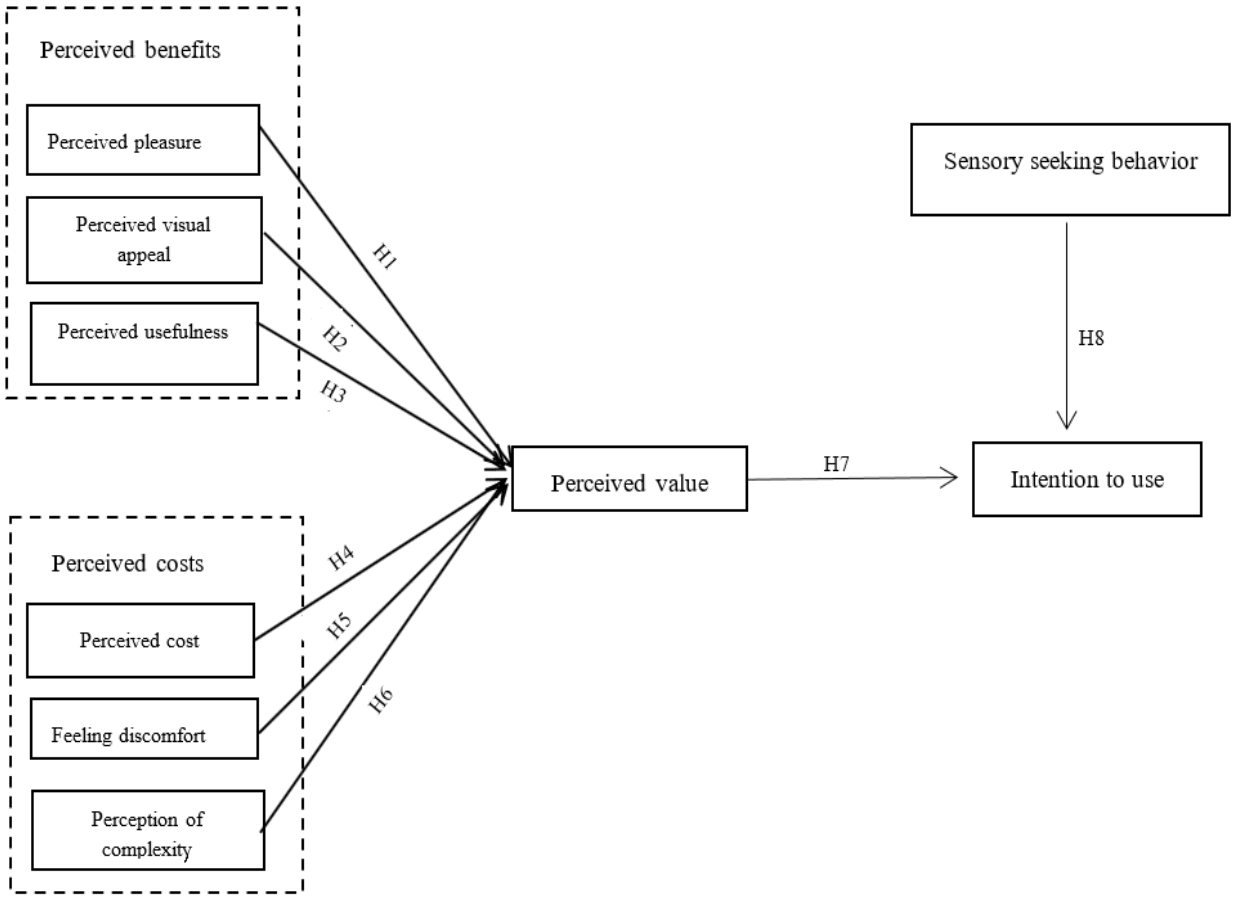

Figure 1.
Research model.

3. Methods

3.1. Questionnaire Design

The survey questionnaire for this study is divided into two sections. The first part focuses on demographic characteristics and collects basic information. The second part utilizes a 5-point Likert scale to measure tourists' perceived value of virtual reality technology and their behavioral intentions, with 5 indicating "strongly agree" and 1 indicating "strongly disagree".

3.2. Sample Selection and Data Collection

The selected participants for this survey are all visitors from the Nanchang VR Theme Park. The data collection took place from March 1st to March 12th, 2022, for duration of 12 days. This study employs an on-site questionnaire distribution method, with the questionnaire aimed at evaluating the perceived value and behavioral intentions of users regarding virtual reality tourism. The on-site experiential activities involved participants wearing VR devices, which significantly enhanced their sensory experiences, including motion sensing, visual perception, and auditory sensations. After the VR experience activity, participants are invited to fill out the survey questionnaire. In sum, 300 questionnaires were distributed. However, some participants spent significantly less time filling out the questionnaire compared to the average participation time, and some questionnaires had incomplete responses. Hence, those questionnaires were excluded. Ultimately, we obtained 238 valid responses, resulting in a validity rate of 79.3%.

3.3. Variable Measurement

This study consists of 8 variables; all the scales utilized in this study are derived from established and validated measurement instruments, and their reliability and validity have been tested in previous research. Redundant items with similar meanings were removed when using the measurement scale. We used three items to measure perceived usefulness [58] as well as perceived visual appeal [59, 60]. This study employs a four-item scale to assess perceived enjoyment. [61]. The measurement of perceived cost [62] and perceived complexity [41, 58] involved a three-item questionnaire. Two items were used to measure perceived discomfort [63]. To measure perceived value, we used three items based on Sirdeshmukh, et al. [64]. To measure sensation seeking, a three-item scale from Hoyle, et al. [65] was employed, and consumers' intention to use VR was gauged using a two-item scale adapted from Fishbein and Ajzen [66]. All these variables were assessed using a 5-point Likert scale, with "1" indicating "strongly disagree" and "5" indicating "strongly agree." The specific questionnaire items can be found in Table 1.

Table 1.
Measurement indicators and sources.

Variables	Measurement items	Source
Perceived interest	Engaging in travel planning using VR is a pleasurable experience.	Agarwal and Karahanna [61]
	I really enjoy using virtual reality technology.	
	I greatly enjoy using virtual reality technology. Experiencing destinations through VR technology brings me a lot of joy.	
	Using VR technology to experience destinations makes me feel bored.	
Perceived visual attractiveness	The colors and menus of wearable devices' user interfaces are designed to be visually appealing.	Cyr, et al. [59]and Yang, et al. [60]
	Wearable devices are visually appealing in terms of their overall appearance and tactile experience.	
	Wearable devices have an attractive appearance.	
Perceived usefulness	Virtual reality enables a more comfortable and improved approach to selecting destinations.	Davis [58]
	VR proves to be highly beneficial for me when it comes to travel planning.	
	Virtual reality technology will facilitate the process of selecting travel destinations in a more convenient manner.	
Perceived cost	VR technology is too expensive for me.	Luarn and Lin [62]
	The price of virtual reality (VR) is a source of dissatisfaction for me.	
	Using VR technology can impose some financial burden on me.	

Variables	Measurement items	Source
Feeling discomfort	Feeling uncomfortable during the test.	Navarro, et al. [63]
	Feeling uncomfortable after the test.	
Perception of complexity	I have a clear understanding of using VR.	Davis [58] and Li and Buhalis [41]
	The use of VR technology is complex.	
Perceived value	I find that utilizing VR technology to immerse oneself in destinations is not a straightforward process.	Sirdeshmukh, et al. [64]
	Compared to the cost I have to pay for using VR, it provides a better value for travel planning.	
	Overall, using VR for travel planning has provided me with better value. Perceived value.	
Intention to use	In the near future, I plan to utilize VR for travel planning purposes.	Fishbein and Ajzen [66]
	I anticipate that I will utilize VR technology for travel planning in the future.	
The behavior of seeking sensations	I have a strong desire to explore unfamiliar places.	Hoyle, et al. [65]
	I have a strong inclination to experience the thrill of bungee jumping.	
	I crave thrilling experiences but value legality and adherence to rules.	

4. Analysis of the Research Results

4.1. Descriptive Statistics and Reliability and Validity Analysis

According to the data presented in Table 2, the experiment involved the participation of 129 males and 109 females in total. It can be observed that the gender ratio is fairly balanced, with males accounting for 54.2% and females accounting for 45.8%. Additionally, the majority of the respondents belonged to the young age group of 18-25 years, representing 45.8% of the sample, followed by the 26-35 age groups, accounting for 30.7%. In terms of education level, a significant proportion of the participants (84.9%) had obtained a bachelor's degree or higher. Regarding the occupational aspect, the highest proportion was students, accounting for 68.4% of the sample. However, since students generally have minimal monthly income, the majority of respondents (70.2%) had a personal income below 900 Yuan. The second-largest income group was in the range of 2000-3999 Yuan, accounting for 17.6%. It can also be observed that the participation rates of males and females in virtual tourism are relatively similar, while the participation rates of younger, older, and lower-educated groups are relatively lower.

Table 2.
VR user data sample.

Statistical variables	Measurement values	Sample size 238	Percentage
Gender	Male	129	54.2
	Female	109	45.8
Age	Under 18 years old	41	17.2
	18-25	109	45.8
	26-35	73	30.7
	36-50	13	5.5
	50 Years old and above	2	0.8
Educational attainment	College degree or below	36	15.1
	Undergraduate degree	126	53
	Master degree or above	76	31.9
Occupation	Student	163	68.4
	Employee	43	18.1
	Civil servant	3	1.3
	Private business owner	10	4.2
	Other	19	8.0
Personal monthly income level	＜900	167	70.2
	900-1900	13	5.5
	2000-3999	10	4.2
	4000-5999	42	17.6
	＞60000	6	2.5

4.2. Descriptive Statistics and Reliability/Validity Analysis

To evaluate the measurement model, a Confirmatory Factor Analysis (CFA) was performed. Based on the fit indices, the results of the CFA demonstrated a favorable fit between the data and the model. $\chi 2/df = 1.327$,Comparative Fit Index (CFI) = 0.962, TLI = 0.96, Root Mean Square Error of Approximation (RMSEA) = 0.032, which met the acceptance criteria. In Table 3, the factor loadings of each latent variable are displayed, all of which exceeded 0.5, indicating the significance of all the items utilized in the study. The measurement model's internal consistency was evaluated through Composite Reliability (CR) and Average Variance Extracted (AVE). The CR values for each factor exceeded 0.7, and the Cronbach's α coefficients were also above 0.7, which indicates that the data exhibits good reliability.

We further examined the discriminant validity of each variable and the correlations among the variables. The results are presented in Table 4, it is evident that the correlation coefficients between latent factors are significantly lower than their corresponding square root of AVE values. These analyses revealed strong evidence of good discriminant validity among the latent factors.

Table 3.
Confirmatory factor analysis (CFA).

Variable	Item	Factor Loading	Cronbach's alpha	CR	AVE
Perceived pleasure	VR services can provide the latest content or information.	0.721	0.745	0.832	0.517
	VR services have the capacity to offer ample content and information.	0.813			
	VR services can deliver content or information that aligns with your specific interests and preferences.	0.756			
Perceived visual appeal	The colors and menus of wearable devices' user interfaces are designed to be visually appealing.	0.659	0.705	0.803	0.537
	Wearable devices are visually appealing in terms of their overall appearance and tactile experience.	0.553			
	Wearable devices have an attractive appearance.	0.772			
Perceived usefulness	Virtual reality enables a more comfortable and improved approach to selecting destinations.	0.682	0.803	0.771	0.553
	VR proves to be highly beneficial for me when it comes to travel planning.	0.721			
	Virtual reality technology will facilitate the process of selecting travel destinations in a more convenient manner.	0.772			
Perceived cost	VR technology is too expensive for me.	0.754	0.737	0.852	0.610
	The price of virtual reality (VR) is a source of dissatisfaction for me.	0.761			
	Using VR technology can impose some financial burden on me.	0.793			
Feeling discomfort	Feeling uncomfortable during the test.	0.674	0.762	0.788	0.529
	Feeling uncomfortable after the test.	0.762			
	I have a clear understanding of using VR.	0.676			
Perception of complexity	The use of VR technology is complex.	0.825	0.716	0.820	0.585
	I find that utilizing VR technology to immerse oneself in destinations is not a straightforward process.	0.765			
Perceived value	Compared to the cost I have to pay for using VR, it provides a better value for travel planning.	0.736	0.800	0.813	0.614
	Overall, using VR for travel planning has provided me with	0.753			

Variable	Item	Factor Loading	Cronbach's alpha	CR	AVE
	better value. Perceived value.				
	In the near future, I plan to utilize VR for travel planning purposes.	0.847			
Intention to use	I anticipate that I will utilize VR technology for travel planning in the future.	0.855	0.852	0.85	0.686
	I have a strong desire to explore unfamiliar places.	0.728			
The behavior of seeking sensations	I have a strong inclination to experience the thrill of bungee jumping.	0.851	0.734	0.80	0.514
	I crave thrilling experiences but value legality and adherence to rules.	0.793			
	VR technology is too expensive for me.	0.563			

Table 4.
Discriminant validity.

Variable	（1）	（2）	（3）	（4）	（5）	（6）	（7）	（8）	（9）
(1) Perceived pleasure	0.719								
(2) Perceived visual appeal	0.352	0.757							
(3) Perceived usefulness	0.171	0.176	0.743						
(4) Perceived cost	0.020	0.062	0.056	0.781					
(5) Feeling discomfort	-0.206	0.010	-0.104	0.168	0.727				
(6) Perception of complexity	-0.231	0.090	-0.132	0.352	0.363	0.764			
(7) Perceived value	0.457	0.346	0.516	-0.340	-0.204	-0.432	0.784		
(8) Intention to Use	0.465	0.033	0.429	-0.214	-0.324	-0.323	0.568	0.828	
(9) The behavior of seeking sensations	0.012	0.137	0.302	0.012	0.017	0.026	0.213	0.382	0.717

4.3. Model Fitting and Hypothesis Testing

The model fit was examined using the Analysis of Moment Structures (AMOS) 24.0 software in this study. The fitting index obtained is: 1<X ²\ Df=2.817 ＜ 3; GFI=0.917 ＞ 0.9; GFI=0.917 ＞ 0.9; Incremental Fit Index (IFI) =0.939 ＞ 0.9; Tucker-Lewis Index (TLI) = 0.925 ＞ 0.9; RMSEA=0.061 ＜ 0.08; it can be seen that all fitting indicators meet their own judgment standards, and the outcomes are depicted in Table 5.

Table 5.
Fit indices for structural model.

Index	Evaluation criterion		Result value	Compliance with standards
	Good	Acceptable		
X^2/df	$1<X^2/df<3$	$3<X^2/df<5$	2.817	Conform
RMSEA	<0.05	<0.08	0.061	Conform
GFI	>0.9	0.8-0.9	0.917	Conform
GFI	>0.9	0.8-0.9	0.938	Conform
IFI	>0.9	0.8-0.9	0.939	Conform
TLI	>0.9	0.8-0.9	0.925	Conform

Table 6 was analyzed to examine the results of hypothesis testing. We found that perceived novelty (β = 0.413, t = 7.328), perceived visual appeal (β = 0.285, t = 4.106), and perceived usefulness (β = 0.312, t = 3.389) have a significant positive impact on perceived value, indicating that H2, H3, and H4 are supported. However, perceived cost (β=0.132, t = 2.142) does not exert a significant influence on perceived value, thus H5 is not supported. Perceived discomfort (β =-0.363, t = -4.137) and perceived complexity (β = -0.215, t = -2.673) have a significant negative impact on perceived value, supporting H5 and H6. Lastly, we can see that perceived value (β = 0.568, t = 7.328) and hedonic motivation (β = 0.217, t = 3.121) have a significant positive influence on travelers' intention to use, confirming H7 and H8. The final results of the hypothesis testing are shown in Figure 2.

Table 6.
Hypothesis verification results.

Hypothesis	Research path	Standardized coefficient（β）	T-value	Result
H1	Perceived pleasure ➡ Perceived value	0.413	4.106***	Accepted
H2	Perceived visual appeal ➡ Perceived value	0.285	3.543***	Accepted
H3	Perceived usefulness ➡ Perceived value	0.312	3.389***	Accepted
H4	Perceived cost ➡ Perceived value	-0.312	2.142	Rejected
H5	Feeling discomfort ➡ Perceived value	-0.363	-4.137***	Accepted
H6	Perception of complexity ➡ Perceived value	-0.215	-2.673***	Accepted
H7	Perceived value ➡Behavioral intention	0.568	7.328***	Accepted
H8	Perceived hedonic motivation ➡ Intention to use	0.217	3.121*	Accepted

Note: *:P＜0.05, ***:P＜0.001.

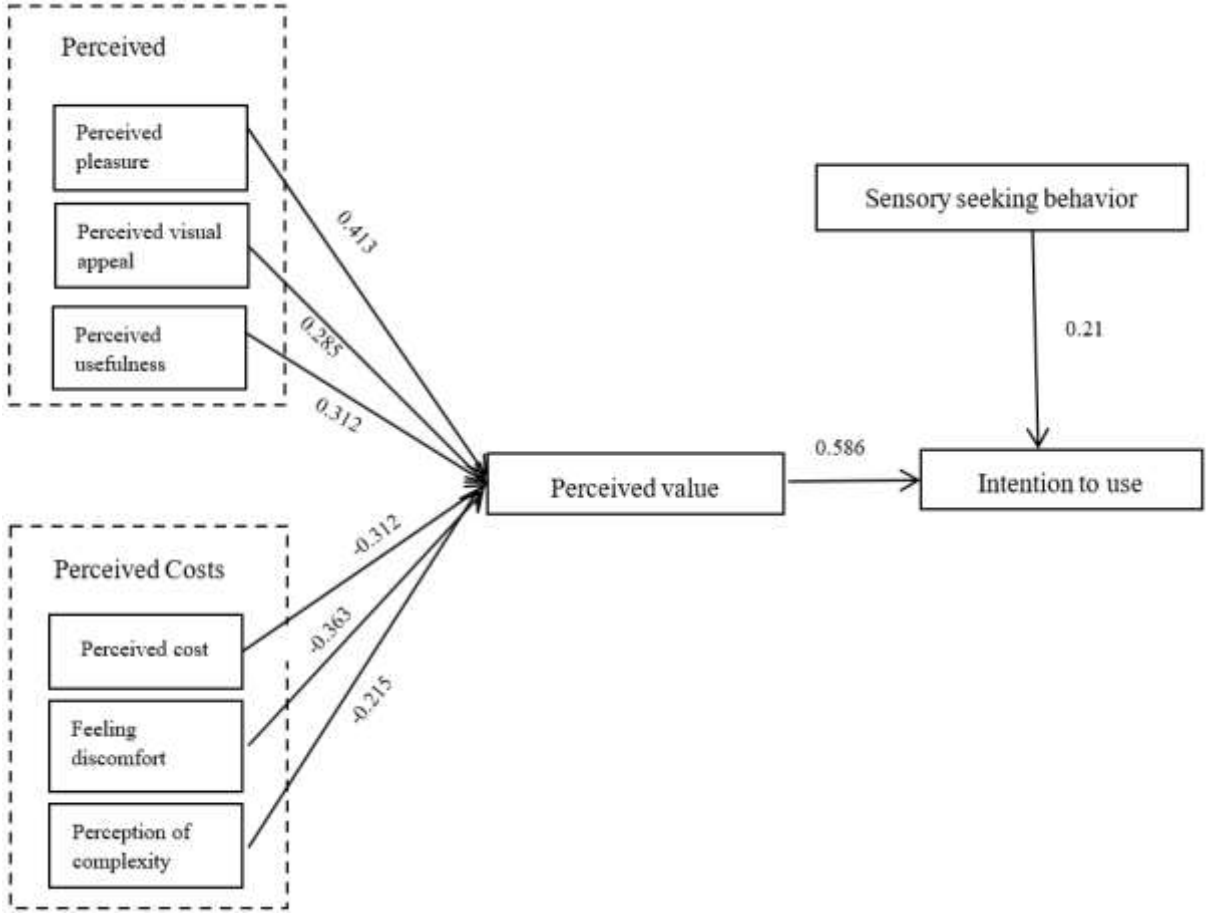

Figure 2.
Hypothesis verification results.

5. Conclusions

This study employs VAM to analyze influences on adopting VR technology in domestic tourism. It focuses on value perceptions, including advantages and disadvantages, demonstrating how perceived value, including advantages and disadvantages, affects consumers' adoption of VR. Seven out of eight hypotheses gain empirical validation.

The investigation establishes a strong positive link between perceived value and VR adoption intention. Perceived value influences tourists' willingness to embrace virtual reality, particularly during virtual tourism experiences. The study explores factors shaping perceptions of value, focusing on perceived benefits and costs.

Results highlight the positive relationship between perceived benefits (novelty, visual appeal, and usefulness) and perceived value. Novelty is the most influential predictor of perceived value. Among perceived costs, discomfort and complexity exhibit negative correlations with perceived value. Discomfort is the primary predictor within cost factors. Instances of physical discomfort and motion sickness during VR experiences influence how tourists assess the value of tourism.

This sentiment could result from users deeming costs acceptable and the presence of staff in VR facilities easing equipment use, reducing perceived complexity.

Lastly, our research findings also indicate that hedonic motivation significantly influences consumers' adoption intentions. This allows consumers to perceive virtual tourism through VR as a unique and exciting way to experience destinations. As a result, they have a more positive intention to use VR for experiencing tourist destinations. Therefore,

marketing personnel of tourist attractions should focus on enhancing tourists' perceptions of benefits (perceived novelty, perceived visual appeal, perceived usefulness) while minimizing their perceptions of costs (perceived cost, perceived discomfort, perceived complexity). This study provides new insights and implications for academic research and marketing practices at tourist attractions.

6. Implications

Based on the aforementioned arguments, marketing personnel at tourist attractions should focus on enhancing tourists' perceptions of benefits (perceived enjoyment, perceived visual attractiveness, and perceived usefulness) while reducing their perceptions of costs (perceived expenses, perceived discomfort, and perceived complexity). The following are some new insights and implications that this study brings to academic research and marketing organizations at tourist attractions.

Destination developers can enhance interactivity between tourists and tourist attractions. When building tourism platforms, they should cleverly integrate entertainment elements to enhance tourists' perceptions of enjoyment. By enhancing the amusement factor during the tourist experience, tourists' perceived value in virtual tourism can be increased, making them more willing to use virtual reality technology to deeply engage in tourism activities, thus inducing the subsequent behavior of visiting the destination in person. This allows them to experience VR on smartphones without the need to purchase expensive VR devices.

Destination marketing organizations should utilize visual elements such as fonts and graphics to display visually appealing and visually stimulating devices. It is essential to ensure that consumers are presented with rich and visually captivating content when using virtual reality devices for virtual tourism. The visual effects should be realistic, as this will increase the perceived value of the virtual tour experience for consumers and have a more positive impact on their subsequent behavior.

Thirdly, comfort is a fundamental aspect of the VR experience. In terms of comfort, destination marketing organizations should avoid using excessively heavy devices, as this directly affects the comfort of wearing them. Heavy devices can cause fatigue in the user's head, and materials, facial contact, and wearing methods that come into contact with the face can also directly impact comfort. For example, for individuals with nearsightedness, wearing glasses along with a VR headset can be extremely inconvenient. Therefore, destination marketing organizations should strive to provide consumers with VR devices for virtual experiences that are lightweight, breathable, and comfortable to wear. If the use of VR is overly complex, it can become a barrier for consumers to adopt VR.

7. Limitations

Although the majority of participants exhibited a certain level of familiarity with VR technology, practical exposure to VR devices remained limited, and only a small fraction of the sample owned VR headsets. To address this constraint, forthcoming researchers could replicate this study by involving participants who have access to VR equipment and contrasting their responses with those already acquainted with VR technology. Additionally, gender might have a notable impact on technology adoption. Subsequent investigations could explore the moderating influence of gender on the propensity to utilize VR for exploring tourist destinations, assessing potential disparities in adoption intent between male and female consumers. Furthermore, the survey predominantly captured the perspectives of younger participants. Hence, future inquiries should consider examining age variations and the moderating effect of age within the proposed model by enlisting middle-aged and elderly individuals in the study. Lastly, the study primarily concentrated on urban VR users, precluding an examination of rural consumers' inclination to embrace VR for tourism objectives. Future research endeavors could bridge this gap by evaluating and comparing the divergence in VR adoption intent for selecting tourist destinations between rural and urban tourists.

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