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What Influences Users' Continuous Behavioral Intention in Cultural Heritage Virtual Tourism: Integrating Experience Economy Theory and Stimulus–Organism–Response (SOR) Model

Shan Jiang ^{1,2} , Zhong Zhang ³ , Huayuan Xu ²  and Younghwan Pan ^{2,*} 

¹ College of Literature and Arts Communication, TongLing University, Tongling 244061, China; jiangshan6633@kookmin.ac.kr

² Department of Smart Experience Design, Graduate School of Techno Design, Kookmin University, Seoul 02707, Republic of Korea

³ College of Finance, TongLing University, Tongling 244061, China

* Correspondence: peterpan@kookmin.ac.kr; Tel.: +82-10-3305-1011

Abstract: Cultural heritage virtual tourism offers users a novel digital heritage experience, becoming an essential channel for cultural dissemination and preservation. However, how to stimulate users' continuous behavioral intention remains unresolved. This study integrates the Stimulus–Organism–Response theory (SOR) and experience economy theories to construct a comprehensive model, exploring factors influencing users' continuous intentions in cultural heritage virtual tourism. By analyzing data from 451 valid questionnaires through structural equation modeling (SEM) and fuzzy-set qualitative comparative analysis (fsQCA) methods, several key findings emerged. The SEM results show that (1) esthetics, entertainment, escapism, education, and connection experiences all positively affect perceived value and satisfaction; (2) except for escapism, other experiences positively influence cultural identity; and (3) perceived value, satisfaction, and cultural identity significantly impact continuous intention. The FsQCA results show that (1) in high continuous intention scenarios, perceived value, satisfaction, and cultural identity are core conditions, while esthetics, entertainment, escapism, education, and connection act as supporting conditions, enhancing users' willingness to continue engaging under different configurations; (2) in low continuous intention cases, the absence of escapism, satisfaction, cultural identity, education, esthetics, and connection weakens users' virtual tourism experiences, leading to a decline in continuous usage intentions. This study provides theoretical and practical insights for promoting users' continuous intentions in cultural heritage virtual tourism.

Keywords: virtual tourism sustainability; cultural heritage; continuous behavioral intention; SOR; experience economy



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1. Introduction

Cultural heritage virtual tourism (CHVT) involves an online environment based on real cultural heritage. It allows tourists to access relevant information and experience a location's heritage through digital technology without physically traveling [1]. This study focuses on tangible cultural heritage tourism. It is important to emphasize that CHVT does not seek to replace physical tourism experiences; rather, it leverages new technologies to present cultural heritage to tourists in innovative ways, effectively promoting its dissemination and sustainable preservation [2,3].

In the post-pandemic era, CHVT continues to develop as an emerging digital form of tourism, generating numerous positive impacts [4]. CHVT actively markets and promotes heritage sites [5], which increases people's willingness to visit these sites in the future [6]. Compared to physical tourism, CHVT offers higher "accessibility", allowing different social

groups to experience historical landmarks worldwide without leaving home [7,8]. Additionally, CHVT enhances tourist interaction, fosters better understanding, and facilitates learning about cultures [9]. Immersive technologies provide tourists with opportunities to virtually engage with heritage sites and artifacts [10], while reducing carbon footprints and overcrowding, thus aiding in the preservation of cultural heritage sites [11].

One of the main challenges in the current development of CHVT is the low level of continuous behavioral intention among the public [12,13], along with other limitations such as insufficient content personalization and technological barriers [14]. Behavioral intention refers to users' willingness to adopt a new technology or product, while continuous behavioral intention focuses on whether users are willing to keep using it after their initial experiences [15]. Bhattacharjee [16] emphasized that the ultimate success of virtual cultural heritage tourism depends on users' continuous intention to engage with it. However, industry reports indicate that one-third of users only use related applications once after downloading and never reopen them [17]. Furthermore, most users spend only a brief time on the platform, quickly browsing before exiting [18].

Insufficient user experience is the main reason for this phenomenon [19,20]. Kang et al. [21] demonstrated this problem through surveys, showing that the interactive designs of current CHVT platforms are often too simple, offering only basic browsing or clicking functions with limited interactivity. Meanwhile, Škola et al. [22] explained that the design of virtual environments frequently lack visual impact and detailed esthetic treatment, making it difficult for users to feel a strong sense of immersion and realism. Gaitatzes et al. [23] also pointed out that the narrative content of these platforms has not kept pace with modern developments, leading to a lack of timeliness in the information users receive. These issues collectively make it challenging for users to maintain continuous interest and engagement.

Several gaps still exist in the current research. Previous literature reviews have explored the experiences of CHVT users, which can be categorized into several areas: (1) Scholars have assessed how the characteristics and acceptance of emerging technologies, such as virtual reality (VR) and augmented reality (AR), affect user experience [24–27]. (2) Researchers have examined how the presentation of visual elements, interactive design, and functionalities enhances tourists' physical experiences [28–30]. (3) Studies have evaluated the roles of social norms, cultural identity, and emotional factors in shaping users' positive tourism experiences [31–33]. Existing research has primarily focused on short-term user experiences and behavioral intentions, without effectively addressing long-term continuous intentions [34]. Moreover, most studies have explored these issues from a single dimension, such as technology [27], visual effects [30], or emotions [35].

The Stimulus–Organism–Response (SOR) model effectively explains the relationship between perceived external factors, stimulus (S), the accompanying internal state, organism (O), and subsequent behavioral intentions, response (R) [36]. Its comprehensive structure makes it the preferred model for studying users' behavioral intentions holistically [37]. Additionally, the experience economy theory highlights the importance of creating added value by offering users deeply engaging experiences [38]. In CHVT, users aim not only to sightsee but also to gain unforgettable experiences through interaction and perception [39]. Research indicates that the experience economy theory can promote continuous behavioral intentions in virtual tourism across multiple dimensions [40]. These dimensions include esthetics, entertainment, escapism, and connection experiences, which collectively influence users' perceived experiences [41].

To fill the existing research gaps, this study integrates the Stimulus–Organism–Response (SOR) model with the experience economy theory to construct a comprehensive conceptual model, applying this to the emerging field of cultural heritage virtual tourism. It not only enriches the theoretical perspective on user behavior research but also extends its applicability to digital cultural experiences, enabling a more effective understanding of complex user behaviors in virtual environments. Based on this integration, this study aims to explore the following question: In the context of cultural heritage virtual tourism, which user experiences and perceptions influence their continuous behavioral intentions?

Methodologically, the study combines structural equation modeling (SEM) with fuzzy-set Qualitative Comparative Analysis (fsQCA) to overcome the limitations of using a single method. SEM helps verify causal relationships within the theoretical model [42], while fsQCA offers flexibility in multi-path analysis, revealing the diversity and complexity of user behavior [43]. Additionally, through empirical analysis, the study proposes strategic recommendations for optimizing virtual tourism platforms to enhance users' continuous usage intentions. These findings provide theoretical support for the design and development of cultural heritage virtual tourism and offer practical guidance to heritage practitioners. By creating more engaging and user-retentive digital experiences, these strategies contribute to the sustainable preservation and dissemination of cultural heritage.

The structure of the remainder of this paper is as follows: The next section presents the literature review and theoretical foundation. In Section 3, the research model and hypotheses are developed. The subsequent section outlines the research methods, followed by a presentation of the data analysis results. Section 6 provides a discussion of the main findings. Finally, the paper concludes with a summary of the study's contributions and limitations.

2. Literature Review and Theoretical Foundation

2.1. Cultural Heritage Virtual Tourism and Users' Continuous Behavioral Intentions

Scholars have already explored the concept of continuous engagement with cultural heritage virtual tourism, which can mainly be categorized into two types.

The first category of research focuses on examining continuous usage intentions from the perspectives of technological attributes and acceptance. Gutierrez et al. [44], through their study on the role of 3D digital technology in the reconstruction of cultural heritage sites, found that reproducing natural landscapes from different time periods can provide strong visual effects and significantly enhance tourists' overall experiences and behavioral intentions. Chung et al. [45] integrated the Information Systems (IS) Continuity Research Model to investigate how user attitudes influence the participation behaviors of Korean users. Iswahyudi et al. [46] showed that during the COVID-19 pandemic, the continuous usage intentions of Indonesian tourists were influenced by the Technology Acceptance Model (TAM) and hedonic motivations. Leung et al. [47] found that the interactive characteristics of digital technology, including synchrony, body communication, and proactive control, can affect tourists' word-of-mouth and continuous engagement intentions. Cheng et al. [13] discovered that enhancing the sense of presence in virtual technology effectively increases user satisfaction, thereby improving continuous usage intentions. Akyurt Kurnaz et al. [48] determined that the authenticity and feeling of immersion offered by virtual technology are key factors influencing Turkish tourists' participation intentions. In the same year, Zheng et al. [12] used the TTF model and the UTAUT to suggest that design aesthetics and perceived enjoyment impact users' continuous behavioral intentions.

These studies integrate various theoretical frameworks and emphasize the relationship between technological attributes and user behavior, providing important guidance and insights for the technical design and optimization of virtual tourism. However, technological advancements do not necessarily lead to increased user experience and continuous engagement intentions [49]. The relationship between technology and users' actual experience has not been fully explored, resulting in an incomplete understanding of continuous behavioral intentions.

The second category of research focuses primarily on the factors influencing continuous behavioral intentions from the perspective of users' psychological experiences. Gao et al. [50] explored how flow experience and user satisfaction enhance positive emotional experiences, which in turn promote continuous engagement. Zhu et al. [51] introduced psychological imagery and vividness as variables, arguing that these factors positively influence users' sense of telepresence. Lee et al. [52] suggested that the positive emotions generated by digital media literacy in cultural heritage tourism impact tourists' willingness to recommend virtual tourism, as well as their continuous behavioral intentions. Xu

et al. [53] performed an eye-tracking experiment, finding that virtual attachment and visual attractiveness positively affect users' intentions. Hwang et al. [54] viewed virtual tourism as a spiritual experience that influences tourists' intentions to continue engaging with religious and cultural heritage content and visiting physical sites.

These studies reveal the central role of psychological experiences in influencing users' continuous usage behaviors, highlighting the importance of enhancing emotional and spiritual experiences to boost user satisfaction and engagement. However, there has been insufficient discussion on how factors from other dimensions affect tourists' willingness to continue engaging.

2.2. Experience Economy Theory

The experience economy theory was proposed by Pine and Gilmore [55], who argued that memorable experiences hold greater value than goods and services [56]. Pine and Gilmore believe that the essence of the experience economy lies in creating profound experiences [55] within specific activities to engage users and encourage their active participation. The experience economy theory divides experiences into four themes: entertainment, education, esthetics, and escapism (4Es). These four themes are organized along two dimensions, as shown in the Figure 1 below: the vertical axis represents the level of connection (immersion and absorption), and the horizontal axis represents the level of participation (active and passive). Specifically, when users are passively involved, they experience entertainment and esthetics; when they are actively engaged, they experience education and escapism [57]. This theory has been widely applied in experience research, such as in temple stays, the cultural metaverse, and museums [58–60].

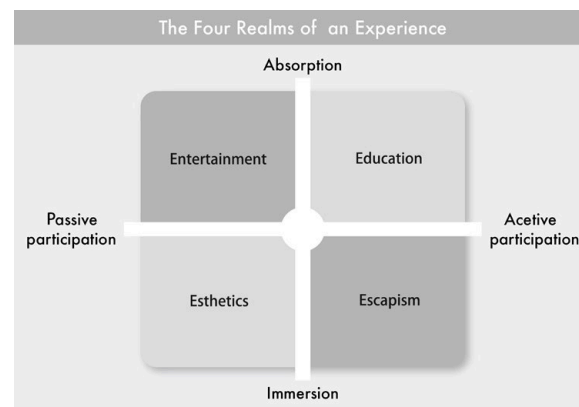


Figure 1. Four realms of experience (Pine and Gilmore, [55], p. 30).

Extensive research has demonstrated that when these experiences are well aligned, they can create a higher-quality virtual tourism experience, which in turn influences users' behavioral intentions [61–63]. Additionally, Kim et al. [64] pointed out that this theory not only focuses on users' immediate reactions but also has a positive impact on enhancing user experiences and continuous behavioral intentions. Wei et al. [41] built on the 4E framework by introducing "connection experience" as an additional factor in virtual tourism research, suggesting that this can more systematically enhance users' overall experience.

Tourism research has applied and validated the experience economy theory in various contexts. In cruise travel, the entertainment and esthetics dimensions are key factors influencing behavioral intentions [65]. In the case of homestays, the esthetic dimension is the most important determinant of behavioral intentions [61]. In golf tourism, the dimensions of education, entertainment, and escapism positively affect tourists' brand identification and revisit intentions [66]. In nature tourism, escapism and esthetics significantly influence customer satisfaction, perceived service quality, and behavioral intentions [67]. These findings suggest that each type of experience has different effects on the dependent variables, depending on the research context.

2.3. Stimulus–Organism–Response (SOR) Model

In 1974, Mehrabian and Russell introduced the Stimulus–Organism–Response (SOR) theory into environmental psychology, outlining its application to the impact of environmental stimuli on individuals' emotions, cognition, and behaviors [68]. "S" describes the broad concept of external environments, which drive individuals' internal emotional states. "O" represents individuals' emotional and cognitive states within a context, acting as the internal perceptions (thoughts, feelings, and evaluations) triggered by stimuli. "R" refers to the behavioral responses that individuals exhibit after perceiving the stimuli [36].

This study adopts the SOR model based on three main reasons. First, the SOR model is a pivotal framework for analyzing user behavior [69]. It has been applied in various fields, including retail, consumer behavior, and online education. For example, research by Zhao et al. [70], based on the SOR model, thoroughly analyzed how the technical environment characteristics in MOOC systems influence learners' willingness to engage through virtual experiences. Second, the theory explores how external environmental stimuli impact individuals' psychological and cognitive states, shaping their ultimate behavioral intentions [71]. In other words, it provides a clear framework for understanding how experiential factors in virtual cultural heritage tourism affect tourists' psychological and cognitive states, as well as their behavioral intentions. Third, Talwar et al. [72] pointed out that the model is flexible and scalable, offering a comprehensive representation of the organism's internal state, making it especially suitable for capturing the complex psychological experience processes of users. In the realm of virtual cultural heritage tourism, various factors, such as emotional needs, technological adaptability, and immersion levels, often influence tourists' experiences.

Currently, some scholars have applied the SOR model in virtual tourism research, as shown in Table 1. Studies have demonstrated that the SOR model allows for a systematic analysis of how external stimuli in various areas of virtual tourism influence tourists' cognitive states, which in turn promotes their behavioral intentions.

Table 1. Previous empirical research on SOR model.

Authors	Object	Theory	Sample	Findings	Methods
Yang et al. [73]	Virtual tourism	SOR + TAM	542	The virtual tourism experience enhances tourists' flow, boosting their acceptance of virtual tourism technologies and subsequently affecting their intention to use and actual travel consumption behavior.	CB-SEM
Leung et al. [47]	Virtual reality tourism	SOR	285	VR interactive elements like synchrony, bidirectional communication, and proactive control enhance tourists' memorable experiences, boosting word-of-mouth.	PLS-SEM
Chin et al. [74]	Virtual hotel booking systems	SOR	472	The ease of use, innovativeness, and practicality of virtual technology positively influence tourists' satisfaction and enhance their usage intentions.	CB-SEM
Lim et al. [75]	Metaverse tourism	SOR + UGT	246	Perceived enjoyment enhances users' hedonic experiences, while customer loyalty is significantly influenced by utilitarian, hedonic, and symbolic factors.	PLS-SEM

In summary, this study integrates the SOR model with the experience economy theory. The experience economy emphasizes shaping customer experiences through various elements but lacks an explanation of how these elements influence individuals' psychology and behavior. The SOR theory addresses this gap by revealing how external experiential

factors influence behavioral responses through individuals' psychological states. By combining these two approaches, a more comprehensive understanding of customer behavioral intentions can be achieved.

3. Research Model and Hypotheses

Guided by the SOR model, in the context of cultural heritage virtual tourism, stimuli (S) refer to the environmental factors that influence tourists' psychological or perceptual states. These factors serve as the starting point for tourist behavior, as they stimulate tourists' perceptions and psychological states, which then lead to cognitive processes [36]. In combination with the experience economy, esthetic experiences in cultural heritage virtual tourism (such as the beauty of visual design and cultural scenes), entertainment experiences (such as interactivity and gamified elements), escapist experiences (such as the temporary escape from reality offered by immersive virtual environments), and educational experiences (such as the transmission of historical and cultural knowledge), are all critical external stimuli [76]. Additionally, social connections and emotional connections are also considered important stimuli that further influence tourists' perceptions [41,77]. Therefore, this study identifies esthetics, entertainment, escapism, education, and connection as the main stimuli to explore how they affect tourists' perceptual states.

Organism (O) refers to tourists' perceptual, emotional, and cognitive states [78]. Tourists analyze the external stimuli they have received, combining their own cognition and emotions before responding to these external factors. Previous studies have shown that experiential stimuli positively influence users' perceived value and satisfaction, which in turn affects their subsequent behaviors [79]. Moreover, in heritage tourism, cultural identity also plays an important mediating role in tourists' engagement and behavioral intentions.

Ratnasari et al. [80] defined "response (R)" as the behavioral intention generated by tourists based on their cognitive reactions, which is the outcome of the organism stage. This study views the continuous usage intention of CHVT users as a type of response, which is the result of tourists' experiences and cognition.

Building on the previous research, we propose relevant hypotheses that explain the relationships between the experiential stimuli in cultural heritage virtual tourism (esthetics, entertainment, escapism, education, and connection), the organism (perceived value, satisfaction, and cultural identity), and the response (continuous behavioral intention). The hypothetical model for examining these relationships is presented in Figure 2.

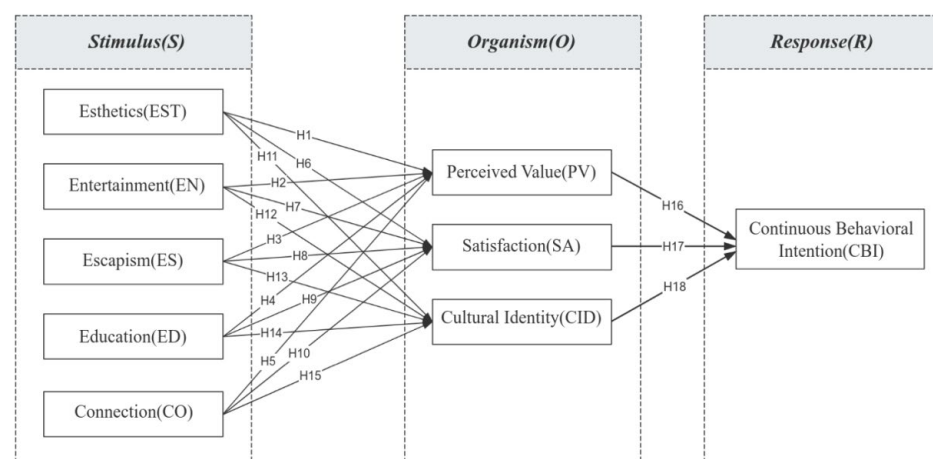


Figure 2. Proposed conceptual model.

3.1. Stimuli

3.1.1. Esthetics

Esthetics is defined as "users' perception of visual and sensory pleasure, specifically their appreciation of the beauty and design of the environment [65]". Esthetic experiences

allow users to actively immerse themselves in a scene or event, which is crucial for creating positive and memorable user experiences. Song et al. [58] analyzed data from tourists at attractions and found that esthetic features are key factors influencing word-of-mouth intentions and revisit. Tom et al. [63] highlighted that in immersive virtual experiences, esthetic motivations are the primary factors that attract users and promote their engagement.

3.1.2. Entertainment

Oh et al. [61] described entertainment experiences as “activities primarily aimed at providing fun and enjoyment”. It combines tourists’ full immersion with passive participation and is considered one of the most appealing forms of user perception [55]. Previous research has explored the potential of digital technologies in providing entertainment value and found that digital technologies not only enhance users’ perceived enjoyment but also stimulate their interests and engagement through game elements and interactive content [81]. In cultural heritage, entertainment can present cultural content to users in a vivid way through virtual scenes and interactive designs [82]. For example, the recently popular game *Black Myth: Wukong* features virtual environments mostly derived from cultural heritage sites in Shanxi, China. By offering entertainment, the game immerses users while simultaneously increasing their interest and satisfaction with cultural heritage.

3.1.3. Escapism

Escapism refers to the “temporary escape from everyday life that tourists experience when they fully immerse themselves in an environment and participate in activities with a new identity” [83]. It is characterized by tourists’ deep immersion and active participation. Song et al. [58] found that when users immerse themselves in impressive virtual experiences, they seek to temporarily forget the real world. Li et al. [84] argued that virtual tourism often provides beautified or reconstructed cultural heritage sites, allowing tourists to escape from the dissatisfaction of reality and enjoy an idealized cultural experience.

3.1.4. Education

Education can be defined as “the active participation of tourists in learning new things through cognitive interaction”. In cultural heritage virtual tourism, this refers to the integration of historical and cultural information for learning purposes [62]. Hincapié et al. [85] found that guided tours using virtual technology applications improve tourists’ learning and knowledge retention of cultural heritage compared to those who do not use such applications. Virtual cultural tourism is considered a typical example of providing both educational and esthetic content [86].

3.1.5. Connection

Connection can be understood as “the process of building and strengthening social and emotional ties through interaction and shared activities in a virtual environment”. Compared to traditional tourism, users can engage in real-time interaction with other tourists worldwide via virtual platforms, share experiences, and participate in virtual community discussions, thereby transcending geographical and cultural boundaries [87]. Deng et al. [62] indicated that virtual tourism experiences enhance users’ willingness to visit physical sites by increasing their perceived value and cultural identity, thus creating a link between the virtual and the real. In addition, by recreating historical events or cultural scenes through virtual technology, users can vividly experience the authenticity of history, triggering emotional responses such as awe, emotion, or nostalgia, thereby establishing deeper emotional connections [77].

3.2. Organism

3.2.1. Perceived Value

Perceived value serves as a key mediator between experience and behavioral intention [88]. It represents “the overall evaluation of a product or service, based on users’

perceptions of the value they receive compared to what they give”, and is built upon the dual concept of the “give-get” trade-off [89]. Numerous empirical studies have explored the four types of experiences from the experience economy and demonstrated their impact on perceived value. For example, Kim et al. [90] indicated that education, esthetics, escapism, and entertainment experiences are positively correlated with perceived value. In the context of homestay experiences, Zhao et al. [91] showed that esthetics and escapism experiences significantly impact perceived value. Xu et al. [92] found that in mobile environments, entertainment experiences positively influence perceived value. Kim et al. [90] pointed out that entertainment and escapist experiences significantly enhance brand reputation in grocery stores, affecting customers’ perceived value through functional, hedonic, and financial value. Yi et al. [93] demonstrated that esthetics and entertainment in the experience economy (e.g., personalized services and entertainment activities) significantly impact tourism development by enhancing perceived value. Additionally, Yu et al. [94] revealed that in location-based social network services, social value enhances perceived value by strengthening social connections. Cheng et al. [95] found that destination image enhances tourists’ overall perceived value of island tourism by increasing their perceptions of novelty and hedonism. Based on these previous studies, this research proposes that when tourists receive multiple stimuli during their experiences, their perceived value increases. Therefore, we propose the following hypotheses:

- H1.** *Esthetics experiences positively influence perceived value for CHVT tourists.*
- H2.** *Entertainment experiences positively influence perceived value for CHVT tourists.*
- H3.** *Escapism experiences positively influence perceived value for CHVT tourists.*
- H4.** *Education experiences positively influence perceived value for CHVT tourists.*
- H5.** *Connection experiences positively influence perceived value for CHVT tourists.*

3.2.2. Satisfaction

Several studies have suggested a significant positive relationship between positive experiences and tourist satisfaction [96]. Satisfaction is an important self-regulatory psychological response that can lead to positive outcomes, such as the willingness to use a service [97]. In the tourism context, satisfaction is an emotional response that arises after experiencing tourism products or services and is understood as a function of tourists’ expectations before and after the experience [80]. Tourist satisfaction encompasses the overall psychological states generated by the tourism experience. The experience economy theory provides a framework for understanding this relationship [98]. For example, Mehmetoglu et al. [99] investigated how the four types of experiences from the experience economy model influenced tourist satisfaction across two different tourism contexts: museums and local festivals. The results demonstrated that the impact of these experiences on tourist satisfaction varied based on the specific setting of the tourism activity. Hosany et al. [65] explored the connection between cruise passengers’ experiences, their satisfaction, and their willingness to recommend the cruise. It identified esthetic and entertainment experiences as the primary factors driving passenger satisfaction. Other studies have shown that emotional connections, such as place attachment, significantly influence tourist satisfaction and loyalty, suggesting that emotional connection is a key factor in enhancing satisfaction. When technology meets tourists’ specific needs (e.g., deepening their understanding of historical culture), it enhances their cognitive connection, thus improving their satisfaction and subjective well-being [100]. Based on the literature, this study proposes the following hypotheses:

- H6.** *Esthetics experiences positively influence the satisfaction of CHVT tourists.*

H7. *Entertainment experiences positively influence the satisfaction of CHVT tourists.*

H8. *Escapism experiences positively influence the satisfaction of CHVT tourists.*

H9. *Education experiences positively influence the satisfaction of CHVT tourists.*

H10. *Connection experiences positively influence the satisfaction of CHVT tourists.*

3.2.3. Cultural Identity

Cultural identity serves as a pivotal factor in determining the overall success or failure of heritage tourism experiences [101]. Cultural identity is a core component of national identity and refers to an individual's or group's sense of belonging, psychological commitment, and value recognition toward a specific culture [3]. Tourists' emotional involvement and experiences in cultural heritage tourism help to enhance their sense of cultural identity. Ren et al. [102] argued that tourists' esthetic appreciation of the environment plays a crucial role in fostering cultural identity, offering a unique form of understanding and spreading cultural identity through the esthetic appreciation of heritage landscapes. Yang, et al. [103] pointed out that psychological experiences and involvement theory in cultural heritage tourism are important variables that profoundly influence tourists' cultural identity. Deng et al. [32] empirically tested the role of entertainment and educational experiences in promoting cultural identity from the audience's perspective. Yang et al. [104] further explored the emotional evaluation theory, revealing the critical influence of tourists' emotional experiences on cultural identity and heritage conservation behavior. Therefore, this study proposes the following hypotheses:

H11. *Aesthetics experiences positively influence the cultural identity of CHVT tourists.*

H12. *Entertainment experiences positively influence the cultural identity of CHVT tourists.*

H13. *Escapism experiences positively influence the cultural identity of CHVT tourists.*

H14. *Education experiences positively influence the cultural identity of CHVT tourists.*

H15. *Connection experiences positively influence the cultural identity of CHVT tourists.*

3.3. Response

The successful adoption of an innovation depends not only on users' initial willingness to adopt it but, more importantly, on their intention to continue using it in the future [105]. In the innovative field of CHVT, continuous behavioral intention can be explained through two dimensions: attitude (tourists' willingness to reuse and recommend) and motivation (their plans to increase usage frequency in the future). The attitude dimension reflects tourists' willingness to engage with or experience the same CHVT content again [100]. This intention is a critical factor for the sustainable development and success of CHVT projects, as it directly influences tourists' revisit rates and loyalty. Research has shown that it is generally more cost-effective to retain existing users' revisit intentions than to attract new users. Additionally, tourists with continuous behavioral intentions are more inclined to recommend or share their experiences with relatives and friends, thereby increasing the project's reach and visibility [106]. This not only boosts the digital spread and recognition of cultural heritage but also contributes to its preservation and continuation, enabling more people to understand, respect, and cherish cultural heritage through virtual platforms, ultimately achieving its sustainable protection and continuation.

Patrick's research demonstrated that perceived value, satisfaction, and service quality are all good predictors of behavioral intention [107]. However, in cultural tourism, cultural identity directly reflects tourists' resonance with and value recognition of cultural content, which significantly influences their continuous engagement intentions and behaviors.

Compared to service quality, cultural identity better captures tourists' emotional connection and identification with cultural heritage, making it a key driver of continuous behavioral intention in CHVT experiences [108]. Based on the above literature, this study proposes the following hypotheses:

H16. *Perceived value positively influences the continuous behavioral intention of CHVT tourists.*

H17. *Satisfaction positively influences the continuous behavioral intention of CHVT tourists.*

H18. *Cultural identity positively influences the continuous behavioral intention of CHVT tourists.*

4. Method

4.1. Case Selection and Experimental Platform

The Forbidden City is one of China's most famous tangible cultural heritage sites. The case selected for this study is the "Panorama of the Forbidden City" virtual heritage tourism platform (<https://pano.dpm.org.cn/#/>, accessed on 20 August 2024) (Figure 3). This project, co-developed by the Palace Museum and a professional mapping team, integrates browsing, navigation, an encyclopedia, and interaction into one well-known product. The platform uses GPRS navigation, LBS positioning, and 360-degree panoramic technology to accurately capture information on over 600 open areas, buildings, exhibition halls, and service facilities within the Forbidden City. It also offers special features like auspicious symbols of the Forbidden City, beautiful images, and thematic routes, all of which have been well received by users. Users can enjoy an immersive 360° panoramic experience of the open areas of the Forbidden City and explore parts that have not yet been opened to the public. Selecting the right experimental platform is crucial, and we carefully considered five factors:

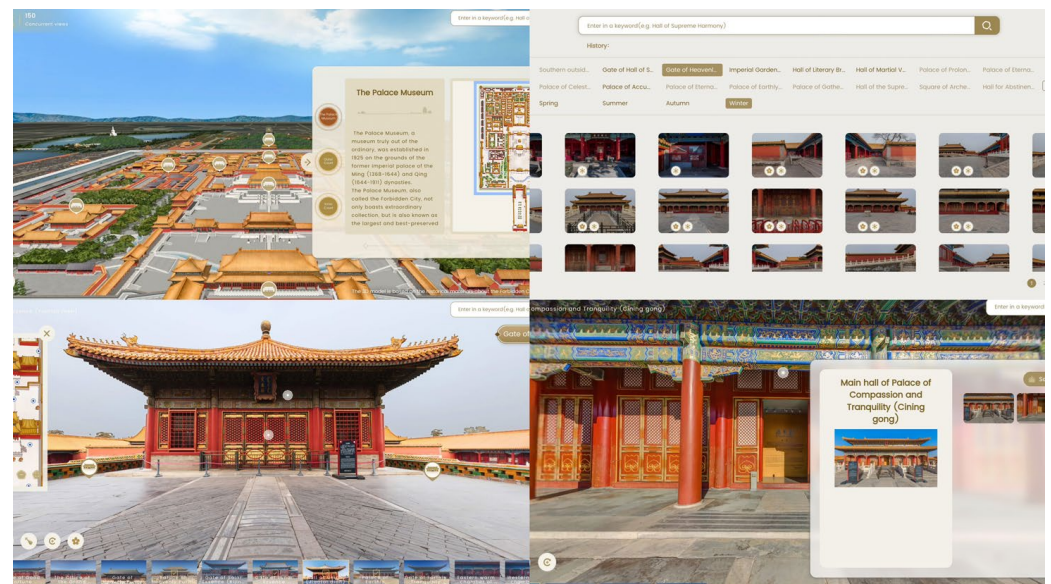


Figure 3. "Panorama of the Forbidden City" heritage virtual tourism platform experience scene.

Immersive Experience—The platform offers a fully immersive virtual environment through panoramic view technology, making users feel as though they are physically in the Forbidden City, significantly enhancing user experience.

Educational Value—Through detailed historical introductions and culturally rich narratives, users can learn about the history and culture of the Forbidden City, deepening their understanding and raising awareness about the preservation of Chinese cultural heritage.

Entertainment—Interactive functions and engaging design provide users with an enjoyable cultural exploration experience, such as dynamic seasonal changes and the

opportunity to explore unopened areas, increasing the platform's attractiveness as a tourism destination.

Ease of Use—The “Panorama of the Forbidden City” is designed to be simple and user-friendly, making it accessible to users of different ages and backgrounds, ensuring broad accessibility and engagement.

Inclusivity—The platform offers multi-language support (such as English, Spanish, etc.), ensuring that global users can seamlessly experience the virtual tour of the Forbidden City.

4.2. Questionnaire Design and Measurement Scales

In the first part of the questionnaire, to provide participants with a comprehensive introduction, we briefly introduced the “Panorama of the Forbidden City” virtual cultural heritage tourism on the homepage. After clicking on the link to the “Panorama of the Forbidden City” website (<https://pano.dpm.org.cn/#/>), participants could freely “wander” through the various palaces, courtyards, and gardens of the Forbidden City. By clicking on specific areas, they could access detailed text, audio, or video explanations to learn about the historical, cultural, and artistic value of the buildings and artifacts.

The second section of the questionnaire collected demographic details about respondents, including their gender, age, education level, familiarity with virtual cultural heritage tourism, and their frequency of using virtual cultural heritage tourism. The third section consisted of 33 questions addressing 9 measurement variables: education (ED), esthetics (EST), escapism (ES), entertainment (EN), connection (CO), perceived value (PV), satisfaction (SA), cultural identity (CID), and continuous behavioral intention (CBI). All questionnaire items were rated using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The items for all variables in this section were primarily drawn from the existing literature, with adjustments made to align the content with the specific context of cultural heritage virtual tourism, ensuring it fit the theme and objectives of this study, as presented in Table 2 of the questionnaire.

To ensure the scientific rigor and validity of the questionnaire, we invited six experts with more than eight years of research experience in cultural heritage and virtual tourism to review the questionnaire. Among them, two experts have accumulated 7–8 years of practical experience in the field of cultural heritage preservation; two experts have 8 years of research experience in virtual tourism; one expert has 9 years of professional background in user experience design; and one expert has 8 years of research experience in digital platform usability and user behavior analysis. First, we arranged the experts' schedules and sent them the full background information of this study, a draft of the measurement scales, and related materials for their review prior to the meeting. Then, we held an expert review meeting to discuss various aspects of the scales, including the wording of the items and the formulation of answer options, ensuring the accuracy and relevance of the questionnaire (Table 2). To further guarantee the quality of the questionnaire, we invited 50 users to participate in a pilot survey, and the results indicated that the scale had good reliability (Cronbach's Alpha > 0.7) and validity (standard factor loading > 0.5) [109].

Since most of the scales applied in this study were originally developed in English, we also hired three expert translators to translate the questionnaire into Chinese to ensure accuracy. In terms of academic ethics, all participants provided informed consent before completing the questionnaire, ensuring their rights were safeguarded. We clearly explained to the participants that all data collected would be used solely for academic research and would never be used for commercial purposes. Additionally, we assured participants that their privacy would be strictly protected.

Table 2. The results of exploratory factor analysis of the questionnaire.

Variable	Items/Issues	Refs.
ED	ED1: I learned a lot of relevant knowledge from the “Panorama of the Forbidden City” virtual tour. ED2: The “Panorama of the Forbidden City” virtual tour sparked my curiosity to learn more about cultural heritage. ED3: The “Panorama of the Forbidden City” virtual tour was a truly educational experience for me. ED4: The “Panorama of the Forbidden City” virtual tour was very educational for me.	[110,111]
EST	EST1: I felt very pleased during the “Panorama of the Forbidden City” virtual tour. EST2: The scenes in the “Panorama of the Forbidden City” are very attractive. EST3: I experienced a sense of harmony in the overall atmosphere of the “Panorama of the Forbidden City” virtual tour. EST4: I think the “Panorama of the Forbidden City” virtual tour looks very esthetic.	[110–112]
ES	ES1: During the “Panorama of the Forbidden City” virtual tour, I felt like I was playing a different role. ES2: During the “Panorama of the Forbidden City” virtual tour, I completely escaped from reality. ES3: During the “Panorama of the Forbidden City” virtual tour, I felt like I was living in a different time or place.	[110–112]
EN	EN1: I found the “Panorama of the Forbidden City” virtual tour fun. EN2: I found the “Panorama of the Forbidden City” virtual tour to be full of excitement. EN3: I found the “Panorama of the Forbidden City” virtual tour experience interesting. EN4: I found the “Panorama of the Forbidden City” virtual tour to be fascinating.	[96,113]
CO	CO1: During the “Panorama of the Forbidden City” virtual tour, I felt a connection to the culture and history of the Forbidden City. CO2: During the “Panorama of the Forbidden City” virtual tour, I was willing to interact with other users. CO3: The “Panorama of the Forbidden City” virtual tour increased my interest in visiting the Forbidden City in person.	[41,114,115]
PV	PV1: I find the “Panorama of the Forbidden City” virtual tour itself to be valuable. PV2: Choosing to visit the “Panorama of the Forbidden City” virtual tour was a good decision. PV3: Compared to other virtual tours, visiting the “Panorama of the Forbidden City” virtual tour is worth the value. PV4: Considering the time I spent, the experience of the “Panorama of the Forbidden City” virtual tour was well worth it. PV5: After visiting the “Panorama of the Forbidden City” virtual tour, I developed a deeper emotional connection to Chinese culture.	[88,106,116]
SA	SA1: I am pleased with the overall experience of the “Panorama of the Forbidden City” virtual tour. SA2: The experience of the “Panorama of the Forbidden City” virtual tour met my expectations. SA3: This is one of the best virtual tourism destinations I have ever visited.	[117,118]
CID	CID1: I have learned more about the culture of the Forbidden City than before. CID2: During the tour, I developed a strong sense of national pride and cultural confidence. CID3: If possible, I would like to spend more time exploring the Forbidden City virtual tour. CID4: I would purchase cultural products related to the Forbidden City virtual tour.	[104,119]
CBI	CI1: I am more willing to use the “Panorama of the Forbidden City” virtual tour in the future. CI2: I will continue to use the “Panorama of the Forbidden City” virtual tour and increase my usage of it. CI3: I strongly recommend others to use the “Panorama of the Forbidden City” virtual tour.	[75,120]

4.3. Data Collection

This study utilized China’s professional online survey platform, Questionnaire Star (<https://www.wjx.cn/>), to create online questionnaire links and QR codes, inviting users to participate through various online channels, including QQ (Version 9.0.95.606), WeChat (Version 8.0.51) group chats and Moments, Weibo topic pages, and Xiaohongshu. Re-

searchers joined diverse groups on QQ and WeChat, targeting various interests, age groups, and regions to ensure a more diverse participant pool. Additionally, they collaborated with group owners or administrators to help share and promote the questionnaire. On WeChat Moments, Weibo topic pages, and Xiaohongshu, more attractive titles and hashtags, were used to draw the attention of different user groups. The promotion also made it clear that participants who completed the survey would have the opportunity to enter a raffle and win small prizes, encouraging greater participation in the experience and the questionnaire. To ensure the rigor of the data, strict screening criteria were applied. Participants were asked to explore the “Panorama of the Forbidden City” platform for a minimum of five minutes before filling out the online survey on the same day. This approach aimed to reduce the effect of time gaps on the accuracy of responses. Furthermore, safeguards were put in place within the questionnaire to prevent duplicate entries, ensuring the reliability and authenticity of the data.

The distribution period was from 20 August to 15 September 2024. A total of 485 questionnaires were collected, and after excluding invalid questionnaires due to incomplete information, 451 valid questionnaires remained, meeting the sample size requirements for structural equation modeling (SEM) and fsQCA analysis [121]. Descriptive statistics of the sample are shown in Table 3.

Table 3. Demographics of participants (N = 451).

Variable	Items	Frequency	Percentage %
Gender	Male	242	53.7
	Female	209	46.3
Age (years)	18–25	60	13.3
	26–35	194	43
	36–45	128	28.4
	46 and over	69	15.3
Education level	Junior high school and below	35	7.8
	High school/secondary school	93	20.6
	University college	117	25.9
	Undergraduate	152	33.7
	Master and above	54	12
Degree of familiarity with CHVT	Very unfamiliar	1	0.2
	Not very familiar	7	1.6
	Generally familiar	200	44.3
	Fairly familiar	142	31.5
	Very familiar	101	22.4
The frequency of using CHVT	Never experienced	3	0.6
	1–2 times	44	9.8
	3–5 times	130	28.8
	6–10 times	184	40.8
	More than 10 times	90	20

4.4. Data Analysis Methods

This study employed both structural equation modeling (SEM) and fuzzy-set qualitative comparative analysis (fsQCA) to more comprehensively explore the complex relationships in cultural heritage virtual tourism experiences. SEM is a multivariate statistical analysis technique widely used in social sciences and management research. It is primarily used to validate causal paths between latent variables and reveal linear relationships between variables [42].

In contrast, fsQCA focuses on the combined effects of conditional variables, revealing how different configurations of conditions jointly influence outcome variables. fsQCA complements SEM by emphasizing the sufficiency and necessity of multiple causal pathways

and their combinations, allowing for the analysis of different outcome scenarios under various variable configurations [43].

By combining SEM and fsQCA, the study could confirm key causal paths while delving deeper into the complex interactions among variable configurations, comprehensively revealing the effects of both linear relationships and combined factors on user behavior. This approach enhances the comprehensiveness and explanatory power of the research. The complementarity of these two methods ensures that the study captures not only the direct effects of individual factors but also the diverse outcomes resulting from multi-factor interactions.

5. Results

5.1. Structural Equation Modeling (SEM) Results

5.1.1. Measurement Model

The evaluation of the measurement model included indicator reliability, Cronbach's Alpha (α) coefficient, construct validity, composite reliability, convergent validity, and discriminant validity. This method has been widely applied in the academic community for the evaluation of measurement models [42,122]. The analysis was conducted using AMOS 28 software.

The first step in evaluating the measurement model was to assess indicator reliability. As shown in Table 4, all factor loadings exceed the threshold of 0.7, indicating that the model performs well in terms of indicator reliability, effectively capturing the core characteristics of the latent variables and ensuring measurement accuracy and reliability [109].

Table 4. Reliability and validity indicators.

Variable	Measurement Item	Factor Loading	Cronbach's Alpha (α)	KMO	CR	AVE
ED	ED1	0.787	0.859	0.826	0.8596	0.6051
	ED2	0.746				
	ED3	0.767				
	ED4	0.81				
EST	EST1	0.788	0.855	0.825	0.8553	0.5965
	EST2	0.763				
	EST3	0.78				
	EST4	0.758				
ES	ES1	0.739	0.821	0.715	0.8233	0.6088
	ES2	0.768				
	ES3	0.831				
EN	EN1	0.771	0.858	0.818	0.8586	0.6032
	EN2	0.768				
	EN3	0.817				
	EN4	0.749				
CO	CO1	0.795	0.826	0.72	0.8261	0.6132
	CO2	0.748				
	CO3	0.805				
PV	PV1	0.783	0.887	0.885	0.8872	0.6113
	PV2	0.781				
	PV3	0.77				
	PV4	0.791				
	PV5	0.784				
SA	SA1	0.827	0.847	0.727	0.8478	0.6502
	SA2	0.774				
	SA3	0.817				

Table 4. Cont.

Variable	Measurement Item	Factor Loading	Cronbach's Alpha (α)	KMO	CR	AVE
CID	CID1	0.779	0.851	0.824	0.8506	0.5874
	CID2	0.77				
	CID3	0.775				
	CID4	0.741				
CBI	CBI1	0.745	0.785	0.705	0.7856	0.5501
	CBI2	0.768				
	CBI3	0.711				

Notes: CR = construct reliability; AVE = average variance extracted.

For reliability assessment, Cronbach's Alpha (α) coefficient was used as the primary indicator to measure internal consistency across the items. Cronbach's Alpha values range from 0 to 1, with values between 0.6 and 0.7 considered acceptable, between 0.7 and 0.8 indicating good reliability, and between 0.8 and 0.9 indicating high reliability [109]. Based on the reliability analysis results from this study (Table 4), all key variables have Cronbach's Alpha coefficients exceeding 0.75.

In terms of construct validity, this study conducted the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity on the sample data, as shown in Table 4. The analysis results reveal that all variables have KMO values above 0.7, indicating that the data are suitable for factor analysis. Additionally, Bartlett's test of sphericity yielded a significance level of 0.000, demonstrating significant correlations among variables and a lack of independence [123].

For composite reliability and convergent validity, the standardized factor loadings for each measurement item on its respective dimension indicate the strength of the association between latent factors and the measurement items, forming an essential foundation for assessing variable validity. Convergent validity is primarily assessed through the average variance extracted (AVE) method, with AVE values of 0.5 or above considered the minimum standard for acceptable convergent validity. This indicates that most of the variance in the variables can be explained by their measurement items rather than measurement error. Additionally, composite reliability (CR) serves as a more refined indicator for reliability evaluation, measuring the internal consistency of the items. The general academic consensus is that CR values should not fall below 0.7 to ensure the reliability and stability of the measurement. According to Table 4, all dimensions in this study exceed the AVE threshold of 0.5, and CR values all exceed 0.7, indicating strong validity and reliability across dimensions in the scale's effectiveness evaluation [124].

Regarding discriminant validity, the diagonal elements in Table 5 represent the square root of the AVE for each dimension, while the off-diagonal elements represent the correlation coefficients between the variables. The square root of the AVE reflects the convergent validity of the factor, indicating the strength of the shared variance among the measurement items within the factor relative to the shared variance between the factor and other factors [124]. The sufficient condition for discriminant validity is that the square root of the AVE for any factor should be greater than the absolute value of the correlation coefficient between that factor and other factors in the model. This means that each variable is conceptually distinguishable from other variables, and the measurement items can accurately represent their respective latent constructs.

As reflected in the analysis results in Table 5, the discriminant validity test in this study demonstrates that the standardized correlation coefficients between the variables are all lower than the square root of the AVE for their respective dimensions, confirming strong discriminant validity among the variables. This result further validates the construct validity of the model, demonstrating that the latent variables are theoretically independent and possess good theoretical distinctiveness.

Table 5. Discriminant validity analysis.

	ED	EST	ES	EN	CO	PV	SA	CID	CBI
ED	0.7779								
EST	0.484	0.7723							
ES	0.467	0.495	0.7803						
EN	0.43	0.446	0.532	0.7767					
CO	0.504	0.453	0.577	0.529	0.7831				
PV	0.496	0.526	0.522	0.484	0.519	0.7819			
SA	0.53	0.548	0.55	0.511	0.547	0.511	0.8063		
CID	0.486	0.472	0.465	0.471	0.544	0.505	0.526	0.7664	
CI	0.413	0.501	0.424	0.437	0.453	0.452	0.457	0.472	0.7417

5.1.2. Model Fit and Common Method Bias Analysis

The model fit analysis results are shown in Table 6 below. According to the reference value ranges provided by Hu et al. [125], the overall model fit is satisfactory.

Table 6. Reference and actual values of fit indices.

Indicator	χ^2	df	χ^2/df	RMSEA	SRMR	IFI	TLI	CFI
Value	679.005	614	1.106	0.015	0.034	0.994	0.994	0.994
Reference value	-	-	1~3	<0.06	<0.05	>0.95	>0.95	>0.95

Common method bias (CBM) refers to systematic errors in research results caused by similarities in data sources or measurement methods. To ensure the scientific rigor of the study, it is necessary to test for this bias. A common approach is to introduce a method factor and compare the model fit before and after its inclusion. If the model fit improves only slightly after introducing the factor (with TLI and CFI increases of less than 0.1 and RMSEA and SRMR decreases of less than 0.05), it indicates that there is no significant common method bias in the data [126]. According to Table 7, after introducing the method factor, the RMSEA decreased by 0.002 (<0.05), the SRMR decreased by 0.002 (<0.05), the TLI increased by 0.001 (<0.1), and the CFI increased by 0.002 (<0.1). Therefore, the sample data in this study do not exhibit serious common method bias.

Table 7. Common method bias (CMB) analysis.

Indicator	RMSEA		SRMR		TLI		CFI					
	OM	MFM	DV	OM	MFM	DF	OM	MFM	DF			
Value	0.015	0.013	0.002	0.034	0.032	0.002	0.994	0.995	0.001	0.994	0.996	0.002
Reference value			<0.05			<0.05			<0.1			<0.1

Notes: OM = Original model, MFM = method factor model, DF = difference value.

5.1.3. Path Analysis

As shown in Table 8, Users' esthetics experience ($\beta = 0.255, p < 0.01$), entertainment experience ($\beta = 0.142, p < 0.05$), escapism experience ($\beta = 0.146, p < 0.05$), education experience ($\beta = 0.164, p < 0.01$), and connection experience ($\beta = 0.167, p < 0.01$) all significantly and positively predicted the perceived value of virtual tourism, supporting hypotheses H1 to H5. Users' esthetics experience ($\beta = 0.277, p < 0.01$), entertainment experience ($\beta = 0.166, p < 0.05$), escapism experience ($\beta = 0.168, p < 0.01$), education experience ($\beta = 0.202, p < 0.01$), and connection experience ($\beta = 0.189, p < 0.01$) significantly and positively influenced satisfaction with virtual tourism, validating hypotheses H6 to H10.

Table 8. Path analysis.

Hypothesis	Paths	β	S. E.	t-Value	p-Value	Results
H1	EST → PV	0.255	0.062	4.105	***	Supported
H2	EN → PV	0.142	0.061	2.323	**	Supported
H3	ES → PV	0.146	0.059	2.474	**	Supported
H4	ED → PV	0.164	0.056	2.938	***	Supported
H5	CO → PV	0.167	0.063	2.672	***	Supported
H6	EST → SA	0.277	0.067	4.129	***	Supported
H7	EN → SA	0.166	0.067	2.497	**	Supported
H8	ES → SA	0.168	0.064	2.611	***	Supported
H9	ED → SA	0.202	0.061	3.334	***	Supported
H10	CO → SA	0.189	0.068	2.787	***	Supported
H11	EST → CID	0.176	0.058	3.024	***	Supported
H12	EN → CID	0.136	0.058	2.344	**	Supported
H13	ES → CID	0.06	0.056	1.075	0.282	Unsupported
H14	ED → CID	0.156	0.053	2.95	***	Supported
H15	CO → CID	0.232	0.06	3.845	***	Supported
H16	PV → CBI	0.197	0.055	3.576	***	Supported
H17	SA → CBI	0.192	0.053	3.635	***	Supported
H18	CID → CBI	0.258	0.062	4.13	***	Supported

Notes: ***. The path is significant at the 0.01 level (two-tailed); **. The path is significant at the 0.05 level (two-tailed).

In terms of cultural identity, esthetics experience ($\beta = 0.176, p < 0.01$), entertainment experience ($\beta = 0.136, p < 0.05$), education experience ($\beta = 0.156, p < 0.01$), and connection experience ($\beta = 0.232, p < 0.01$) all significantly and positively predicted cultural identity in virtual tourism, supporting hypotheses H11, H12, H14, and H15. However, escapism experience did not have a significant effect on cultural identity, so hypothesis H13 was not supported.

Additionally, perceived value ($\beta = 0.197, p < 0.01$), satisfaction ($\beta = 0.192, p < 0.01$), and cultural identity ($\beta = 0.258, p < 0.01$) all significantly and positively predicted the continuous usage intention of virtual tourism, supporting hypotheses H16 to H18.

5.2. fsQCA Analysis Results

5.2.1. Data Calibration

After measuring the variables, the fuzzy set data must undergo calibration [127]. Taking the esthetic experience variable as an example, the fsQCA 4.1 software can recognize the relative differences between the values of different cases, but it cannot determine the extent to which a particular case belongs to the “high esthetic experience” set. Data calibration clarifies the position of each value within the set and its corresponding membership degree. The core of calibration is to treat the outcome variable and each condition variable as separate sets and convert the original values into membership degrees ranging between 0 and 1, thereby clarifying the set membership degree of the variables [128].

This study followed the direct calibration method referenced from Coduras et al. [129] to select three anchors based on the characteristics of the original data. Specifically, the 95th percentile was used as the anchor for full membership, the 5th percentile as the anchor for full non-membership, and the 50th percentile as the cross-over point. The specific anchor values are listed in Table 9. Since the value of 0.5 lies at the cross-over point of the set and cannot definitively indicate full membership or full non-membership, values exactly at 0.5 must be manually adjusted after calibration to 0.499 or 0.501. In this study, all values were uniformly adjusted to 0.501 to avoid the fsQCA software automatically excluding cases with a membership degree of 0.5 when processing fuzzy set intersections, thereby ensuring the completeness of the analysis results.

Table 9. Data calibration.

Variable	Full Membership Threshold	Crossover Point	Full Non-Membership Threshold
ED	5	3.31	1
EST	5	3.33	1.25
ES	5	3.37	1
EN	5	3.37	1
CO	5	3.35	1
PV	5	3.39	1
SA	5	3.33	1
CID	5	3.36	1.25
CBI	5	3.43	1

5.2.2. Necessity Analysis

Based on set-theoretic causal logic, if condition X must always occur when a result Y is observed, then X can be considered a necessary condition for Y. In fsQCA studies, consistency is commonly used as a criterion to measure necessity, with the threshold for consistency typically set at 0.9 [130]. In this research, the Necessary Conditions function in the fsQCA software was used to conduct a necessity analysis of the condition variables influencing users' continuous usage intention in virtual tourism. The results are shown in Tables 10 and 11.

Table 10. Necessity analysis of high continuous behavioral intention.

Condition Variable	Consistency	Coverage	Condition Variable	Consistency	Coverage
fsED	0.758769	0.775868	~fsED	0.579623	0.664252
fsEST	0.761109	0.788816	~fsEST	0.573140	0.647116
fsES	0.759837	0.769244	~fsES	0.567970	0.658297
fsEN	0.767017	0.771292	~fsEN	0.573386	0.669765
fsCO	0.760822	0.775038	~fsCO	0.560133	0.644645
fsPV	0.776291	0.781842	~fsPV	0.568954	0.663381
fsSA	0.766853	0.772656	~fsSA	0.553198	0.644702
fsCID	0.761231	0.784540	~fsCID	0.570678	0.648301

Note: "~" indicates the absence state of a condition.

Table 11. Necessity analysis of low continuous behavioral intention.

Condition Variable	Consistency	Coverage	Condition Variable	Consistency	Coverage
fsED	0.655555	0.570153	~fsED	0.742294	0.723548
fsEST	0.632544	0.557601	~fsEST	0.760433	0.730275
fsES	0.653384	0.562622	~fsES	0.732019	0.721643
fsEN	0.667615	0.571010	~fsEN	0.732598	0.727855
fsCO	0.636982	0.551914	~fsCO	0.740365	0.724736
fsPV	0.660572	0.565873	~fsPV	0.745332	0.739163
fsSA	0.641566	0.549819	~fsSA	0.734720	0.728289
fsCID	0.636017	0.557534	~fsCID	0.754209	0.728754

Notes: "~" indicates the absence state of a condition.

As the analysis results indicate, none of the condition variables reached the 0.9 consistency threshold, suggesting that none of the individual conditions independently constitute a necessary condition for continuous usage intention in virtual tourism. Therefore, it can be inferred that users' continuous usage intention in cultural heritage virtual tourism is the result of the interaction of multiple condition variables, rather than being determined by any single condition.

5.2.3. Configuration Analysis

Unlike necessity analysis, sufficiency analysis explores whether the combination of condition configurations X can adequately derive a specific outcome Y [131]. Here, condition X refers to the combination of multiple condition variables rather than a single condition. Therefore, sufficiency analysis aims to assess the sufficiency of different condition configurations regarding the outcome variable. When generating the truth table, three key thresholds need to be set [132]. Following the recommendations of Fiss et al. [127], this study adopted 0.8 as the consistency threshold. Given that this research includes 451 cases, categorizing it as a large sample, the frequency threshold is set at 3 [132]. Additionally, the PRI consistency is used to further filter the rows of the truth table, with higher values indicating a lower likelihood of different causes leading to the same effect. This study set the PRI threshold at 0.75, referencing the works of [133].

This study analyzed condition configurations through the intermediate and parsimonious solutions obtained from the above analyses [127]. The overall analysis results are presented in Tables 12 and 13. The configuration table indicates that there are six configurations that lead to high continuous usage intention in cultural heritage virtual tourism, with both the overall consistency and the consistency of each configuration exceeding the threshold of 0.8. The overall coverage is also satisfactory, indicating that these six configurations have strong explanatory power for continuous usage intention in cultural heritage virtual tourism. Similarly, there are two configurations that lead to low continuous usage intention in cultural heritage virtual tourism, and their overall consistency and the consistency of each configuration also exceed 0.8, with good coverage, demonstrating that these two configurations similarly possess strong explanatory power for low continuous usage intention.

Table 12. Configurations for high continuous behavioral intention analysis.

Variable	CG1-a	CG1-b	CG1-c	CG1-d	CG1-e	CG1-f
fsED			●	●	●	●
fsEST	●		○	●	●	●
fsES	●	●		●	●	●
fsEN	●	●	●	●	●	
fsCO	●	●	●	●		●
fsPV	●	●	●		●	●
fsSA	●	●	●	●	●	●
fsCID		●	●	●	●	●
Raw Coverage	0.505559	0.505887	0.300685	0.476878	0.476426	0.478478
Unique Coverage	0.0228141	0.00574446	0.00824749	0.0114071	0.0109556	0.0130073
Consistency	0.936531	0.940858	0.968799	0.952936	0.959587	0.948203
Solution Coverage	0.572319					
Solution Consistency	0.915644					

Notes: CG = Configurations; filled circles “●” indicate the presence of conditions, while open circles “○” indicate their absence. Core conditions are shown with large circles, and peripheral conditions are shown with small circles. Blank spaces represent whether conditions are present or absent.

Configurations of High Continuous Usage Intention: In Configuration 1-a, the presence of perceived value and satisfaction are core conditions, while the presence of esthetics, entertainment, escapism, and connection serve as supporting factors. In Configuration 1-b, the presence of perceived value, satisfaction, and cultural identity are core conditions, with entertainment, escapism, and connection acting as supporting factors. In Configuration 1-c, the presence of perceived value, satisfaction, and cultural identity are core conditions, while the presence of education, entertainment, and connection, along with the absence of esthetics, serve as supporting factors. In Configuration 1-d, the presence of satisfaction and cultural identity are core conditions, with education, esthetics, entertainment, escapism, and connection serving as supporting factors. In Configuration 1-e, the presence

of perceived value, satisfaction, and cultural identity are core conditions, with education, esthetics, entertainment, and escapism serving as supporting factors. In Configuration 1-f, the presence of perceived value, satisfaction, and cultural identity are core conditions, with education, esthetics, escapism, and connection serving as supporting factors.

Table 13. Configurations for low continuous behavioral intention analysis.

Variable	CG2-a	CG2-b
fsED	○	○
fsEST	○	○
fsES	○	○
fsEN	○	○
fsCO	●	○
fsPV	○	○
fsSA	○	●
fsCID	○	○
Raw Coverage	0.331179	0.326017
Unique Coverage	0.0549475	0.049786
Consistency	0.960946	0.965153
Solution Coverage	0.380965	
Solution Consistency	0.953399	

Notes: CG = Configurations; filled circles “●” indicate the presence of conditions, while open circles “○” indicate their absence. Core conditions are shown with large circles, and peripheral conditions are shown with small circles.

Configurations of Low Continuous Usage Intention: In Configuration 2-a, the absence of escapism, satisfaction, and cultural identity, along with the presence of connection, are core conditions, while the absence of education, esthetics, entertainment, and perceived value serve as supporting factors. In Configuration 2-b, the absence of education, esthetics, and connection, along with the presence of satisfaction, are core conditions, while the absence of escapism, entertainment, perceived value, and cultural identity serve as supporting factors.

6. Discussion

6.1. Discussion of Structural Equation Model Results

The results of the structural equation model (SEM) provide substantial validation for the impact of various stimulus factors on perceived value, satisfaction, and cultural identity in virtual tourism; however, not all hypotheses were confirmed. The following is a detailed analysis of these results:

First, stimulus factors such as esthetics, entertainment, escapism, education, and connection significantly enhance perceived value for users, aligning with previous theoretical assumptions. Users’ visual and sensory experiences of environmental design (esthetics) in cultural heritage virtual tourism can enhance their enjoyment of the content [63,65], thereby increasing overall perceived value (H1). The effect of entertainment was also validated, consistent with the positive impact of entertainment on users’ perceived value outlined in the experience economy theory (H2). The escapism experience allows users to temporarily escape from real-world pressures through virtual tourism, leading to relaxation and mental relief [112]; this immersive experience effectively enhances users’ perceived value of virtual tourism (H3). Regarding education and connection, while learning about history and culture, users further reinforce their perceived value through interactions on the virtual platform (H4, H5) [76].

In terms of satisfaction, esthetics, entertainment, escapism, education, and connection also had a significant impact on virtual tourism satisfaction. Esthetics enhance users’ enjoyment of the scenes, directly boosting overall satisfaction with virtual tourism (H6), which is consistent with previous research [1,45], highlighting the importance of esthetics in

user experience. The positive effects of entertainment and escapism align with their ability to immerse users in pleasurable experiences (H7, H8). Additionally, education experience provides users with a sense of fulfillment through rich content and in-depth information, thereby increasing their satisfaction (H9). The interactive features of connection also significantly enhance users' sense of engagement and satisfaction (H10).

However, the role of escapism in cultural identity was not significantly validated (H13 is not supported). This may be because the immersive experience of escapism focuses more on the temporary shift of personal emotions rather than on a deep understanding and identification with culture. In contrast, the positive effects of esthetics, entertainment, education, and connection on cultural identity were supported (H11, H12, H14, and H15). Connection enhances a sense of belonging and cultural identity through social and emotional interactions. Esthetics strengthen users' emotional resonance with culture through the visual presentation of cultural heritage. Entertainment stimulates users' interest in culture through interactive content, while education helps users gain a deeper understanding of cultural content, thereby promoting cultural identity.

In terms of users' continuous usage intentions, perceived value, satisfaction, and cultural identity significantly influence users' future behavioral intentions (H16, H17, and H18). An increase in perceived value makes users more willing to experience virtual tourism again, while enhanced satisfaction increases user loyalty. Cultural identity, as a key factor in cultural heritage tourism, promotes users' willingness to continue participating in virtual tourism by strengthening their identification with the culture.

6.2. Discussion of fsQCA Results

This study further analyzes the results of continuous usage intentions in virtual tourism from the fsQCA configuration perspective, focusing on how the combination of variables influences the outcome variable through the synergistic effects of core and peripheral conditions. The findings are as follows:

The configurations for high continuous usage intentions exhibit the synergistic effects of multiple core conditions, particularly the combined influences of perceived value, satisfaction, and cultural identity. This aligns with the perspectives of the SOR model and the experience economy theory, indicating that users' overall perceptions of their experiences, satisfaction, and cultural identity are key drivers of their continuous usage intentions in virtual tourism. The presence of peripheral conditions, such as esthetics, entertainment, escapism, education, and connection, enhances the experience in various configurations, further enriching users' experiences of cultural heritage virtual tourism.

Specifically, in Configurations 1-b, 1-c, 1-d, and 1-f, satisfaction, perceived value, and cultural identity collectively serve as core conditions, forming a powerful triple driving force. Perceived value enhances users' cognitive utility through their overall evaluation of the virtual tourism experience, while satisfaction further strengthens users' positive experiences through feedback. Cultural identity, as a deep emotional connection, reinforces users' sense of belonging to the cultural content [103]. Furthermore, these four configurations all include at least three experiential factors as supporting conditions, which effectively enhance users' continuous usage intentions. Notably, in Configuration 1-c, even with the absence of esthetic experience, the presence of the other four experiential factors still strengthens users' usage intentions. This indicates that while esthetic experience can enhance users' perceptions, its absence does not significantly affect continuous usage intentions when supported by other factors.

In Configuration 1-a, perceived value and satisfaction form the core conditions, while esthetic, entertainment, escapism, and connection experiences serve as supporting conditions. Together, they effectively enhance users' continuous usage intentions. In this configuration, the presence or absence of educational value and cultural identity did not have a significant impact. This suggests that some users may prioritize the immediate enjoyment and relaxation brought by virtual tourism rather than its potential educational function or cultural significance.

In Configuration 1-d, satisfaction and cultural identity act as core conditions, while the presence or absence of perceived value significantly influences users' continuous usage intentions. In this configuration, the five experiential factors (esthetic, entertainment, escapism, education, and connection) serve as supporting conditions, and their combined effect still effectively enhances users' continuous usage intentions. This indicates that even if users' perceived value of virtual tourism is relatively weak, the combined impact of other experiential factors can still strengthen their intention to continue using the platform.

In contrast, the configuration for low continuous usage intentions indicates that when the absence of escapism, satisfaction, and cultural identity serve as core conditions, users' virtual tourism experience is somewhat weakened. Additionally, the lack of educational value, esthetics, and connection experiences diminishes the appeal of virtual tourism, leading to a reduced sense of emotional immersion, social interaction, and cultural cognitive value, ultimately affecting their continuous behavioral intentions.

In Configuration 2-a for low continuous usage intentions, the absence of escapism, satisfaction, and cultural identity are core conditions, indicating that when users fail to achieve a sense of immersion from escapism during the CHVT experience, and their overall satisfaction with the experience is low, their continuous usage intentions significantly decrease [100]. Additionally, a lack of cultural identity suggests that users have not established value recognition in virtual tourism. The auxiliary conditions in this configuration (such as the absence of esthetic perception, entertainment perception, and perceived value) further contribute to the result of low continuous usage intentions.

In Configuration 2-b, the absence of education, esthetics, and connection as core conditions weakens users' continuous behavioral intentions toward CHVT. The lack of esthetics and connection fails to provide sufficient appeal, leading to a decrease in the enjoyment and interactivity of the user experience. The absence of education implies that users are unable to acquire valuable cultural knowledge. The auxiliary conditions in this configuration (such as the absence of escapism, entertainment, perceived value, and cultural identity) further contribute to the result of low continuous usage intentions.

7. Conclusions, Implications, and Limitations

7.1. Conclusions

This study integrates the SOR model and experience economy theory to propose a new model from the multi-dimensional perspective of user experience and perception, explaining the factors influencing users' continuous behavioral intentions. By applying both SEM and fsQCA methods, the study fully utilizes the strengths of qualitative and quantitative analysis to clarify how antecedent variables affect users' continuous intentions.

In terms of perception, perceived value, satisfaction, and cultural identity play a crucial role in the CHVT experience. Whether in the independent path analysis of SEM or the configurational analysis of fsQCA, these factors consistently emerge as key drivers of users' continuous usage intentions. Especially when these factors interact with other stimuli, they significantly enhance users' overall experience perception and behavioral intentions.

With respect to experience, education, esthetics, escapism, entertainment, and connection, these variables collectively form the multidimensional structure of CHVT. Education, entertainment, and connection significantly and independently influence users' perceived value, satisfaction, and cultural identity in the SEM, while fsQCA demonstrates their compensatory and synergistic effects in different contexts. However, the influence of esthetics differs between the two analytical methods. The SEM results indicate that esthetics significantly enhance perceived value and satisfaction, where users' pleasurable visual experiences reinforce their overall perception of the virtual cultural heritage. FsQCA shows that even in the absence of esthetic experience, users' continuous usage intentions can remain stable under certain condition combinations. This suggests that the role of esthetics may be compensated by other factors when users focus more on education or entertainment content.

7.2. Implications

Regarding theoretical contributions, this study combines the Stimulus–Organism–Response (SOR) framework with experience economy theory to construct a more inclusive model. Compared to previous studies that rely on a single theory [21,96], this model more comprehensively explains the combined impact of different experiential dimensions on users' continuous behavioral intentions in cultural heritage virtual tourism. Through enhancing perceived value, satisfaction, and cultural identity, the model promotes sustained behavioral intentions, supporting the ongoing preservation and transmission of cultural heritage. This integrated model not only broadens the application of SOR and experience economy theories in the virtual cultural heritage domain but also lays a solid theoretical foundation for future research directions. Moreover, by combining SEM and fsQCA methodologies, the study demonstrates how both symmetric and asymmetric approaches can be effectively merged to capture the complex behavioral patterns of users. SEM is prevalent in tourism studies; for example, Hernández-Rojas et al. used this method to analyze the impact of perceived heritage quality and perceived cultural quality on tourist loyalty [134], while Nguyen et al. analyzed how Gen Z's perception of social media content influences their travel intention [135]. However, the fsQCA method addresses the limitations of traditional SEM in causal inference by revealing multiple behavioral pathways through the combination of conditions [128]. This methodological synthesis opens new avenues for virtual tourism research and enhances the understanding of the multifaceted factors shaping continuous usage intentions.

In terms of practical contributions, this study proposes several specific strategic guidelines to optimize the design and user experience of cultural heritage virtual tourism platforms. Firstly, platforms should focus on the depth and diversity of content by enhancing perceived value and user satisfaction through high-quality cultural displays, interactive features, and immersive experiences. For instance, it is recommended to integrate virtual reality (VR) and augmented reality (AR) technologies to enhance user engagement with immersive tours and interactive activities. Secondly, designers should strengthen users' cultural identity by using narrative-driven and emotionally rich cultural presentations, enabling users to form deeper emotional connections with cultural heritage. This can be achieved by creating virtual characters that guide users through historical scenes, transforming cultural experiences from simple information displays to interactive, immersive experiences. Future design efforts should also prioritize personalized experiences and intelligent recommendation systems, leveraging big data and machine learning technologies to recommend content based on user preferences. For example, for users who seek visual enjoyment, platforms can enhance aesthetic experiences with high-resolution scene rendering and dynamic lighting effects. For users interested in interaction and entertainment, platforms can incorporate gamified elements like cultural exploration tasks and interactive quizzes to increase engagement. For those focused on knowledge acquisition, platforms should offer a variety of learning modes, such as audio, video, and virtual lectures, allowing users to choose their preferred learning paths. Additionally, platform design should utilize advanced immersive technologies, such as 3D modeling and sound integration, to create an escapist experience, helping users relieve everyday stress while exploring virtual cultural heritage sites. Finally, to foster social interaction among users, it is recommended to develop social features such as virtual tour groups, interactive discussion boards, and cultural-themed events. By enhancing emotional communication and cognitive interaction between users, these features can further enrich their overall experience in virtual cultural heritage tourism. These strategies not only provide practical guidance for the design of cultural heritage virtual tourism platforms but also offer actionable recommendations for heritage practitioners, thereby promoting the digital preservation and sustainable transmission of cultural heritage.

7.3. Limitation and Future Research

This study provides valuable insights into the continuous participation intentions in cultural heritage virtual tourism from a user experience perspective, but it also has several limitations. First, the research focuses on the “Panorama of the Forbidden City”, a virtual tourism platform for tangible cultural heritage in China, which may lead to issues of generalizability. It remains unclear whether the findings are applicable to intangible cultural heritage (e.g., folklore, traditional handicrafts) or to virtual tourism of cultural heritage in other countries. Future studies should test this model in a broader context to ensure its applicability. Additionally, the reliance on surveys as the primary research method introduces subjective factors, potentially resulting in response bias. To capture user interaction in cultural heritage virtual tourism more accurately, future research should consider integrating more objective methods, such as EEG (electroencephalogram) monitoring or real-time behavior analysis, for a more comprehensive reflection of user behavior and reactions. Lastly, although the sample included 451 participants from various Chinese cities, the study did not account for potential cognitive differences stemming from cultural and regional factors. Future research should provide a more detailed classification of participants and incorporate a broader range of variables to explore the impact of different national and regional backgrounds on continuous participation intentions.

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