

Virtual Reality Application in Rural Tourism Experience: Influence of Authenticity and Tourist Satisfaction

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ABSTRACT

This study evaluates the influence of virtual reality (VR) on tourists' perceptions of authenticity and satisfaction within the context of rural tourism. While substantial research has been conducted on VR tourism, studies specifically addressing its application in rural settings remain scarce. Such contexts present unique challenges as these destinations are often characterized by their authenticity and natural distinctiveness. Data from 385 respondents was collected from March to April 2024 using purposive sampling through tourism forums and social media platforms in West Java and its surrounding areas. Structural Equation Modelling (SEM) with SmartPLS was employed to examine the relationships between inner and outer models. The results reveal that authenticity significantly influences both activities and objects, which, in turn, positively impacts tourist satisfaction. Furthermore, no significant differences in satisfaction were observed based on the type of VR devices used, highlighting the primacy of content quality over the technical specifications of the device. Theoretical contributions of this emphasize the critical role of authenticity in enhancing VR tourism experiences, particularly in rural settings. Managerial implications suggest prioritizing the development of authentic and immersive VR content to improve tourist satisfaction and foster greater engagement with rural tourism destinations.

KEYWORDS

Virtual Reality (VR)
Tourism
Authenticity
Satisfaction
Rural

INTRODUCTION

The tourism industry landscape is experiencing a significant transformation driven by virtual reality (VR), which enhances both pre-visit and post-visit experiences for tourists (Suhartanto et al, 2021). VR technology enables the creation of immersive three-dimensional environments and has been proven effective in promoting tourist destinations through 360-degree virtual tour videos (Rahimizhian, Ozturen, & Ilkan, 2020). For example, Alamendah Tourist Village has leveraged VR technology to introduce its attractions to prospective visitors through such videos. These VR displays provide realistic simulations of tourist destinations and serve as efficient marketing tools, showing authentic features such as natural landscapes, social interactions, and traditional activities (Fan, Jiang, & Deng, 2022). The primary goal of VR technology is to enhance tourist experiences by

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deepening engagement and extending the memory of their visits through interactive and satisfying virtual environments (Oh & Kong, 2022; Zheng, Chen, Zhang, & Guo, 2022). Beyond being a promotional medium, VR applications in Alamendah Tourist Village offer tourists the opportunity to virtually revisit the destination. These revisits allow tourists to explore details and differences that may have been overlooked during their initial physical visit, significantly enhancing their desire to return (F. Wang, Huang, Morrison, & Wu, 2022). Understanding tourists' perceptions of VR is crucial, particularly in assessing how the authenticity of VR content influences satisfaction (Gao, Zhu, Song, & Dempsey, 2022; Kim, Lee, & Preis, 2020). Authentic VR experiences, characterized by rich details and realistic interactions, contribute to a profound and immersive engagement (H. Lee, Jung, tom Dieck, & Chung, 2020). Such experiences reinforce tourists' memories and impressions, thereby solidifying their connection to the destination (Oh & Kong, 2022).

Authenticity is a critical aspect that profoundly influences tourist experiences, shaping their impressions and satisfaction during virtual visits (Fu, 2019). In the context of VR, authenticity can be categorized into two dimensions: object-related and activity-related. The object-related dimension pertains to the genuineness of physical elements, such as buildings, landscapes, and cultural artifacts. Meanwhile, the activity-related dimension concerns the appropriateness and realism of activities simulated during the virtual experience (Nam, Dutt, & Baker, 2023). Both dimensions play a significant role in determining tourist satisfaction, which, in turn, influences their interest and engagement with the destination (Atzeni, Del Chiappa, & Mei Pung, 2022). Tourist satisfaction depends not only on the visual quality or immersive technology used in VR but also on how effectively the experience captures and conveys the essence of the tourist destination (Mohagegh, Sobarna, & Zahraputeri, 2022; Suhartanto et al., 2021). This includes the accurate reproduction of the physical environment and the presentation of authentic activities, enabling tourists to feel as though they are truly at the location (Lo & Cheng, 2020).

VR tools in tourism, particularly in rural settings, have introduced new dimensions to the presentation and enjoyment of travel experiences. These tools serve as moderators that enhance the intensity of immersive experiences and accelerate the perception of authenticity (Fan et al., 2022; Kim, Lee, & Preis, 2020). The accurate reproduction of physical environments further contributes to tourists' perceptions during virtual visits (Fan et al., 2022). While numerous studies have examined the use of VR in tourism (Fan et al., 2022; Kim, Lee, & Preis, 2020), a notable gap exists in the literature concerning the influence of VR tools on perceptions of authenticity and satisfaction in rural tourism contexts. Previous studies predominantly focus on the broader impact of VR technology, often overlooking the role of specific characteristics in shaping tourists' experiences of authenticity and satisfaction (Ying, Tang, Ye, Tan, & Wei, 2022). An in-depth exploration of these aspects is needed to optimize the use of VR to effectively promote tourist destinations and meet the expectations of VR tourists. Therefore, this study attempts to evaluate the influence of VR on perceptions of authenticity and tourist satisfaction in the context of rural tourism. Authenticity is conceptualized as accuracy and realism in reproducing environments and activities, which are critical factors in fostering a satisfying tourist experience. Furthermore, this research explores the specific influence of VR tools in modulating the relationship between perceptions of authenticity and satisfaction. By adopting this approach, the study aims to provide new insights into the potential of VR as an effective promotional tool for tourism and as a medium that significantly enhances the quality of tourist experiences.

LITERATURE REVIEW

Virtual reality tourism

Virtual reality (VR) is a technology that enables users to interact with digitally simulated environments through headsets or other devices (Guttentag, 2010). Tools such as Oculus Rift, Google Cardboard, and various VR-compatible smartphones enhance the accessibility and effectiveness of VR experiences (Ozdemir, 2021). These tools allow users to have a sense of presence at a location without physically traveling (Yung, Khoo-Lattimore, & Potter, 2021). VR provides immersive experiences by engaging multiple senses, including sight, sound, and motion (Lo & Cheng, 2020; Melo et al., 2022). The integration of three-dimensional images, audio, and motion sensors creates a virtual environment that closely simulates real-world experiences (Kim, Lee, & Jung, 2020; Yung & Khoo-Lattimore, 2019). Due to these capabilities, VR is applied in various sectors, including education (Oyelere et al., 2020), commerce (Jang & Hsieh, 2021), real estate (Pleyers & Poncin, 2020), and tourism (Suhartanto et al., 2021). In tourism, VR offers several significant advantages. First, it enables tourists to experience a destination's sense of place without physical travel, providing a more immersive experience compared to traditional photos or videos (Kim, Lee, & Jung, 2020). Second, this tool serves as an attractive and interactive medium for promoting tourist destinations (Adachi, Cramer, & Song, 2022). Virtual tours showcasing natural beauty, cultural heritage, and local activities can effectively attract potential visitors (Jorge, Losada, & Teixeira, 2023). Finally, VR interactively delivers information about history, culture, and attractions (Atzeni et al., 2022), enhancing tourists' understanding and appreciation of destinations.

Authenticity in VR Tourism

Tourist authenticity refers to the perception of genuineness and honesty in the experience of visited destinations (Olsen, 2002). The measurement of authenticity typically employs two dimensions: object authenticity and activity authenticity (Reisinger & Steiner, 2006). Object authenticity pertains to tourists' perception of a place, artifact, or environment as genuine (Atzeni et al., 2022). This dimension is often assessed through indicators such as the physical condition of objects, architectural style, natural environment, and preservation of original forms (Domínguez-Quintero, González-Rodríguez, & Paddison, 2020). Additionally, previous studies have measured emotional authenticity, characterized by the level of emotional participation and personal feelings elicited by the object (C. Wang, Liu, Wei, & Zhang, 2020). These indicators are typically straightforward to measure directly and objectively (Lu, Chi, & Liu, 2015). However, VR, as a new tourism tool, has shifted the focus of previous studies towards technical aspects or basic visual experiences without considering object authenticity.

The second dimension, activity authenticity, pertains to tourists' perceptions of activities as genuine or traditional, including local handicrafts, traditional dances, and cultural ceremonies (Handapangoda, Madduma Bandara, & Kumara, 2019). Despite its importance, this dimension has received comparatively less attention in the measurement of authenticity. Unlike object authenticity, activity authenticity presents greater challenges in evaluation due to its dynamic and interactive nature (Atzeni et al., 2022; Nam, Baker, & Dutt, 2023b). While physical objects such as buildings, artifacts, and landscapes can be measured and assessed with relative ease and objectivity, activities often lack the same level of standardization, making them more complex to quantify and evaluate (Domínguez-Quintero et al., 2020). Nonetheless, studying activity authenticity in the context of VR tourism is essential to gaining deeper insights into tourists' experiential and socio-cultural

interactions.

Previous studies have explored authenticity in VR tourism, particularly using the activity authenticity method. For instance, Kim, Lee, and Jung (2020) and Nam et al. (2023b) measured how activity authenticity contributes to creating genuine and unique experiences in virtual tourism settings. Similarly, Atzeni et al. (2022) and Nam et al. (2023) emphasized the importance of activity authenticity in shaping tourists' perceptions of virtual experiences. These studies underscored the distinct characteristics of activity authenticity and its differential impact on tourist experiences (Nam et al., 2023b). The separation of activity and object authenticity allows for a more nuanced and specific analysis of how each dimension influences tourists' perceptions of authenticity and satisfaction. Recognizing the unique contributions of each aspect is critical to understanding their roles in shaping overall tourist experiences. Consequently, this study adopts a dual approach to authenticity measurement, analyzing activity and object authenticity as separate yet complementary dimensions.

Satisfaction in VR tourism

Previous studies on tourist satisfaction have provided valuable insights for destination managers to enhance service quality and travel experiences (Song, Kawamura, Uchida, & Saito, 2019; Yuksel, Yuksel, & Bilim, 2010). Understanding tourist perceptions, particularly in rural tourism villages, is critical for optimizing satisfaction. Key factors influencing tourist satisfaction include accommodation, service quality, attractions, infrastructure, cleanliness, information accessibility, and local community participation (Jia, Liu, Li, Sun, & Yeh, 2022). In the context of virtual reality (VR) tourism, satisfaction levels are influenced by the quality of the VR experience, tourists' expectations, and the specific application of the technology (Melo et al., 2022; Trunfio, Lucia, Campana, & Magnelli, 2022). VR provides intense sensory stimulation—such as visuals, auditory cues, and simulated movement—that can deliver highly immersive experiences (M. Lee, Lee, Jeong, & Oh, 2020). Tourist satisfaction arises when VR experiences offer realistic and profound sensations, resulting in a fulfilling and memorable journey (Nam et al., 2023b; Nam et al., 2023). The unique satisfaction derived from VR in village tourism settings is particularly noteworthy, as it integrates elements of local culture and environmental authenticity (Yilmaz & Yilmaz, 2019). This intersection of technology and cultural heritage distinguishes VR village tourism from other forms of VR applications. With advancements in VR technology enabling increasingly immersive and lifelike experiences, understanding its role in enhancing tourist satisfaction has become a significant area of study (Yung & Khoo-Lattimore, 2019). Thus, examining VR applications in rural tourism contexts provides an opportunity to deepen the understanding of how technology interacts with tourist experiences, especially in cultural and environmental settings.

Hypotheses Development

Authenticity in VR tourism

Previous studies have categorized authenticity in VR tourism into two distinct types: object-related and activity-related authenticity (Nam et al., 2023). This classification facilitates a deeper understanding of how different elements of the VR experience shape the overall perception of authenticity (Atzeni et al., 2022; Nam et al., 2023). Object-related authenticity pertains to the degree to which objects in the VR environment accurately replicate their real-world counterparts (Nam et al., 2023). Key factors include visual fidelity, precise representation, and alignment with user

expectations (Atzeni et al., 2022). Activity-related authenticity focuses on the extent to which VR-simulated activities mirror real-world experiences. This encompasses aspects such as emotional engagement, interactivity, responsiveness, and the authenticity of the simulated actions (Nam et al., 2023b). The integration of both object-related and activity-related authenticity is crucial for delivering a fully immersive and satisfying VR tourism experience (Atzeni et al., 2022; Nam et al., 2023b; Nam et al., 2023).

Understanding the interplay between these two dimensions provides valuable insights into optimizing VR applications in tourism. This study aims to ensure that this VR technology is developed and implemented in a way that respects, nurtures, and promotes the cultural and social heritage of rural villages while creating new opportunities in digital tourism. Rural areas possess unique environmental and activity-based characteristics, making it essential to differentiate between object-related and activity-related authenticity (Rosalina, Dupre, & Wang, 2021). By emphasizing strong authenticity in both objects and activities, VR experiences can offer tourists a genuine and profound understanding of rural environments, fostering trust and enhancing interest in visiting these locations in person (Nam et al., 2023).

Object-related and activity-related authenticities have been shown to positively influence tourism satisfaction (Atzeni et al., 2022; Nam et al., 2023). Perceived authenticity plays a critical role in shaping satisfaction in tourism experiences (Gao et al., 2022). High levels of authenticity in both objects and activities can significantly enhance the immersive quality of the experience (Pleyers & Poncin, 2020). In the context of VR, objects and activities that provide accurate representations and realistic interactions evoke feelings comparable to real-world experiences, leading to increased tourist satisfaction (Melo et al., 2022). Additionally, the sense of "being there" created by VR has been found to heighten engagement, further contributing to satisfaction (Adachi et al., 2022). Based on these findings, the following hypotheses were proposed:

H₁: Object-related authenticity has a positive influence on satisfaction.

H₂: Activity-related authenticity has a positive influence on satisfaction.

H₃: Object-related authenticity has a positive influence on activity-related authenticity.

The moderating role of VR tools used

VR tools and devices play a crucial role in shaping and moderating tourists' perceptions during virtual experiences (Lo & Cheng, 2020; Ozdemir, 2021). The quality and technical capabilities of these devices significantly impact the satisfaction obtained from the experience (Fan et al., 2022). VR devices with higher resolution and better speed can produce sharper and more realistic images (Tussyadiah, Wang, Jung, & Tom Dieck, 2018). Moreover, better frame rates in VR devices result in a more immersive experience, significantly increasing user satisfaction (M. Lee et al., 2020). Objects rendered with natural and accurate details contribute to a heightened sense of realism, further improving tourist satisfaction (Wu, Ai, & Cheng, 2020). Additionally, devices that enable seamless and unobstructed interactions amplify the sense of engagement, leading to greater satisfaction (Yung & Khoo-Lattimore, 2019). Therefore, integrating technical aspects into the development and evaluation of VR experiences is essential to ensure that the experience is not only authentic but also comfortable and fulfilling for tourists (Kim, Lee, & Preis, 2020). Based on this explanation, the following hypotheses were formulated:

H₄: The relationship between object-related authenticity and satisfaction is moderated by the type of VR tools.

H₅: The relationship between activity-related authenticity and satisfaction is moderated by the type of VR tools.

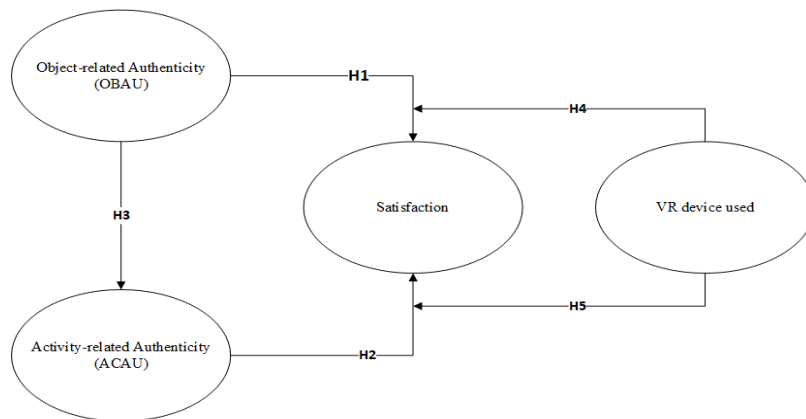


Figure 1. Research model

RESEARCH METHOD

The scarcity of studies on VR tourism in village destinations highlights unique challenges stemming from the distinct characteristics of these rural settings, which are often defined by their authenticity and natural uniqueness (Rosalina et al., 2021). Drawing on consultations with experts and academics, the study adopted a framework from prior research to emphasize the originality and authenticity of tourist destinations. This approach facilitated the development of instruments capable of effectively capturing the essence of rural tourism experiences through VR while evaluating their impact on tourist satisfaction and perceptions.

The perception of authenticity included a substantial number of items, precisely seven (Kim, Lee, & Jung, 2020; McLean & Barhorst, 2022). This extensive list was necessary due to the inclusion of both object- and activity-related dimensions of authenticity. Satisfaction was measured using three items, based on previous studies (An, Choi, & Lee, 2021; Atzeni et al., 2022). All variable constructs were assessed using a 5-point Likert scale (from 1=strongly disagree to 5=strongly agree). The questionnaire was pre-tested on 50 respondents to ensure clarity and to avoid ambiguous questions. Reliability was confirmed through Cronbach's Alpha scores exceeding 0.7 for all constructs.

This study aims to evaluate the effectiveness of VR videos from Alamendah village tourism in terms of authenticity and tourist satisfaction. The sample included individuals who had watched the video, encompassing both those who had and had not visited the Alamendah village tourism site in person. Data collection was carried out through tourism forums and social media platforms targeting audiences in the West Java region and surrounding areas from March to April 2024. A purposive sampling method was employed to select respondents. The questionnaire was administered online using a Google Form. To ensure the validity and authenticity of respondents' eligibility, the questionnaire included a preliminary question: "Have you ever visited Alamendah village tourism virtually?" A link to the VR video was embedded in this question to confirm that participants had watched the video before proceeding.

The majority of respondents were young adults aged 18-25, representing 93.8% of the sample. Additionally, 55.3% of respondents held a bachelor's degree, and the majority were students

(82.1%). Out of 524 individuals who were sent the survey link or met the selection criteria, 385 responded, yielding a response rate of 74%.

The demographic data of respondents were analyzed using the statistical software SPSS. Structural Equation Modeling (SEM) was conducted using SmartPLS to examine the relationships between the inner and outer models. This tool was selected due to its capability to handle complex models and test multiple relationships simultaneously, making it particularly suitable for evaluating the connections among perceived authenticity, satisfaction, and the moderating effect of VR device influence. SEM is also advantageous for its ability to accommodate relatively small sample sizes and to support both formative and reflective modeling frameworks (Malhotra, Nunan, & Birks, 2020). This approach enabled an in-depth exploration of the relationships within the data, generating valuable insights. These insights were instrumental in formulating evidence-based recommendations and reinforcing theoretical propositions.

RESULTS

This section presents the findings in three primary segments: the measurement model, the structural model, and the multi-group analysis. First, the measurement model was evaluated to verify the reliability and validity of the constructs. Second, the structural model was explored to test the relationships among the constructs. Third, multi-group analysis explored potential differences in variable relationships based on the type of VR device used.

Table 1. Demographic Characteristics of Respondents

Demographic		Frequency	Percent
Gender	Male	189	49.1
	Female	196	50.9
Age	18-25	361	93.8
	26-33	21	5.5
	34-41	2	0.5
	>41	1	0.3
Education	Less than High School	2	0.5
	High School	127	33.0
	Diploma	33	8.6
	Bachelor's Degree	213	55.3
	Postgraduate	10	2.6
Occupation	Employee	32	8.3
	Entrepreneur	7	1.8
	Student	316	82.1
	Other	30	7.8
Income	<= Rp 5.600.000	350	90.9
	Rp 5.600.000-Rp 11.200.000	26	6.8
	>Rp 11.200.000	9	2.3

Table 1. Demographic Characteristics of Respondents (continued)

Demographic		Frequency	Percent
Virtual Reality (VR) Visits	First Time	234	60.8
	2-5 Times	134	34.8
	More than 5 Times	17	4.4
Device Used	Computer/Laptop	79	20.5
	Smartphone/Tablet	273	70.9
	Specialized VR Headset	33	8.6

The demographic profile of respondents in this study exhibited diversity across several dimensions. Gender distribution was nearly balanced, with 189 males (49.1%) and 196 females (50.9%). The sample was predominantly young, with 361 respondents (93.8%) aged 18 to 25. In terms of educational background, a majority held a bachelor's degree (231 respondents, 55.3%), followed by high school graduates (127 respondents, 33%), while a smaller proportion had diplomas or postgraduate qualifications. Most participants were students (316 respondents, 82.1%), with a minority employed as workers, entrepreneurs, or in other professions. Regarding income, the majority (350 respondents, 90.9%) reported earning below Rp 5,600,000. In terms of VR usage, 273 respondents (70.9%) accessed the technology via smartphones or tablets, and 234 respondents (60.8%) were first-time VR users, indicating the relative novelty of this technology among participants.

Measurement Model

Key aspects of the measurement model were evaluated to ensure the constructs in this study were valid and reliable. Individual reliability was confirmed, with all outer loading values exceeding the recommended threshold of 0.7. Construct reliability was assessed using Cronbach's Alpha (CA) and Composite Reliability (CR), both of which met the threshold of 0.7. As shown in Table 2, all constructs passed the reliability tests, ensuring the robustness of the measurement model (Hair Jr, Hair Jr, Hult, Ringle, & Sarstedt, 2021).

Validity was assessed using two metrics: convergent validity and discriminant validity. Convergent validity was evaluated through the Average Variance Extracted (AVE), which measures the proportion of variance explained by a construct relative to the total variance. In this study, convergent validity was confirmed as all AVE values exceeded the recommended threshold of 0.5, indicating that the constructs explained a substantial portion of the variance in their respective indicators. Discriminant validity was established using the Fornell-Larcker criterion, further supporting the distinctiveness of the constructs (Hair Jr, Hair Jr, Hult, Ringle, & Sarstedt, 2021).

Table 2. Measurement test results

Construct/Item	Loading	CA/CR	AVE
Object-related Authenticity		0.805/0.872	0.631
I felt that VR made tourist attractions look real.	0.779		
I felt that VR was very accurate in duplicating the actual attractions.	0.791		
I felt that I could identify the original features of the attractions through VR.	0.801		
I felt as though I had truly experienced these attractions.	0.806		

Table 2. Measurement test results (continued)

Construct/Item	Loading	CA/CR	AVE
Activity-related Authenticity		0.673/0.819	0.604
I felt that VR made me feel connected to the tourist attractions.	0.807		
I felt that VR helped me feel immersed in the atmosphere of the attractions.	0.832		
I felt that VR provided me with an escape from everyday life.	0.684		
Satisfaction		0.783/0.874	0.697
I felt that this VR experience was valuable to me.	0.823		
I was satisfied with this VR experience.	0.851		
I felt that this VR experience exceeded my expectations.	0.832		

**All significant at $p < 0.01$.

Structural Model

The structural model was evaluated using bootstrapping procedures to test the significance of path coefficients and validate the indicators (Hair Jr et al., 2021). Two key metrics, the Normed Fit Index (NFI) and the coefficient of determination (R^2), were employed to assess the model fit with the observed data. The NFI for this model was 0.774, which represents the ratio of the tested model's chi-square to the null model's chi-square. Typically, an NFI value closer to 1 indicates a better model fit. Thus, an NFI of 0.774 suggests a moderate fit for the current model (Malhotra et al., 2020). Regarding R^2 , the value for the activity-related authenticity (ACAU) construct was 0.513, indicating that 51.3% of the variance in ACAU was explained by the independent variables in the model. Similarly, the R^2 for satisfaction was 0.478, signifying that 47.8% of the variance in satisfaction was accounted for by the independent variables, suggesting moderate explanatory power for both constructs. Predictive relevance (Q^2) was also assessed, with ACAU and satisfaction yielding Q^2 values of 0.302 and 0.329, respectively. Since Q^2 values above 0 indicate effective predictive relevance, these results confirm that the model possesses moderate predictive capabilities (Hair Jr et al., 2021).

Table 3. Hypotheses test results

Relationship	Direct Effect		Indirect Effect		Total Effect	
	β	t-value	β	t-value	β	t-value
Object $\rightarrow$ Satisfaction	0.370	5.612**	0.271	5.910**	0.641	17.180**
Activity $\rightarrow$ Satisfaction	0.378	6.234**	-	-	0.378	6.234**
Object $\rightarrow$ Activity	0.717	26.853**	-	-	0.717	26.853**

*Significant at $p < 0.05$; **Significant at $p < 0.01$

Table 3 presents the results of the path coefficient analysis, with three key columns providing information on direct, indirect, and total effects. The direct effects reveal that object-related authenticity positively and significantly influences satisfaction ($\beta=0.370$; $P<0.01$), confirming the acceptance of H1. Similarly, activity-related authenticity also demonstrates a positive and significant impact on satisfaction ($\beta=0.378$; $P<0.01$). Furthermore, object-related authenticity exerts a strong

positive and significant influence on activity-related authenticity ($\beta=0.717$; $P<0.01$), leading to the acceptance of H2 and H3. The total effects column further substantiates the significant positive relationships among the constructs. For instance, object-related authenticity strongly influences both activity-related authenticity ($\beta=0.717$; $P<0.01$) and satisfaction ($\beta=0.641$; $P<0.01$). Similarly, activity-related authenticity maintains a significant positive relationship with satisfaction ($\beta=0.378$; $P<0.01$). Figure 2 visually illustrates the direct relationships among the variables, providing a clear depiction of the hypothesized links tested in this study.

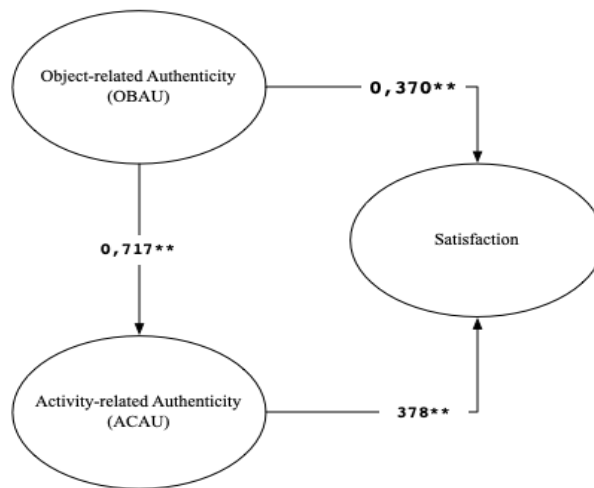


Figure 2. Direct effect results

Multi-group Analysis

Moderate analysis testing was conducted to evaluate hypotheses H4 and H5, which proposed the moderating role of VR devices on the relationships among the constructs (Henseler & Fassott, 2010). The VR devices were cross-validated and categorized into three groups: 1 = Computer/Laptop, 2 = Smartphone/Tablet, and 3 = VR Headset. The results of the path model testing indicate no statistically significant differences across these three device categories. Consequently, hypotheses H4 and H5 were not supported, as summarized in Table 4.

Table 4. Moderating effect test results

Relationship	Computer/Laptop v Smartphone/Tablet		Computer/Laptop v Headset		Smartphone/Tablet v Headset VR	
	B	p-value	B	p-value	B	p-value
Object => Satisfaction	0.234	0.137	0.396	0.124	0.162	0.462
Activity => Satisfaction	-0.133	0.346	-0.367	0.127	-0.234	0.257

DISCUSSION

This study evaluates the impact of virtual reality (VR) on tourists' perceptions of authenticity and satisfaction within the context of rural tourism. The findings reveal a positive correlation between object-related authenticity and tourist satisfaction, indicating that tourists experience higher satisfaction when VR environments accurately replicate real-world objects. Similarly, a significant positive relationship exists between activity-related authenticity and satisfaction, demonstrating that engaging and immersive activities in VR significantly enhance tourist satisfaction. Additionally, the strong relationship between object-related authenticity and activity-related authenticity suggests that authentic objects in VR environments promote activities perceived as authentic. Tourists who regard virtual representations of objects as highly authentic tend to view the associated activities as genuine, leading to a more cohesive and satisfying experience. These findings align with previous studies showing the importance of accurate and realistic reproduction of tourist objects in enhancing tourist experiences (Godovykh, Baker, & Fyall, 2022; Suhartanto et al., 2021). High object authenticity supports the simulation of credible activities, fostering immersion and engagement, which are critical for a satisfying virtual tourism experience. The interconnectedness of elements within the VR environment is underscored by the finding that the authenticity of objects enhances the perceived credibility of activities, thereby creating a seamless and immersive experience (Pleyers & Poncin, 2020). Prioritizing the authenticity of both objects and activities in VR content development can substantially improve tourist satisfaction and experience. This approach not only enhances engagement but also positions VR tourism as a viable alternative to physical travel, potentially increasing tourists' interest in virtual tourism (Kim, Lee, & Preis, 2020). Overall, the results highlight the critical role of attention to detail and commitment to authenticity in VR tourism content. By ensuring high levels of authenticity, developers can create more engaging and satisfying experiences, contributing to the broader acceptance and adoption of VR tourism.

The results confirm a strong relationship between object and activity authenticity, showing that authentic objects in VR enhance the perceived authenticity of activities. This result is consistent with Atzeni et al. (2022) and Nam et al. (2023), reporting that object authenticity indirectly influences activity authenticity. Therefore, authenticity in VR should be viewed as an interconnected system where the genuineness of objects enhances the simulated activities (Gao et al., 2022). This interconnectedness implies that when VR developers focus on providing highly authentic virtual objects, the overall experience improves as related activities are perceived as more genuine and engaging (Nam et al., 2023b). The authenticity of objects serves as a foundation element upon which the entire VR experience is built, necessitating developers to prioritize accurate and detailed virtual representations of real-world elements. Based on these results, VR emerges as a powerful tool for promoting rural tourism by providing potential tourists with a highly realistic preview of destinations, thereby encouraging both first-time and repeat visits. This approach enhances the perceived authenticity of activities and facilitates a more immersive and satisfying experience for users (Dağ, Çavuşoğlu, & Durmaz, 2023; Kim, Lee, & Jung, 2020). Furthermore, this perspective underscores the importance of a holistic approach to VR content creation. In this context, the focus is not merely on isolated elements but on how these elements interact to provide a cohesive and authentic experience. This holistic viewpoint is essential for maximizing the potential of VR in tourism, ensuring that tourists perceive the virtual experience as a credible and valuable alternative to physical travel.

Finally, the results of this study demonstrate no significant differences in tourist satisfaction based on the type of VR device used. This finding is crucial as it highlights that the content and quality of the simulation have a more substantial impact on tourists' satisfaction than the technical

specifications of the devices (Kim, Lee, & Jung, 2020; Kim, Lee, & Preis, 2020). Therefore, the ability of VR technology to deliver immersive experiences is paramount, surpassing the importance of device specifications. Development efforts should prioritize improving content quality and simulation, rather than investing in more advanced hardware. By focusing on content quality, VR developers can ensure that the products remain relevant and compelling even as hardware continues to evolve. This strategic emphasis on content over hardware enhances user satisfaction and fosters inclusivity and accessibility in the rapidly growing field of VR tourism.

CONCLUSION

In conclusion, this study reaffirms the vital role of authenticity in virtual reality (VR) tourism experiences in influencing user satisfaction. The results indicate that the authenticity of objects and activities within VR significantly impacts tourist satisfaction in rural experiences. The findings align with the consensus in the literature, highlighting authenticity as a central element in meeting expectations and enhancing VR user satisfaction. Furthermore, this study confirms that the type of VR device used does not significantly impact user satisfaction, showing the importance of focusing on content quality and experience design. Tourism operators should prioritize the development of detailed and authentic VR content, ensuring the accurate representation of objects and cultural activities to enhance tourist satisfaction and engagement. By addressing aspects of authenticity, practitioners can design products that prioritize satisfying and realistic user experiences, incorporating interactive features and ensuring the importance of authenticity in providing more enjoyable and engaging customer experiences. These efforts are crucial for advancing the VR tourism industry toward a more mature level and meeting users' expectations for immersive and fulfilling experiences. Future research is necessary to explore the long-term effects of VR experiences on tourist behavior and satisfaction, ideally using a more diverse sample to improve generalizability. Additionally, the potential of VR in different tourism contexts, such as urban or adventure tourism, should be examined to expand the understanding of VR's impact across various settings. Future studies could also employ longitudinal methodologies to assess the influence of repeated VR experiences on tourists' perceptions and behaviors over time.

THEORETICAL IMPLICATIONS

This study provides significant theoretical contributions by highlighting the critical role of object and activity authenticity within virtual reality (VR) experiences as determinants of tourist satisfaction—an area that has been underexplored in rural tourism contexts. The findings align with the principles of Existential Authenticity Theory (EAT), which posits that authentic experiences foster emotional engagement and satisfaction. By applying EAT to VR contexts, particularly within rural tourism, this study expands the theoretical framework's applicability and underscores its relevance in contemporary digital environments.

A key finding of this study is the identification of the close relationship between object and activity authenticity within the VR environment, conceptualized as a unified ecosystem. A unique contribution is an insight into the interconnectedness of object and activity authenticity, demonstrating that enhancing the realism of virtual objects significantly improves the perceived authenticity of associated activities. Moreover, this study highlights the critical role of content quality and VR experience design over the technical specifications of devices. This finding adds new insights

to the literature by emphasizing that the primary focus of VR development should be on creating authentic and immersive content rather than advancing hardware.

Additionally, the study offered a novel perspective on the moderating role of devices in VR experiences. While prior research (Ozdemir, 2021) predominantly focused on the direct influence of device types, this study shows that the quality of VR content significantly influences user satisfaction. For instance, respondents who experienced high object authenticity reported a stronger sense of place and heightened emotional engagement, supporting the premise that realistic VR simulations can replicate the psychological effects of actual travel experiences.

The theoretical contribution of this study lies in offering a holistic understanding of the interplay among various elements within the VR ecosystem to create satisfying experiences. Based on the findings, an integrative model is proposed, positioning object-related and activity-related authenticity as mediators between VR content quality and tourist satisfaction. This framework provides a comprehensive understanding of how VR influences tourism experiences, advancing the theoretical discourse in this domain.

MANAGERIAL IMPLICATIONS

The findings of this study offer significant practical insights into the virtual reality (VR) tourism industry. Specifically, the results highlight that enhancing the authenticity of objects and activities within VR experiences has a direct and substantial impact on tourist satisfaction. This insight provides a strategic direction for industry practitioners aiming to develop more engaging and immersive VR content. Tourism operators are encouraged to focus on the accuracy and detail of virtual representations of tourist destinations. By offering highly authentic virtual environments, practitioners can foster a sense of immersion that mirrors real-world experiences. This increases the appeal of VR tourist experiences and directly boosts satisfaction levels. Additionally, integrating interactive features that enable tourists to actively engage with virtual objects or participate in activities can further enhance user satisfaction. For example, virtual tours that replicate the ambiance and intricate details of rural destinations, combined with interactive elements such as guided explorations or cultural demonstrations, can significantly increase the perceived value of VR tourism products.

By recognizing the critical role of authenticity in VR experiences and its significant influence on user satisfaction, practitioners can strategically focus on developing more engaging and fulfilling customer experiences. This effort should include investments in training and skill enhancement to enable the creation of high-quality VR content. Furthermore, this study underscores the importance of collaboration with cultural and historical experts to ensure that VR content is not only immersive but also accurate and contextually rich. Such collaborations can enhance the educational and cultural value of VR experiences, elevating them beyond mere entertainment. The VR tourism industry is progressing toward a more mature phase, characterized by a dual emphasis on educational enrichment and user satisfaction. Accordingly, the managerial contributions of this research provide actionable recommendations for practitioners. These include prioritizing content authenticity and depth, fostering collaborations with experts, and integrating educational elements into VR experiences. By implementing these strategies, the VR tourism sector can enhance the quality of its offerings, attract a broader audience, and build stronger customer loyalty, thus contributing to the sustained growth of the industry.

This study highlights the critical role of advancing VR technologies in enhancing authenticity and interactivity. The integration of cutting-edge innovations, such as augmented reality (AR) and

artificial intelligence (AI), can significantly enrich user experiences by offering more dynamic and personalized interactions. These advancements enable the development of VR products that are not only visually compelling but also functionally relevant, catering to diverse market segments such as education, professional training, and tourism. The practical application of these findings paves the way for substantial product innovation, the exploration of new market opportunities, and the improvement of the VR industry's overall competitiveness.

LIMITATIONS AND FUTURE RESEARCH

This study offers valuable insights, but certain limitations must be acknowledged. First, the generalizability of the findings is constrained by the sample, which consisted of VR users participating in tourism forums and social media platforms primarily in the West Java region and its surrounding areas. Consequently, the results are specific to particular demographic and geographic contexts and may not reflect broader trends. Second, there were technical limitations in accurately measuring authenticity and satisfaction. Variations in the quality and reliability of VR devices used by respondents might have influenced the validity and consistency of the findings. Third, the study was limited by time and budget constraints, which affected both the sample size and the depth of analysis.

Future research should aim to address these limitations. Expanding the geographic and demographic diversity of respondents is crucial for improving the generalizability of findings. This can be achieved by collecting data from a wider range of regions and engaging VR users with more diverse socio-demographic characteristics. Additionally, more robust methods for assessing authenticity and satisfaction should be employed. This could include the development of advanced measurement instruments or the integration of direct observational techniques to provide deeper insights into tourists' perceptions and experiences with VR tourism. Longitudinal studies are also recommended to examine the long-term impacts of VR usage in tourism. Such studies would offer a clearer understanding of how repeated or sustained VR interactions influence tourist behavior, satisfaction, and perceptions over time.

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