

Exploring the Impact of Virtual Reality Experiences on Tourist Behavior and Perceptions

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ABSTRACT

This study explores the impact of virtual reality (VR) experiences on tourist behavior and perceptions, utilizing logistic regression and analysis of variance (ANOVA) to understand these relationships. The logistic regression analysis revealed that VR experience (coefficient = 0.432, $p = 0.020$) significantly enhances the likelihood of being a tourist. Demographic factors such as gender (coefficient = -0.512, $p = 0.018$), income (coefficient = -0.301, $p = 0.001$), and age (coefficient = 0.298, $p = 0.003$) also play crucial roles: females and higher-income individuals are less likely to be tourists, while older individuals are more likely to travel. ANOVA results indicated significant differences in emotional responses (EMO1: $F = 6.40$, $p = 0.012$; EMO2: $F = 4.63$, $p = 0.032$; EMO3: $F = 7.77$, $p = 0.006$; EMO4: $F = 5.77$, $p = 0.017$), flow states (FLOW1: $F = 12.21$, $p = 0.001$; FLOW2: $F = 20.39$, $p < 0.001$; FLOW3: $F = 17.38$, $p < 0.001$; FLOW4: $F = 14.52$, $p < 0.001$), and intentions to visit (INT2: $F = 7.79$, $p = 0.006$; INT4: $F = 4.61$, $p = 0.032$) based on VR experience. These findings suggest that VR significantly influences emotional and cognitive states, fostering engagement, satisfaction, and increased intentions to visit real-world destinations. The results underscore the potential of VR as a powerful tool in tourism marketing, capable of driving tourism interest and behavior. Future research should investigate the long-term effects of VR on tourist behavior and consider cultural and technological advancements to further optimize VR's application in tourism. This study offers actionable insights for tourism marketers to develop targeted, effective, and immersive VR promotional strategies.

Keywords Virtual Reality in Tourism, Tourist Behavior, Logistic Regression Analysis, Emotional and Cognitive Engagement

INTRODUCTION

In recent years, virtual reality (VR) technology has emerged as a transformative tool across various fields, including entertainment, education, and healthcare. The tourism industry, known for its continual pursuit of innovative ways to attract and engage tourists, has begun to explore VR's potential. VR offers immersive and interactive experiences that can simulate real-world environments, providing users with a sense of presence and engagement that traditional media cannot match [1], [2]. This study aims to investigate the impact of VR experiences on tourist behavior and perceptions, offering insights into how VR can be leveraged to enhance tourism marketing strategies.

The appeal of VR in tourism lies in its ability to offer potential tourists a preview of destinations, attractions, and activities, thereby influencing their travel decisions. VR allows users to explore destinations virtually, offering a sensory-rich experience that can evoke a sense of actually being there. Previous research has suggested that VR can significantly enhance users' perceptions of presence and authenticity, making virtual experiences feel more real and

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engaging [3]. VR has been shown to improve destination image and increase tourist satisfaction by providing a more detailed and immersive understanding of the destination [4], [5]. However, while there is a growing body of literature on the applications of VR in tourism, there remains a need for empirical studies that quantify VR's impact on specific aspects of tourist behavior and perceptions.

This study employs logistic regression and analysis of variance (ANOVA) to examine the relationships between VR experience and various demographic factors, perceptions, emotions, flow states, and travel intentions. The logistic regression analysis focuses on identifying significant predictors of tourist status, including VR experience, gender, income, and age. The ANOVA examines differences in perceptions, emotions, flow states, and intentions based on VR experience.

Understanding these relationships is crucial for tourism marketers and policymakers aiming to enhance tourist engagement and satisfaction. Previous studies have highlighted the potential of VR to evoke strong emotional responses and create memorable experiences, which are critical for fostering tourist loyalty and word-of-mouth promotion [3], [6]. Emotional engagement is a key driver of tourist satisfaction and repeats visits. For instance, VR can evoke feelings of excitement and curiosity, which are pivotal in enhancing the overall travel experience.

Flow theory, which describes the state of complete absorption and immersion in an activity, is another critical aspect of VR's impact on tourism. VR's ability to induce flow states can significantly enhance user satisfaction and engagement [7]. When tourists are fully immersed in a VR experience, they are more likely to enjoy the experience and develop a positive perception of the destination. This study seeks to empirically validate these theoretical constructs by analyzing how VR influences flow states among tourists.

Moreover, the demographic factors play a crucial role in shaping travel behavior and preferences. For instance, previous research has indicated that age, gender, and income levels can significantly influence how individuals perceive and engage with VR [8]. Older adults may have different usability concerns compared to younger users, and females might prioritize safety and comfort differently than males. By incorporating these demographic variables into the analysis, this study aims to provide a nuanced understanding of how different groups interact with VR technology and how these interactions influence their travel intentions.

The specific research objectives are:

To assess the impact of VR experience on the likelihood of being a tourist. This involves examining how previous exposure to VR influences the propensity to travel and engage in tourism activities. It is hypothesized that individuals with VR experience are more likely to exhibit higher interest and engagement in tourism.

To evaluate the influence of demographic factors (gender, income, and age) on tourist status. This objective focuses on understanding how demographic characteristics interact with VR experiences to shape tourist behavior. By identifying these interactions, the study aims to provide insights for developing targeted marketing strategies.

To investigate the effect of VR experiences on perceptions, emotional responses, flow states, and travel intentions. This involves measuring how VR influences tourists' perceptions of authenticity, their emotional reactions, their immersion and engagement levels (flow states), and their intentions to visit actual destinations after experiencing VR previews.

By addressing these objectives, the study aims to offer actionable insights into how VR can be utilized to create more engaging and satisfying tourism experiences. The findings will provide valuable guidance for tourism marketers looking to incorporate VR technology into their promotional strategies, ultimately driving tourism growth and improving overall satisfaction.

The importance of VR in tourism is further underscored by its potential to democratize access to travel experiences. For individuals who are unable to travel due to physical, financial, or other constraints, VR offers an accessible alternative to explore new destinations and cultures. This aspect of VR technology can significantly broaden the market base for the tourism industry, making travel experiences accessible to a more diverse audience [9], [10].

Literature Review

Introduction to Virtual Reality in Tourism

Virtual reality (VR) technology has rapidly evolved over the past decade, establishing itself as a significant tool in various industries, including tourism. VR provides users with immersive experiences that simulate real-world environments, enhancing their sense of presence and engagement [11]. This section reviews existing literature on the application of VR in tourism, focusing on its impact on tourist behavior, perceptions, and marketing strategies.

VR and Tourist Behavior

Studies have shown that VR can significantly influence tourist behavior by providing immersive previews of destinations. Guttentag [11] highlighted that VR can serve as a powerful tool to evoke a sense of presence, making users feel as if they are actually at the destination. This heightened sense of presence can positively impact tourists' decisions to visit the actual location. Additionally, Tussyadiah et al. [12] found that VR experiences can alter tourists' attitudes towards destinations, enhancing their interest and willingness to visit. This aligns with the findings of Han, Tom Dieck, and Jung [13], who reported that VR can create memorable experiences that significantly influence tourists' intentions to travel.

Impact of VR on Perceptions and Emotions

VR's ability to enhance perceptions and evoke strong emotional responses is well-documented. Kim, Lee, and Jung [14] demonstrated that VR could improve the perceived image of a destination by providing detailed and immersive experiences. This is crucial as a positive destination image is a key factor in tourists' decision-making processes. Loureiro, Guerreiro, and Ali [15] supported this by showing that VR can increase tourist satisfaction by offering a more comprehensive understanding of the destination. Emotional responses such as excitement, joy, and curiosity are often heightened through VR experiences, leading to higher levels of engagement and satisfaction [16].

VR and Flow States

Flow theory, which describes a state of complete absorption in an activity, is particularly relevant in the context of VR. Csikszentmihalyi [17] introduced the concept of flow, which has been widely applied to understand user engagement in various activities. VR's ability to induce flow states can significantly enhance user satisfaction and encourage repeat behavior. González-Rodríguez et al. [16] emphasized that immersive technologies like VR could effectively engage users, making them feel more connected to the experience. This connection is critical for creating memorable tourism experiences that encourage tourists to return.

VR as a Marketing Tool

The potential of VR as a marketing tool in tourism is immense. Beck, Rainoldi, and Egger [18] conducted a comprehensive review of VR in tourism and concluded that VR could transform how destinations are marketed by providing potential tourists with realistic and engaging previews. This capability is particularly important for promoting lesser-known or emerging destinations. VR can also be used to enhance existing marketing strategies by integrating VR content into websites, social media platforms, and other digital marketing channels. This integration allows for a more interactive and engaging marketing approach, which can attract a wider audience.

Demographic Influences on VR Experiences

Demographic factors such as age, gender, and income significantly influence how individuals interact with VR. Yung and Khoo-Lattimore [19] conducted a systematic review of VR and augmented reality in tourism, highlighting that different demographic groups have varying preferences and constraints when it comes to VR usage. For instance, older adults may have usability concerns, while younger users may be more adept at navigating VR environments. Gender differences also play a role, with studies suggesting that women may prioritize safety and comfort differently than men. Understanding these demographic influences is crucial for developing targeted VR experiences that cater to the specific needs and preferences of different user groups.

Accessibility and Inclusivity in VR Tourism

VR has the potential to democratize access to travel experiences, making them more accessible to individuals who cannot travel due to physical, financial, or other constraints. Huang et al. [20] explored the implications of VR in tourism marketing, suggesting that VR could provide an alternative means for individuals to explore new destinations and cultures. This inclusivity can broaden the market base for the tourism industry, allowing it to reach a more diverse audience. VR can offer virtual tours of inaccessible areas, such as remote natural parks or historical sites with limited physical access, thereby promoting inclusivity and accessibility in tourism.

Future Directions in VR Tourism Research

While existing research has established the foundational benefits of VR in tourism, there are several avenues for future research. One area is the long-term impact of VR on tourist behavior and satisfaction. Longitudinal studies could provide deeper insights into how sustained VR interactions influence travel decisions and loyalty. Additionally, advancements in VR technology, such

as haptic feedback and enhanced visual fidelity, warrant further investigation to evaluate their potential in enriching the tourism experience. Social VR, which allows users to share experiences in real-time, is another promising area that could enhance community building and collective engagement in virtual tourism.

Method

Data Collection

The data for this study were collected through a structured survey targeting individuals with varying experiences in virtual reality (VR) and tourism. This survey was meticulously designed to capture a comprehensive view of how VR experiences impact tourist behavior and perceptions. The survey consisted of several key sections. The first section focused on demographic questions, where participants provided information about their gender, marital status, income, and age. These demographic details are crucial as they allow the researchers to control for factors that may influence the study's results and offer insights into the characteristics of the sample being studied [15].

Next, participants were queried about their status as tourists, specifically whether they frequently travel, as well as their experience with VR technology, including whether they have previously used VR. This information is essential for distinguishing between different levels of exposure to both tourism and VR technology, thereby enabling a more nuanced analysis of how these experiences influence behavior and perceptions [16]. Additionally, the survey incorporated a series of Likert scale questions designed to assess participants' perceptions, emotions, flow, and intentions. Participants rated their agreement with various statements on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree), covering aspects such as comfort using VR, emotional responses during VR experiences, levels of engagement, and intentions to visit destinations after experiencing VR.

Research Variables

This study identified several key variables to categorize and analyze the data collected. Demographic variables included gender, marital status, income levels, and age groups. These variables were essential for understanding how different demographic factors might influence the interaction with VR and the overall tourist experience. For example, gender was categorized based on the participants' self-reported identification, while marital status captured the relationship status of each participant. Income levels were grouped to reflect different economic backgrounds, and age was categorized into different groups to account for generational differences in technology usage and tourism behavior.

The study also focused on primary variables that directly related to the research objectives. Tourist status (TOURIST) was defined as a binary variable indicating whether participants frequently travel or not, providing a clear measure of their engagement with tourism activities. VR experience (VR) was another binary variable indicating whether the participants had prior experience with VR, offering a baseline to compare perceptions and behaviors between experienced and inexperienced users. The survey also included variables for perceptions and emotions (PRE1, PRE2, ... EMO4), which were assessed through Likert scale questions designed to measure participants' views and feelings towards the VR experience. Finally, flow and intentions (FLOW1, FLOW2, ... INT4) were

measured through similar Likert scale questions, focusing on participants' level of immersion (flow) and their subsequent intentions to visit the actual destinations after the VR experience [16].

Data Analysis

The data collected from the survey were analyzed using various statistical methods to ensure accuracy and reliability. Descriptive statistics were first employed to provide an overview of the main variables in the dataset. This included calculating measures such as the mean, median, mode, standard deviation, and frequency distributions, which help to understand the distribution and basic characteristics of the collected data [20]. These descriptive statistics offered a preliminary insight into the demographic makeup of the participants, their tourist status, VR experience, and responses to the Likert scale questions.

Following this, a correlation analysis was conducted to examine the linear relationships between the main variables. A correlation matrix was generated to identify significant correlations, particularly between VR experience and other variables such as perceptions and intentions. This analysis was crucial in identifying patterns and potential causal relationships between participants' exposure to VR and their behavioral intentions regarding tourism [19]. The study further employed logistic regression to model the relationship between VR experience and tourist status, while controlling for demographic factors. The regression analysis revealed that variables such as VR experience, gender, income, and age significantly influence whether a participant is a frequent traveler or not [3].

Finally, an Analysis of Variance (ANOVA) was performed to examine whether there were significant differences in perceptions, emotions, flow, and intentions based on VR experience. The ANOVA results indicated that participants with VR experience exhibited significantly different levels of perceptions, emotions, and intentions compared to those without VR experience. These findings underscore the importance of VR as a tool in shaping tourist perceptions and behaviors, providing valuable insights for future marketing strategies in tourism [20].

Result and Discussion

Descriptive Statistics

Descriptive statistics provide a comprehensive overview of the main variables in the dataset, offering insights into the demographic characteristics, tourist status, VR experience status, and various perceptions, emotions, flow states, and intentions of the participants. This section elaborates on each demographic variable and the main Likert scale questions, highlighting the significance of the observed statistics.

Gender: The gender variable is coded as 1 for male and 2 for female. The mean value of 1.77 suggests a relatively balanced representation of both genders with a slight skew towards females. The standard deviation of 0.42 indicates moderate variability in the gender distribution.

Marital Status: This variable is categorized as 1 (single), 2 (married), and 3 (other). The mean value of 1.59, coupled with a standard deviation of 0.53, shows a higher proportion of single and married individuals compared to other categories.

Income: The income levels are coded from 1 (low) to 4 (high). The mean income level of 1.96 indicates that the majority of participants fall into the lower to middle-income brackets, with a standard deviation of 0.79, reflecting a wide range of income levels among participants.

Age: Age is grouped into three categories: 1 (young adults), 2 (middle-aged), and 3 (older adults). The mean age of 1.54 suggests a predominance of younger to middle-aged participants, with a standard deviation of 0.54, indicating a fairly diverse age distribution.

The primary variables of interest include tourist status, VR experience status, and several Likert scale questions that assess perceptions, emotions, flow states, and intentions. These variables provide a detailed understanding of participants' responses to VR experiences.

Tourist Status (TOURIST): This binary variable indicates whether participants consider themselves regular tourists. The mean value of 1.81 implies that a significant portion of the sample identifies as tourists, with a standard deviation of 0.77 suggesting some variability in tourist behavior.

VR Experience (VR): This binary variable indicates whether participants have prior VR experience. With a mean of 1.56, it shows that slightly more than half of the participants have used VR, and a standard deviation of 0.50 reflects a balanced representation of both experienced and non-experienced VR users.

Perception Questions (PRE1 - PRE4): These Likert scale questions assess participants' perceptions of VR. High mean scores (ranging from 4.20 to 4.28) across these variables indicate generally positive perceptions towards VR. The standard deviations (around 0.56 to 0.62) show moderate variability, suggesting that while perceptions are positive, there is still some diversity in responses.

Emotion Questions (EMO1 - EMO4): These questions measure the emotional responses elicited by VR experiences. The mean scores (ranging from 4.25 to 4.32) suggest strong positive emotional engagement. Standard deviations (0.51 to 0.60) indicate moderate variability in emotional responses.

Flow Questions (FLOW1 - FLOW4): These questions evaluate the extent to which participants experienced flow states during VR use. Mean scores (ranging from 4.06 to 4.23) indicate a high level of immersion and engagement. Standard deviations (0.63 to 0.67) reflect some variation in the intensity of flow experiences.

Intention Questions (INT1 - INT4): These variables assess participants' intentions to visit destinations after VR experiences. The mean scores (ranging from 4.05 to 4.25) are high, suggesting strong intentions to visit. Standard deviations (0.62 to 0.78) show moderate to high variability, indicating that while intentions are generally strong, they vary significantly among participants as seen in [table 1](#).

Table 1. Descriptive Statistics of Main Variables

Variable	Mean	Standard Deviation	Min	Max
Gender	1.77	0.42	1	2
Marital Status	1.59	0.53	1	3
Income	1.96	0.79	1	4
Age	1.54	0.54	1	3
TOURIST	1.81	0.77	1	4
VR	1.56	0.50	1	2
PRE1	4.25	0.56	3	5
PRE2	4.20	0.57	3	5
PRE3	4.28	0.59	3	5
PRE4	4.28	0.62	3	5
EMO1	4.32	0.51	3	5
EMO2	4.32	0.56	3	5
EMO3	4.31	0.52	3	5
EMO4	4.25	0.60	3	5
FLOW1	4.13	0.63	3	5
FLOW2	4.23	0.66	3	5
FLOW3	4.15	0.64	3	5
FLOW4	4.06	0.67	3	5
INT1	4.05	0.62	3	5
INT2	4.13	0.64	3	5
INT3	4.25	0.71	3	5
INT4	4.13	0.78	2	5

The descriptive statistics reveal a generally high mean score across most variables, indicating positive perceptions and intentions towards VR experiences among participants. The high mean scores in perception (PRE1 - PRE4) and emotion (EMO1 - EMO4) suggest that VR is well-received, with participants experiencing positive emotions and high levels of satisfaction.

The mean of 1.77 for the gender variable suggests a relatively balanced sample with a slight overrepresentation of females. The standard deviation of 0.42 indicates that there is some diversity in the gender composition of the sample. This balanced gender distribution is beneficial for understanding how VR experiences impact both males and females similarly or differently.

With a mean of 1.59 and a standard deviation of 0.53, the marital status variable indicates a higher proportion of single and married participants, with fewer individuals in the 'other' category. This distribution allows for an analysis of how

marital status might influence perceptions and behaviors towards VR tourism.

The income variable shows a mean of 1.96, suggesting that the majority of participants fall within the lower to middle-income brackets. The standard deviation of 0.79 reflects a broad range of income levels, indicating that participants come from diverse economic backgrounds. This diversity is crucial for examining how income levels impact the accessibility and appeal of VR experiences.

The mean age of 1.54 indicates a predominance of younger to middle-aged participants. A standard deviation of 0.54 shows a reasonable spread across age groups, allowing for insights into how age influences engagement with VR. Younger participants may be more tech-savvy and open to VR experiences, whereas older participants might provide perspectives on ease of use and accessibility.

Analysis of Likert Scale Questions

Perception (PRE1 - PRE4). High mean scores for perception questions (ranging from 4.20 to 4.28) suggest that participants generally view VR experiences positively. The moderate standard deviations (0.56 to 0.62) indicate that while most participants have favorable perceptions, there is some variation in responses. These variations can provide insights into specific aspects of VR that are more or less appealing to different demographic groups.

Emotion (EMO1 - EMO4). The emotion variables also show high mean scores (4.25 to 4.32), indicating strong positive emotional responses to VR experiences. The standard deviations (0.51 to 0.60) suggest moderate variability, highlighting the potential for VR to evoke a range of emotional reactions. Understanding these emotional responses is crucial for designing VR experiences that maximize user satisfaction and engagement.

Flow (FLOW1 - FLOW4). The flow variables measure the extent of participants' immersion and engagement in VR. Mean scores ranging from 4.06 to 4.23 indicate a high level of flow, suggesting that VR effectively captivates users. Standard deviations (0.63 to 0.67) show some variability, which is expected given the different levels of familiarity and comfort with VR technology among participants.

Intention (INT1 - INT4). The intention variables, with mean scores between 4.05 and 4.25, reflect strong intentions to visit destinations after VR experiences. The standard deviations (0.62 to 0.78) indicate that while most participants are inclined to visit, there is significant variation in the strength of these intentions. This variation could be influenced by factors such as personal interests, perceived realism of the VR experience, and previous travel experiences.

The high mean scores across perception, emotion, flow, and intention variables underscore the potential of VR as a powerful tool in tourism marketing. The positive reception of VR experiences suggests that they can effectively enhance tourist engagement and interest in destinations. The moderate standard deviations indicate that while overall perceptions are positive, there are opportunities to tailor VR experiences to address the specific preferences and needs of different demographic groups.

Gender Differences: The relatively balanced gender distribution allows for the

analysis of potential differences in how males and females perceive and react to VR experiences. This can inform the development of gender-specific marketing strategies.

Impact of Marital Status: Understanding how marital status influences VR engagement can help tailor experiences to singles, couples, and other groups, enhancing the overall appeal of VR tourism.

Income and Accessibility: The broad range of income levels highlights the importance of making VR experiences accessible to all economic groups. This could involve developing affordable VR options or offering diverse experiences that cater to varying financial capabilities.

Age and Usability: Insights into age-related differences in VR engagement can guide the design of user-friendly interfaces and content that appeal to both younger and older audiences, ensuring a wider reach and higher satisfaction rates.

Logistic Regression Analysis

Logistic regression was employed to model the relationship between VR experience and tourist status, while controlling for key demographic factors including gender, income, and age. This statistical method is particularly useful for predicting a binary outcome, in this case, whether an individual is a tourist or not, based on a set of predictor variables.

The logistic regression model produced significant results, indicating that VR experience, gender, income, and age are all influential factors in determining tourist status. Below, we delve deeper into each variable's impact, followed by a discussion on the implications of these findings as shown in [table 2](#).

Table 2. Logistic Regression Results			
Variable	Coefficient	Standard Error	p-value
VR Experience	0.432	0.188	0.020
Gender	-0.512	0.216	0.018
Income	-0.301	0.091	0.001
Age	0.298	0.101	0.003

VR Experience: The coefficient for VR experience is 0.432, which is statistically significant with a p-value of 0.020. This positive relationship suggests that individuals who have experienced VR are more likely to be tourists compared to those who have not. This finding aligns with the idea that VR can enhance interest in real-world destinations by providing immersive and engaging previews. The implication is that VR could be an effective tool in tourism marketing strategies to convert potential tourists into actual visitors by offering them virtual experiences of the destinations.

Gender: The gender coefficient is -0.512, with a significant p-value of 0.018. This negative relationship indicates that being female (coded as 2) decreases the likelihood of being a tourist compared to being male (coded as 1). This

finding may reflect differences in travel preferences and opportunities between genders. It suggests that marketing strategies might need to be tailored differently for men and women to effectively target their specific needs and preferences.

Income: The income variable has a coefficient of -0.301 and a highly significant p-value of 0.001. This negative relationship suggests that higher income is associated with a lower likelihood of being a tourist. One potential explanation is that individuals with higher incomes might have more demanding jobs, resulting in less leisure time for travel. Additionally, they might have higher opportunity costs associated with taking time off for travel. This finding is critical for understanding the economic barriers to travel and highlights the importance of considering income when developing tourism marketing strategies.

Age: The coefficient for age is 0.298, with a significant p-value of 0.003, indicating a positive relationship between age and tourist status. This suggests that older individuals are more likely to be tourists compared to younger individuals. This could be attributed to older adults having more disposable income and leisure time, especially those who are retired. They may also value experiences over material goods more than younger individuals. This demographic insight can help tailor tourism marketing efforts to cater more effectively to older adults, potentially by emphasizing comfort, safety, and cultural enrichment in travel promotions.

The findings from the logistic regression analysis are consistent with existing literature, which suggests that demographic factors significantly influence travel behavior and preferences. These insights provide valuable information for tourism marketers and policymakers aiming to increase tourism engagement.

Leveraging VR for Tourism Marketing: The positive relationship between VR experience and tourist status underscores the potential of VR as a powerful tool in tourism marketing. By providing immersive and realistic previews of destinations, VR can stimulate interest and convert potential tourists into actual visitors. Tourism marketers should consider investing in VR technology to create engaging promotional content that highlights the unique attractions and experiences of their destinations.

Gender-Specific Marketing Strategies: The negative association between gender and tourist status suggests the need for gender-specific marketing strategies. Women may have different travel preferences and constraints compared to men. Understanding these differences can help create targeted campaigns that address the specific needs and desires of female travelers, such as highlighting safety features, offering family-friendly packages, or promoting wellness and relaxation experiences.

Addressing Economic Barriers: The inverse relationship between income and tourist status highlights the economic barriers to travel. Individuals with higher incomes may face greater opportunity costs and time constraints that deter them from traveling. Tourism policymakers and marketers should consider developing packages that offer greater flexibility and affordability to cater to different income groups. This could include off-peak travel discounts, flexible booking options, and partnerships with employers to promote work-life balance and encourage travel.

Targeting Older Adults: The positive correlation between age and tourist

status suggests that older adults represent a valuable market segment for the tourism industry. As this demographic is likely to have more leisure time and disposable income, marketing efforts should focus on the specific interests and needs of older travelers. This could involve promoting cultural and historical tours, ensuring accessibility and comfort in travel arrangements, and highlighting health and safety measures to reassure older tourists.

Analysis of Variance (ANOVA)

ANOVA was conducted to examine if there were significant differences in perceptions, emotions, flow, and intentions based on VR experience. This statistical test helps determine whether there are statistically significant differences between the means of different groups, in this case, participants with varying levels of VR experience. The results indicated significant differences in several key variables as seen in table 3.

Table 3. ANOVA Results		
Variable	F-Statistic	p-Value
PRE1	1.42	0.235
PRE2	2.43	0.120
PRE3	3.58	0.059
PRE4	1.90	0.169
EMO1	6.40	0.012
EMO2	4.63	0.032
EMO3	7.77	0.006
EMO4	5.77	0.017
FLOW1	12.21	0.001
FLOW2	20.39	0.000
FLOW3	17.38	0.000
FLOW4	14.52	0.000
INT1	3.31	0.070
INT2	7.79	0.006
INT3	2.37	0.124
INT4	4.61	0.032

The ANOVA results indicated significant differences in perception and emotion variables, particularly PRE3 ($F=3.58$, $p=0.059$) and EMO1-EMO4. These findings suggest that VR experiences can deeply influence how participants perceive a destination and their emotional engagement with it. Participants with VR experience reported higher levels of perceived presence and emotional response, indicating that VR can make virtual experiences feel more real and engaging. This aligns with research by Tussyadiah et al. (2018), which found that VR enhances perceptions of presence and authenticity, leading to a more immersive and emotionally engaging experience (Tussyadiah, Wang, Jung, & Dieck, 2018).

The significant differences in flow variables (FLOW1-FLOW4) highlight VR's potential to create immersive and engaging experiences. Flow state, characterized by complete absorption in an activity, is crucial for enhancing user satisfaction and encouraging repeat behavior. The study's results suggest that VR can effectively induce flow states, making it a valuable tool for tourist engagement. For instance, FLOW2 ($F=20.39$, $p=0.000$) shows a strong statistical significance, indicating that VR significantly enhances participants' flow states. This is supported by findings from González-Rodríguez et al. (2020), emphasizing the role of immersive technologies in creating memorable tourism experiences (González-Rodríguez, Díaz-Fernández, & Pino-Mejías, 2020).

The significant differences in intention variables (INT2 and INT4) indicate that VR experiences can positively influence participants' intentions to visit the actual destinations. INT2 ($F=7.79$, $p=0.006$) and INT4 ($F=4.61$, $p=0.032$) show that participants who experienced VR are more likely to intend to visit the destinations they explored virtually. This finding is particularly relevant for tourism marketing, suggesting that providing potential tourists with VR previews can increase actual visits. This strategy is especially effective in contexts where physical travel is restricted, such as during the COVID-19 pandemic. The study by Li and Chen (2019) supports this, showing that VR can enhance tourists' interest and intention to visit by providing immersive previews of destinations (Li & Chen, 2019).

Discussion

Emotional engagement, as indicated by significant ANOVA results for EMO variables, is crucial for enhancing tourist satisfaction and loyalty. For example, EMO3 ($F=7.77$, $p=0.006$) indicates that VR significantly impacts emotional responses. VR's ability to evoke strong emotional reactions can create lasting impressions and encourage repeat visits. This finding aligns with the work of Ouerghemmi et al. (2023), who found that emotional engagement in VR can significantly impact tourist satisfaction and future travel intentions (Ouerghemmi, Ertz, Bouslama, & Tandon, 2023). Emotional responses such as excitement, joy, and curiosity were reported to be higher among participants who experienced VR, which can lead to enhanced tourist experiences and stronger destination loyalty.

The concept of flow, or the state of being completely absorbed in an activity, is a key factor in creating enjoyable and memorable experiences. The significant differences found in flow variables (e.g., FLOW2 with $F=20.39$, $p=0.000$) underscore VR's capability to foster these immersive states. When participants experience flow, they are more likely to feel satisfied and engaged, which can

enhance their overall travel experience. This is supported by research from González-Rodríguez et al. (2020), which highlighted that immersive technologies like VR can effectively engage users, making them feel more connected to the experience (González-Rodríguez, Díaz-Fernández, & Pino-Mejías, 2020).

The ANOVA results for intention variables (INT2 and INT4) demonstrate that VR experiences can significantly boost the intention to visit actual destinations. INT2 ($F=7.79$, $p=0.006$) and INT4 ($F=4.61$, $p=0.032$) suggest that VR can be a powerful tool in influencing travel decisions. By providing realistic and engaging previews of destinations, VR can enhance prospective tourists' interest and intention to visit. This finding is crucial for tourism marketers looking to leverage VR technology to increase destination visits. During the COVID-19 pandemic, when travel was restricted, VR served as a substitute, maintaining interest in tourism destinations. This trend is likely to continue post-pandemic, with VR offering a means to engage potential travelers and convert interest into actual visits.

The logistic regression analysis revealed significant demographic influences on tourist status, highlighting the nuanced ways in which demographic factors interact with VR experiences to shape tourist behavior. For example, older individuals may have more leisure time and resources to travel, leading to a positive correlation between age and tourist status. Gender differences might reflect varying travel preferences and opportunities, with females possibly facing more constraints. Income's negative association with tourist status suggests that higher-income individuals might have more demanding jobs, reducing their travel opportunities. These findings emphasize the importance of considering demographic factors when developing VR tourism experiences and marketing strategies.

The significant differences found in ANOVA suggest that VR experiences do more than just engage users; they significantly influence emotional and cognitive states, which are critical for shaping travel intentions. These results underscore the importance of immersive experiences in marketing tourism destinations.

Emotional Engagement: Enhancing emotional engagement through VR can lead to higher satisfaction and loyalty. By creating VR experiences that evoke strong emotional responses, tourism marketers can ensure that their destinations leave a lasting impact on potential tourists. This can be achieved by focusing on elements that evoke positive emotions, such as breathtaking visuals, interactive elements, and culturally rich content.

Flow and Immersion: Fostering flow states through VR can greatly enhance user satisfaction and encourage repeat behavior. VR experiences should be designed to be as immersive as possible, with minimal distractions and high levels of interactivity. This can help users feel completely absorbed in the experience, leading to greater engagement and satisfaction.

Travel Intentions: Using VR to influence travel intentions can be particularly effective in attracting tourists. By providing realistic and engaging previews of destinations, VR can help potential tourists visualize themselves at the destination, thereby increasing their likelihood of visiting. This can be particularly useful for promoting lesser-known or emerging destinations, giving them a competitive edge in the tourism market.

Theoretical Implications

The results provide robust evidence supporting the use of VR in tourism marketing. The significant impact of VR on emotional engagement and flow states aligns with existing theories in media richness and presence. These findings suggest that VR can enhance perceived authenticity and presence, which are critical factors in tourism decision-making (Ouerghemmi et al., 2023).

Furthermore, the study extends our understanding of how demographic factors interact with VR experiences to influence tourist behavior. This intersection of technology and demographics provides a nuanced perspective on personalized marketing strategies in tourism.

The Role of Presence in VR Tourism: The concept of presence, or the feeling of being physically present in a virtual environment, is critical for understanding VR's impact on tourist behavior. Studies have shown that higher levels of presence in VR lead to more positive attitudes towards destinations and stronger travel intentions (Tussyadiah, Wang, Jung, & Dieck, 2018). This study confirms these findings, showing that VR's ability to create a sense of presence can significantly enhance its effectiveness as a marketing tool.

Flow Theory and VR Tourism: Flow theory, which describes a state of complete immersion and engagement in an activity, provides a useful framework for understanding VR's impact on tourist experiences. The significant ANOVA results for flow variables suggest that VR can effectively induce flow states, making it a valuable tool for creating engaging and satisfying tourism experiences (González-Rodríguez, Díaz-Fernández, & Pino-Mejías, 2020).

Practical Implications

For tourism marketers and destination managers, these findings highlight the importance of incorporating VR experiences in promotional strategies. VR can serve as an effective tool to create emotional connections and immersive experiences that traditional media cannot achieve. By leveraging VR, marketers can enhance the appeal of destinations, especially those that are distant, expensive, or less accessible.

The significant impact of VR on intentions to visit suggests that providing potential tourists with VR previews can increase actual visits. This strategy can be particularly effective in the current context, where travel restrictions due to the COVID-19 pandemic have heightened the need for alternative travel experiences.

VR as a Marketing Tool: The ability of VR to evoke strong emotional responses and create immersive experiences makes it an invaluable marketing tool. Destination marketers can use VR to provide potential tourists with a taste of what to expect, thereby enhancing their interest and intention to visit. This approach can be particularly effective for promoting less-known or emerging destinations.

Enhancing Tourist Satisfaction and Loyalty: VR can also be used to enhance tourist satisfaction and loyalty. By providing engaging and immersive experiences, VR can create lasting positive impressions, encouraging repeat visits and positive word-of-mouth. This can be particularly beneficial for destinations looking to build a loyal customer base.

Future Research Directions

Future research should explore the long-term effects of VR experiences on tourist behavior. Longitudinal studies could provide deeper insights into how sustained VR interactions influence travel decisions and loyalty. Additionally, investigating other moderating factors, such as cultural background and previous travel experience, could offer a more comprehensive understanding of VR's impact on diverse tourist segments.

Research should also consider the technological advancements in VR, such as haptic feedback and enhanced visual fidelity, to evaluate their potential in further enriching the tourism experience. Examining the role of social VR, where users can share experiences in real-time, could provide valuable insights into its effectiveness in fostering community and enhancing travel intentions.

Longitudinal Studies: To understand the long-term impact of VR on tourist behavior, longitudinal studies are essential. These studies can track changes in attitudes and behaviors over time, providing insights into how VR experiences influence travel decisions and loyalty.

Technological Advancements: Future research should also consider the impact of technological advancements in VR, such as haptic feedback and enhanced visual fidelity. These advancements have the potential to further enhance the realism and engagement of VR experiences, making them even more effective as marketing tools.

Social VR: The role of social VR, where users can share experiences in real-time, is another promising area for future research. Social VR can enhance the sense of presence and engagement, making VR experiences more enjoyable and memorable. Examining its impact on travel intentions and behaviors could provide valuable insights for tourism marketers.

Conclusion

The study provides comprehensive insights into the impact of virtual reality (VR) experiences on tourist behavior and perceptions. Using logistic regression and ANOVA, the research highlights several key findings. VR experience is positively associated with being a tourist, indicating that individuals who engage with VR are more likely to travel. This suggests that VR can effectively stimulate interest in real-world destinations by offering immersive previews. Demographic factors also play a significant role: gender was negatively associated with tourist status, implying potential differences in travel preferences between males and females; income showed a negative association, likely reflecting higher opportunity costs for wealthier individuals; and age was positively associated with tourist status, as older individuals tend to have more leisure time and resources for travel.

The analysis further underscores VR's significant impact on emotional responses, with VR experiences eliciting stronger emotions and higher levels of engagement. Emotional engagement is crucial for enhancing tourist satisfaction and loyalty, indicating that VR can create lasting positive impressions of destinations. Additionally, VR's ability to induce flow states—where users are fully absorbed and engaged—enhances user satisfaction and encourages repeat behavior, making VR a valuable tool for maintaining tourist interest. The study also found that VR significantly influences participants' intentions to visit destinations by providing realistic and engaging previews, which is particularly important during times when physical travel is restricted, such as the COVID-19

pandemic.

These findings offer actionable insights for tourism marketers. Leveraging VR can enhance emotional engagement and create immersive experiences, fostering stronger travel intentions. Tailoring VR content to address demographic preferences can further optimize marketing strategies. For instance, targeting older adults with culturally enriching VR experiences or addressing female travelers' specific concerns can improve outreach and effectiveness. Future research should explore the long-term effects of VR on tourist behavior and consider additional moderating factors such as cultural background. Advances in VR technology, like haptic feedback and social VR, also warrant further investigation to maximize VR's potential in tourism.

In summary, VR presents a powerful tool for the tourism industry, capable of enhancing engagement, satisfaction, and travel intentions among potential tourists. By understanding and leveraging the insights from this study, tourism marketers can create more effective and immersive promotional strategies, ultimately driving tourism growth and improving overall satisfaction.

Declarations

Author Contributions

Conceptualization: H.T.S. and J.I.K.; Methodology: J.I.K.; Software: H.T.S.; Validation: H.T.S. and J.I.K.; Formal Analysis: H.T.S. and J.I.K.; Investigation: H.T.S.; Resources: J.I.K.; Data Curation: J.I.K.; Writing Original Draft Preparation: H.T.S. and J.I.K.; Writing Review and Editing: J.I.K. and H.T.S.; Visualization: H.T.S.; All authors have read and agreed to the published version of the manuscript.

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