Virtual Tourism and Sustainability in Post-pandemic: Case Study in China

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Abstract

During the pandemic, people were not permitted to travel physically; now that VR technology is maturing and being applied in various contexts, people are considering VR travel as an alternative method to complete a trip, to enhance the experience of traditional travel. Concerned about contracting an illness, some individuals have difficulty traveling physically, so they opt for virtual reality tourism. This paper applies the S-O-R theory to examine the stimulus from the external environment, the internal status of the organism, and the response the consumer will make to comprehend the physiological path of visitors in the context of VR tourism in China following a pandemic. This article examines the attitude of Chinese tourists toward virtual reality tourism and their intent to employ it in the future. In this research, the responses of 306 individuals to an online questionnaire are analyzed to determine how they feel about VR tourism and what they intend to do following the pandemic. The results support most hypotheses regarding how the environmental impact on tourism and travel anxiety in COVID-19 induce a positive attitude toward VR tourism. Modern consumers have a heightened environmental consciousness, and the pandemic significantly impacts travel. In some measure, the pandemic influences travelers' travel habits. In

this regard, destination managers are urged to devote more resources to developing their VR facilities to enhance customer journeys.

1. Introduction

The covid-19 pandemic significantly alters the lives of people all over the globe. The pandemic wreaks havoc on the global economy, education, society, and environment, all undergoing radical changes. Entertainment, tourism, and service industries are believed to be the most severely affected (Kumar et al., 2021). Students engage in less face-to-face learning at school and more home-based learning. To remain in business, restaurants must enhance their take-out services or go out of business. In addition, the pandemic disrupts the market's overarching equilibrium between supply and demand. This results in a lack of supplies and a change in how they are distributed, which alters the shopping habits of individuals. In addition, small and medium-sized enterprises struggle to obtain business orders and have issues with employee layout (Ceylan, Ozkan, & Mulazimogullari, 2020).

In addition to travel restrictions, travel anxiety is the leading cause of significant tourist decline. Travel anxiety has been discovered to affect travel intent significantly negatively (Luo & Lam, 2020). People are concerned about social distance and become apprehensive when gathered in large groups. On the other hand, tourism affects several environmental-related industries (McKercher, 1993). Tourism is highly reliant on natural resources, and most recognize that tourism is inherently detrimental to the environment due to human imprints and other alterations to a healthy ecosystem. In reality, however, the concept of sustainability has been around for some time, and the public is well aware of it. This study will determine if people will relinquish physical travel and travel for pleasure due to sustainability concerns. Assume that individuals who recognize COVID-19 anxiety and tourism sustainability choose virtual travel to supplant in-person attendance.

When this research was being conducted, some countries opened their borders to encourage the gradual recovery of economic activity. Despite this, there is still a considerable distance to travel to return to normal due to numerous unknown

factors. According to UN (2022), the fragile and sluggish economic recovery from the pandemic, at 3.1% in 2022, was eventually slowed by the war in Ukraine, which caused a devastating humanitarian crisis in Europe and even the entire world, increased food and commodity prices, and exacerbated inflationary pressures globally. Tourism is an excellent chance to break through and spur economic recovery. In the vicinity of Beijing, tourism positively correlates with economic expansion. As a vital part of the macroeconomy and in conjunction with the tourism recovery, it fosters the growth of other industries, such as energy and public consumption (Su et al., 2021). Therefore, learning how to leverage the tourism recovery to anchor the contentious restoration of the associated sectors is essential. In contrast to most COVID-19-compliant travel policies, the situation in China is slightly different.

Regarding virtual tourism, China's virtual technology is undergoing rapid development. It is frequently utilized in China's tourist destinations to improve the well-being of locals and the image of the destination (Li, Song, & Guo, 2021). Many of China's most popular tourist destinations have been associated with technology companies that pioneered virtual travel. Visitors psychically restrained from traveling during particular periods try out and laud the new travel routine frequently (Finston, S. 2014). Primarily, this article applies the proposed hypothesis to Chinese citizens to determine whether their virtual travel intentions are consistent. It has been established that risk perception, such as the dread of becoming infected and self-protection, are the most influential factors in tourists' decisions during a pandemic (Meng et al., 2021). In addition to the travel anxiety caused by the pandemic, this article seeks to determine whether environmental sustainability also plays a significant role in their decision-making.

It has been observed that virtual reality (VR) is used to enhance the visitor experience in numerous tourism-related fields. For instance, sports tourism can be allowed to attain sustainability, and applications can be set up in booths from tourism agencies and tourism information centers, which can help promote a destination. In addition, the implementation of virtual reality has been expanded to include education, marketing, cultural heritage, etc. (Yung & Khoo-Lattimore, 2019). Noting the tremendous potential of virtual reality technology, Pahlevi et al. also proposed a three-step plan to develop a virtual tour as a "teaser" for promoting local heritage sites. Particularly, it relates to the mission of the heritage village (2021). Numerous VR implementations in tourism have been identified, all seeking to surpass guests' expectations by enhancing the information they would normally gain from a tour, strengthening their connection to the locations, and improving the overall experience.

(Shin & Jeong, 2021) It is necessary to comprehend the motives and causes underlying the escalating technology adoption by tourists during their travel

phase. Li et al. (2021) confirmed the positive effects of VR tourism on the satisfaction of Chinese tourists. Positively, tourism satisfaction influences the well-being of travelers further (Yang et al., 2022). determined the significance of the application of VR technology in tourism and evaluated five distinct incentives for people to adopt VR tourism. According to research conducted on Belitung Island, domestic tourists can navigate and minimize travel restrictions by utilizing VR technology, which makes them want to return (Perdana Kusumah et al., 2022). There are numerous studies on applying VR and AR technology in the tourism sector, with the majority focusing on tourist satisfaction, destination image, and various immersive feelings. This research will determine if travel's environmental impact and anxiety motivate Chinese travelers' attitudes and responses toward virtual trips. These hypotheses are proposed by Talwar et al. (2022) to examine the perceptions and responses of British citizens to the discussed topic.

2. Literature Review

2.1 Virtual tourism development in the COVID-19 Pandemic

Bhuiyan et al. (2020) propose virtual tourism as a reliable element to facilitate sustainable tourism development. Virtual reality (VR) equipment can leak information beforehand and create a pre-experience for visitors, allowing them to construct a detailed image based on the realistic expectation stimulated by VR (Griffin et al., 2017; Rainoldi et al., 2018). Virtual reality enhances a destination's image. VR is also considered an early-stage instrument for attracting new markets (Tussyadiah et al., 2018). During a pandemic, a large number of young people intend to travel virtually, and COVID-19 introduces behavioral changes in the context of tourism (Corbisiero & Monaco, 2021).

2.2 Chinese Tourism during the Pandemic

China's tourism industry has been a significant contributor to China's Gross Domestic Product (GDP) for more than two decades. In 2019, China earned 5.73 Trillion CNY from tourism; by 2025, tourism is projected to account for 10.93% of its GDP (Li et al., 2021). Tourism has contributed to China's economy and become an important sector, as it has in many other nations and regions. Since the outbreak in Wuhan, China, at the beginning of 2020, the pandemic has caused unquantifiable losses for China due to the closure of borders, travel restrictions, frequent flight cancellations, and concerns from consumers attending social gatherings. The research of Li et al. (2021) supported the passive effect of the pandemic on Chinese tourism. It was demonstrated that, in addition to energy prices and exchange rates, the pandemic significantly influences travelers' decisions regarding tourism revenue.

2.3 S-O-R Theory

Mehrabian & Russell (1974) were the first to propose the Stimulus-Organism-Response model to examine consumers' responses to external stimuli. In 2002, Jacoby (2002) reconceived the S-O-R and presented the model in three intersecting circulars with seven sectors: Encountered Environment, Automatic Processing, Experiential Storehouse, Consciousness, Nontrace Stimulus–Response Events, Internal Responses, and External Responses. A stimulus is a factor in a person's environment at a particular time. Due to the wealth of academic studies, the S-O-R model provides a basis for addressing the complexity of social and managerial sciences. The stimulus is the 'input,' and the response is the 'output' processed by internal organismic states triggered by the stimulus. Jacoby's seven illustrative factors are exhaustive and all-inclusive, encompassing every complex issue a phenomenological individual may encounter. The 2013 meta-analysis by Vieira (2013) confirms the significant association between the three constructs of environment, emotion, and responses, which is consistent with the conclusion of Mehrabian & Russell's 1974 environmental theory.

2.4 Environmental impact of travel (EIT)

Tourism is consistently designated as a sustainable industry, particularly when compared to the manufacturing sector, which requires substantial amounts of fuel and contributes to environmental pollution. Tourism is anticipated to affect the region's economic recovery significantly (Miller, S. M. 2014). Nevertheless, tourism harms the environment due to the imprints left by human activities. Overtourism is one of the leading causes of irreversible damage to the ecological system. Overtourism occurs not only in well-known destinations but also in smaller ones. Krajickova, Hampl, and Lancosova (2022) argued that excessive tourists contributed to environmental problems. Gowreesunkar and Seraphin (2019) also discussed the negative effects of over-tourism on a particular location. Numerous studies have demonstrated that tourism harms the environment. In addition to the negative impact tourism has on other industries, it has also contributed to the excessive emission of greenhouse gases over the past few decades. Due to this, the adjacent environment is in grave danger (Narmadha & Anuradha, 2021).

2.5 Pandemic travel anxiety (PTA)

Rogers et al. (2021) discovered the influence of anxiety sensitivity on COVID-19 anxiety and concern symptoms. Finally, it has been determined that anxiety sensitivity can reduce the anxiety caused by COVID-19. All studies evaluating the level of stress during the pandemic confirmed that infected individuals exhibit symptoms of mental trauma, emotional distress, depression, anxiety, mood fluctuations, irritability, insomnia, and attention deficit (Seviç & Başaran, 2022).

Chesbro et al. (2022) discovered that most sample population exhibits anxiety and depression symptoms. Additionally, research from (Yu et al., 2022) supported the argument proposed by previous academic studies that mental health concern risk is substantially associated with travel intent. In the case of tourism in Honekong, research (Luo & Lam, 2020) confirmed that travelers' awareness of COVID-19 travel has increased. The dread of COVID-19 immediately impacts travel anxiety and risk perceptions. The traveler's intention to visit diminishes as the level of tension rises.

2.6 Attitude toward VR tourism (AVT)

Nanni and Ulqinaku (2021) experimented with group museum excursions incorporating virtual travel. Tourism professionals struggling during the pandemic may employ virtual options to promote and advertise their destinations. According to the research of El-Said and Aziz (2022), respondents indicated that the trip's environmental impact on the destination is a valid reason for people to pursue alternative travel modes Maymand, Farsijani, and Moosavi (2012). also confirmed that travelers' environmental concerns are one of the most influential factors in the growth of virtual tourism. According to the findings of (Tsai, 2022), virtual tourism is more appealing to individuals with a high environmental consciousness. Ecologically conscious individuals are more environmentally conscious. According to Davahli et al. (2020), due to the dynamic and complex issues during the COVID-19 pandemic, the safety of tourism and hospitality has been significantly impacted, and new technology and equipment in the tourism industry are encouraged to enhance the tourist experience.

2.7 ECO-guilty (EGT)

Eco-guilt, eco-grief, and eco-anxiety are proposed to influence environmentally favorable behavior most frequently (Ágoston et al., 2022). From the perspective of self-examination and self-criticism, eco-guilty encourages the dissemination of the message and establishes the objective of pro-environmental conduct. Eco-guilt and travel anxiety both belong to the organism part of the S-O-R model used in this article, and travel anxiety caused by the COVID-19 pandemic also triggers a sense of eco-guilt, according to the framework devised and tested by Talwar et al. (2022).

Although substantial academic research has been conducted on eco-guilt, tourism-related eco-guilt literature review is relatively limited. Regarding the study (Bahja & Hancer, 2021), the direct relationship between eco-guilt and tourism revisit intention is not specified. However, eco-friendly accounted for 76.7% of the variance for environmentally friendly tourism behavior, environmental concerns, and tourism knowledge. In other terms, eco-guilt awareness increases the ecological behavior of tourists.

2.8 Willingness to forgo the pleasure of in-suite tourism (WFP)

Since the 1980s, pleasure has been extensively utilized in social and cultural phenomenal studies, and most studies identify pleasure as community activities and dedication. According to O'Connor and Klaus (2000), the emotions of pleasure are associated with amusement, hilarity, and satisfaction. People book flights and accommodations to complete their vacation packages to receive the pleasure mentioned above and contentment from the tourism services and products they acquire. Therefore, it is true that people enjoy travel that includes multiple forms of entertainment. Communicating with the gentle breeze captures all of the world's gorgeous natural elements. All of these cannot be accessed through digital devices. To further demonstrate the happiness factors of psychical travel McCabe and Johnson (2013), explain that holiday travel contributes to an increase in travelers' happiness and quality of life by generating significant effects on psychological resources and leisure.

2.9 Post-pandemic VR tourism continuance intentions

Zhong et al. (2021) analyzed and summarized predictions for the tourism sector following the pandemic in 2021. It is commonly believed that virtual tourism (such as live-streaming) is paving the way for the new era of the tourism industry in predicting tourist attractions. This satisfies the requirements and expectations of travelers, who will still prefer to visit places with fewer people after the pandemic to avoid social isolation. People with travel anxiety utilize VR equipment to simulate travel. People's anxiety from social distancing may not vanish immediately after the pandemic, and some will continue to favor VR travel for peace of mind.

Tussyadiah et al. (2018) confirm that a greater presence of VR technology in tourism increases the likelihood that a consumer will be intrigued by a particular destination. The research of Zaman et al. (2022) also verifies digital transformation tourism as the new form of travel to achieve tourism sustainability in the post-pandemic world with the advent of metaverse technologies.

3. Data and Methodology

3.1 Research Strategy

This article uses the S-O-R theory to examine people's inner psychological activities to ascertain their intentions and willingness to VR tourism. During this investigation, China was still subject to stringent travel restrictions. A quantitative research approach was implemented. According to Bhandari (2022), quantitative research involves collecting and analyzing numerical data.

3.2 Research Method

The investigation is conducted through a self-administered online questionnaire. It is economical and provides accurate information for this study. The entire questionnaire is comprised of eight sections, which are designated A through H. We must comprehend how Chinese citizens perceive virtual tourism from the perspective of pandemic anxiety and sustainability and if their understanding will assist in modifying the behavior of virtual travel in post-pandemic eras. Consequently, this study enables tourism stakeholders to comprehend better how travelers perceive virtual tourism, enhance their current destination marketing strategy, and modify future tourism development investments. Before beginning the survey, the following queries are posed to respondents: Are you at least 18 years old? b. Have you ever utilized virtual reality (VR) in any capacity? c. Do you reside in China? The respondents are eligible if the responses to the listed queries are all affirmative. The respondent is advised not to continue answering the remaining questions if any response is negative.

The self-administered questionnaire was transferred to the Wenjuanxing form, which has significant ties to the Chinese social media platform with the largest user base. Due to pandemic restrictions in the majority of provinces and regions at the time the research was conducted, the links were disseminated online via the Wenjuanxing platform to continue the survey. The survey link was distributed via Chinese social media channels such as Wechat, QQ, and Weibo to acquire new data from Chinese social media users deemed eligible by completing the self-administered questions at the beginning of the survey.

3.3 Research Instrument

In 1946, Steven introduced the concept of specific measurement scales, including nominal, ordinal, interval, and ratio, as requirements for statistical procedures. Steven confirmed the correlation between the psychological process and the statistical system using psychological scale measurement, Likert Scale. In contemporary academic research, a greater emphasis is placed on the five-point Likert Scale to investigate the associations between various variables that illustrate particular social and psychological phenomena. Referring to the VR tourism attitudes and intentions of Talwar et al. (2022). On the questionnaire, participants are asked to designate their level of agreement with the proposed statements using the table-described Scale. One indicates strong disagreement, two disagreements, three neither concur nor disagree, four consent, and five strong agreement.

3.4 Sample and Sampling

This study utilizes a sample size of 306, and 306 data are processed and analyzed. Inviting respondents from diverse provinces in China and spanning

a broad age range to complete the questionnaire. Kibuacha (2022) suggested using Andrew Fisher's Formula to determine the required sample size for a survey.

Sampling is essential to help the researcher acquire sufficient data to solve the research-identified problem. Comparatively to population, sampling is a subset of the people selected for research purposes. As each individual in the population has an equal chance of being selected, simple random sampling will be used as the sampling procedure in this study. This sampling procedure saves time and money because the sample size is small compared to the population. Using simple random sampling, a researcher selects participants from a population at random; it is a type of probability sampling.

3.5 Pre-test

This study's question items are taken directly from the academic research of Talwar et al. (2022). The original questionnaire is written in English exclusively. Most respondents are Chinese, so the questionnaire has been translated into Chinese for all participants' convenience. To accomplish this, the researcher first translated the questionnaire. With an explanation of the purpose of the research, a certified translator from E-translator (Beijing) Information Technology Company checks the researcher's translation. Based on responses from respondents, questionnaire questions can be readily understood.

3.6 Data Analysis

After all, the data has been prepared. A preliminary analysis investigates the normality of the skewness and kurtosis values. Normality tests are used to determine whether a normal distribution adequately characterizes a data set and to estimate the probability that a random variable underlying the data set is normally distributed. Additionally, a frequency analysis will be conducted. Frequency analysis is utilized when predicting the frequency of variable phenomena and evaluating the accuracy of the prediction. This research begins with a descriptive study to determine the average values of each variable. The subsequent processing of variance inflation factor (VIF) values confirmed the collinearity. To pass the collinearity test, all values must be less than 5. In addition, the Harman single-factor test was conducted to guarantee the absence of common method bias (CMB). In addition, the marker factor method considers the time it took respondents to complete the questionnaire. After completing the descriptive analysis to prepare the raw data, the SPSS 26.0 software was used to verify the data's reliability and common method deviation, followed by the AMOS software (IBM, New York, NY, USA) application for additional data analysis. Using a two-step procedure, the covariance-based structural equation modeling method is used to complete the

study. The questionnaire is based on the research of Talwar et al., and exploratory factor analysis was performed to determine the applicability and effectiveness of the question items for each factor by counting the number of loaded factors. First, a confirmatory factor analysis will assess the model fit, followed by a path analysis to validate the hypothesized relationships. Model 4 in SPSS 26 will be used to conduct the mediation analysis in this section. This study aims to examine the moderating effect of willingness to forego in-suite tourism on the relationship between attitude toward VR tourism and post-pandemic intention to continue VR tourism. Also, the indirect relationship between eco-guilt and the intention to continue VR tourism post-pandemic.
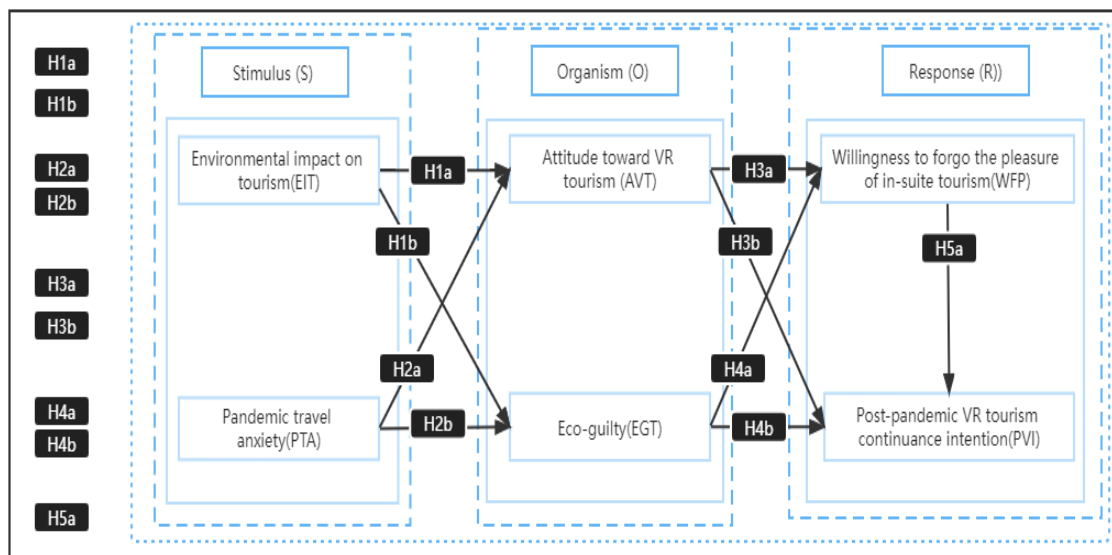

Figure 1: Conceptual Framework

4. Result

4.1 Multivariate assumptions

Verify the normality of the entire data set by first analyzing the Skewness, Kurtosis, and standard curve for each variable in SPSS 26. All of the data for each variable are appropriate and normal. Informed by Talwar et al. (2022), this study first examines the normality and multicollinearity of the collected data to confirm the normality and independence of all variable relationships. For normality, skewness and kurtosis values are reviewed to verify the data set has a normal distribution. In this study, the sample size exceeds 100, and P-P sampling can more accurately reflect the distribution of the data set. The standard display curve generated by SPSS 26 from the processed P-P plot corroborates the normal distribution. Therefore, it can be determined that the data follows a normal distribution.
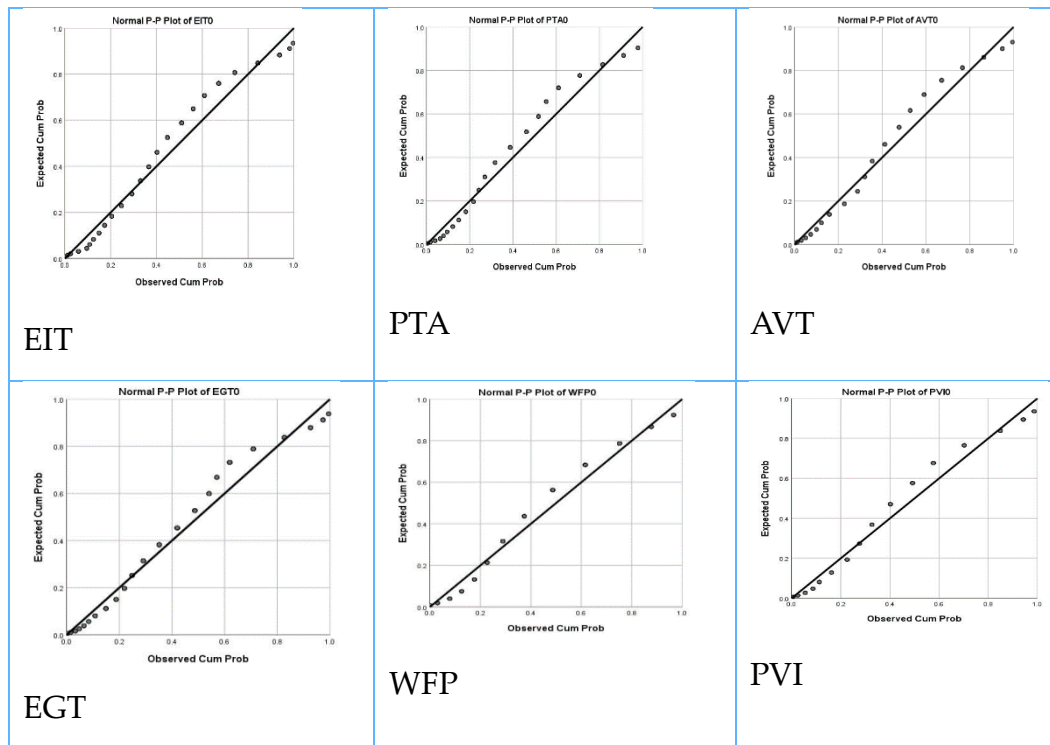
Figure 2: P-P Plot

4.2 Frequency test

From the respondents' social-demographic profile, it can be determined that the gender distribution is optimum, with 47.37 percent female and 52.61 percent male. Regarding age, most participants are between 26 and 40 years old. More than half of the participants reside in families with two to three members, and most do not have children. Regarding education, nearly half of the attendees hold bachelor's degrees, and the other half hold master's degrees. The average level of education is quite high. Due to social isolation and travel restrictions, Chinese citizens are well-protected against infection. Therefore, only 3 percent of our participants are infected. As of the date of the investigation, only three individuals had not been vaccinated, even though 91% of participants were fully immunized.

4.3 Descriptive Analysis

Subsequently, descriptive analysis summarizes the data set and emphasizes potential relationships between the variables under consideration. Referring to the table generated by SPSS 26, within the recommended standard deviation, all average values of the tested factors are greater than the average 3, and it can be inferred that the hypothesized variables have positive associations. Regarding multicollinearity, the variance inflation factor (VIF) is utilized to investigate the relationship between two elements. All VIF values are less than 5, indicating that the correlation between any two variables in this study is independent. Using

correlation analysis, the correlation between Gender and the other 14 items was investigated. The correlation coefficient is employed to determine the intensity of the correlation relationship. Specific study reveals that Gender and Age group, Household size, Children, Educational background, Tourism destination preference, Travel mode, COVID-19 infection status, COVID-19 vaccination status, EIT0, PTA0, AVT0, EGT0, WFP0, PVI0, a total of 14 variables, do not exhibit any significant relationship, with correlation coefficient values of -0.013, -0.019, -0.052, -0.020, -0.036, 0.096,

4.5 Reliability

The validity and dependability of the collected data set have been determined to satisfy the conditions mentioned above. (a) all extracted average variances exceed 0.5 (b) composite reliability (CR) exceeds 0.7 (c) Crobach's alpha exceeds 0.7. In terms of the analysis of discriminant validity, the AVE square root value for Factor 1 is 0.842, which is greater than the maximal absolute value of the correlation coefficient between factors (0.326), indicating that it has good discriminant validity. For Factor 2, the AVE square root value is 0.814, greater than the maximal absolute value of the correlation coefficient between factors (0.501), indicating excellent discriminant validity. As for Factor 3, the AVE square root value is 0.834, greater than the maximal absolute value of the correlation coefficient between factors (0.428), indicating discriminant validity. The same rule was applied to factors 4, 5, and 6 with AVE square root values of 0.800, 0.854, and 0.8009.

Table 1: Validity and Reliability Analysis

Validity, reliability, and Cronbach's alpha									
Variable	AVE	CR	MSV	ASV	EIT	PTA	AVT	EGT	WFP	PVI
EIT	0.709	0.936	0.123	0.311	**0.842**					
PTA	0.663	0.922	0.308	0.438	0.326	**0.814**				
AVT	0.696	0.92	0.216	0.341	0.166	0.283	**0.834**			
EGT	0.64	0.914	0.253	0.452	0.319	0.464	0.428	**0.800**		
WFP	0.73	0.89	0.283	0.454	0.303	0.43	0.398	0.447	**0.854**	
PVI	0.654	0.883	0.308	0.439	0.317	0.501	0.277	0.405	0.474	**0.809**

4.6 HTMT Analysis

Using the research of Talwar et al. (2022), a heterotrait-monotrait ratio (HTMT) analysis was conducted to determine the validity of the discriminant. On the HTMT values, the discriminant validity analysis was performed. All HTMT values were less than 0.85, indicating a high level of discrimination between the factors and high discriminant validity of the research data.

Table 2: HTMT

HTMT						
	EIT	PTA	AVT	EGT	WFP	PVI
EIT	-					
PTA	0.351	-				
AVT	0.178	0.307	-			
EGT	0.345	0.505	0.467	-		
WFP	0.332	0.474	0.441	0.496	-	
PVI	0.348	0.556	0.307	0.45	0.534	-

4.7 Measurement Model

From the below tables, it is concluded a great model fit with v2/df ¼ 1.380, CFI ¼.977. TLI ¼.974, RMSEA ¼.035; GFI ¼ .898, p-value ¼ .000; p-close ¼ .00.

Table 3: Measurement Model

Measurement Model									
Indicator	χ^2	df	p	χ^2/df	GFI	RMSEA	RMR	CFI	NFI
Suggested value	-	-	>0.05	<3	>0.9	<0.10	<0.05	>0.9	>0.9
Actual value	545.216	395	0.000	1.380	0.898	0.035	0.107	0.977	0.921
Indicator	TLI	AGFI	IFI	PGFI	PNFI				
Suggested value	>0.9	>0.9	>0.9	>0.9	>0.9				
Actual value	0.974	0.880	0.977	0.763	0.836				

4.8 Regression and path analysis

Referring to the path analysis, there is a positive relationship between environmental impact on tourism and eco-guilty (H1b; ß ¼ 0.19, p =.007), but not with attitude towards VR tourism (H1a; ß ¼ 0.09, p >.05). Attitudes towards VR tourism shows a positive association with willingness to forgo the pleasure of in-suite tourism (H3a; ß ¼ 0.28, p =.001), but not with post-pandemic VR tourism continuance intention (H3b; ß ¼ 0.04, p >.05)

Table 4: Regression and Path Analysis

			Hypothesis	β	S.E.	t	P	
EGT	<---	EIT	H1b	0.19	0.08	2.52	0.007	Accept
AVT	<---	EIT	H1a	0.09	0.08	1.09	0.263	Reject
AVT	<---	PTA	H2a	0.30	0.08	3.63	0.001	Accept
EGT	<---	PTA	H2b	0.46	0.08	5.61	0.001	Accept
WFP	<---	EGT	H4a	0.40	0.08	5.05	0.001	Accept
WFP	<---	AVT	H3a	0.28	0.08	3.49	0.001	Accept
PVI	<---	EGT	H4b	0.26	0.10	2.69	0.003	Accept
PVI	<---	AVT	H3b	0.04	0.08	0.44	0.603	Reject
PVI	<---	WFP	H5a	0.38	0.09	4.10	0.001	Accept

4.9 Mediating analysis

According to the table of indirect effects between dependent and independent variables, the mediation effect on the relationship between VR tourism attitude (AVT) and post-pandemic VR tourism continuation intention (PVI) is 0.1602. The mediation effect of eco-guilt (EGT) on post-pandemic VR tourism continuation intention (PVI) is 0.1701. The regression analysis confirms the positive direct relationships between EGT and PVI. Therefore, it is concluded that the relationship between EGT and PVI is partially mediated by the willingness to forego the enjoyment of in-suite tourism. There is no direct correlation between attitude toward VR tourism and intention to continue VR tourism post-pandemic. Therefore, willingness mediates the relationship between AVT and PVI completely.

Table 5: Mediating Analysis

	Effect	SE	LLCI	ULCI
AVT→WFP→PVI	0.1602	0.0324	0.1101	0.2393
EGT→WFP→PVI	0.1701	0.0383	0.1003	0.2482

5. Discussion

In COVID-19, all participants who completed the questionnaire are largely well protected by China's stringent mobility restrictions. The majority are from provinces with relatively high discretionary income, are more likely to have Internet access, and have greater intentions to complete the online survey. These individuals have a greater understanding of virtual reality technology than the general population. The result is consistent with the previous literature review and hypotheses that environmental stimuli influence individuals' internal states to choose more environmentally favorable actions within the tourism context.

5.1 Direct Connections

Pandemic travel apprehension influences people's attitudes toward VR tourism positively and induces eco-guilt, whereas the environmental impact of tourism ultimately induces eco-guilt. There are positive associations between eco-guilt, intent, and persistence of use, whereas there are only positive associations between attitude toward VR and post-pandemic VR tourism persistence of use. In response to the first research question, it can be concluded that travel anxiety and environmental stimuli motivate individuals' pro-environmental internal states in the context of the pandemic. To answer research question 2, it can be inferred from the data analysis that eco-guilt, and a positive attitude toward VR tourism induce a pro-environmental tourism-related response in pandemic-affected individuals. In answer to research question 3, it is confirmed that willingness fully mediates the relationship between attitude toward VR tourism and continued use. The

relationship between eco-guilt and post-pandemic VR tourism continuation use is partially mediated by willingness. Surprisingly, the predicted significance of the relationship between environmental impact on tourism and attitude toward VR tourism is not observed. Their research, referencing Talwar et al. (2022) explained that the result did not support the relationship between pro-environmental and high-effort pro-environmental behaviors (such as VR equipment utilization or subscription). Consumers have indicated a high level of concern for the environment but are not yet prepared to alter their perspective on VR tourism or adopt the new technology immediately. Second, there is no direct relationship between attitude toward VR tourism and post-pandemic VR continuation intent. Guttentag (2010) asserts that virtual reality is still a preservation tool and faces numerous obstacles before it can be fully implemented in the tourism industry. Early adopters are still a small market segment (AlFath, Sujarwo, & Harun, 2021). People are still uncertain about the maturity of this new technology.

5.2 Mediating effect

Based on the abovementioned data, the willingness to forego the pleasure of en-suite tourism can entirely mediate the associations between attitude toward VR tourism and intention to engage in VR tourism post-pandemic. Willingness to forego the enjoyment of en-suite tourism can partially mediate the relationship between eco-guilt and post-pandemic VR tourism intent. These findings are unchanged from the previous study (Talwar et al., 2022). Due to VR equipment's immersive and convenient experience, tourists with a general knowledge of virtual reality may have a favorable opinion of VR tourism. However, they are assuring the longevity of the new technology and are not abandoning the happiness that physical travel can provide.

5.3 Contribution

The applicability of the S-O-R model to Chinese VR tourism and sustainability travel was validated, and the distance between VR tourism and the post-pandemic world was closed in terms of theoretical implications. Second, it is demonstrated that Chinese tourists are becoming increasingly aware of environmental issues. In addition, they are willing to incorporate technological tools into their leisure travel. Thirdly, this study's conceptual framework enables us to comprehend the individual psychological process when stimulated by external information and environmental states.

Regarding managerial implications, this paper aims to heighten tourism managers' awareness of VR technology. Although many tourists persist in traveling physically to the destinations, This study's findings indicate that the majority of respondents have a strong interest in VR technology. They concur with the numerous advantages that VR tourism provides. Whether motivated by environmental concerns or the immense appeal of VR tourism itself, some individuals are prepared to forego the

happiness that conventional travel provides. In the context of a historic site, virtual reality technology can augment the knowledge and happiness destinations seek to give visitors. Even historical sites with restoration problems are accessible to tourists. Virtual reality can facilitate interactive activities in some museums that accelerate children's historical education. Consequently, VR can be an alternative instrument to enhance the traveler's experience.

In the first seven months of 2022, according to UNWTO, the international tourism recovery nearly reached 57% of pre-pandemic levels (UNWTO, 2022). After the pandemic in China, known consumers are willing to accept virtual tourism, and decision-makers whose target audience is Chinese comprehend how to attract their customers better. On the other hand, destination administrators are cautioned against considering VR technology. They should explicitly distinguish between the benefits of physical travel and virtual reality tourism. If tourists obtain the same level of gratification from virtual travel, they may not visit the sites, causing the managers to incur enormous losses. Consequently, they must preserve the distinct appeal of the physical site while developing virtual travel.

6. Conclusion

According to this research, the S-O-R model is a valid framework for explaining how VR tourism affects Chinese visitors. The S-O-R model is a valid framework for describing how VR tourism affects Chinese visitors. Pandemic travel anxiety is a valid external factor that motivates individuals to choose VR tourism. Due to the environmental impact of tourism and pandemic travel anxiety, Chinese tourists feel eco-guilt. Chinese tourists are more inclined to forego en-suite tourism due to a more robust attitude toward VR tourism and eco-guilt. After the pandemic, the intentions of Chinese visitors who are more concerned about environmental sustainability to engage in VR tourism will remain unchanged. The environment is an issue that most Chinese visitors are aware of. Anxiety from social gatherings also encourages the development of VR tourism as people seek alternative travel methods. Therefore, destination administrators must recognize the advantages of VR technology and implement VR tourism after the pandemic to improve the travel experience for tourists.

6.1 Limitations & Future Research

First, the sample size of future research must be increased. China possesses the largest population in the globe. To confirm the conclusion's validity, it is suggested that a much larger sample size be utilized in future studies. Secondly, given that the Chinese government was gradually lifting travel restrictions for domestic travel, future research could concentrate on the travel situation in China after the pandemic to confirm the validity of this study's conclusion. It may be intriguing to conduct a comparative analysis to determine if there have been any shifts in people's attitudes regarding the topic under study.

Regarding suggestions for future research, scientists may validate the conclusion in a distinct geographic region. Second, a longitudinal study could be devised to compare people's attitudes and intentions toward the same examined objectives a few years after the pandemic to confirm the validity of this paper's conclusion. Thirdly, AR is a popular topic and shares many similarities with VR regarding its benefits and applications; AR can be substituted for VR to evaluate the framework's suitability.

References

Ágoston, C., Csaba, B., Nagy, B., Kőváry, Z., Dúll, A., Rácz, J., & Demetrovics, Z. (2022). Identifying types of eco-anxiety, eco-guilt, eco-grief, and eco-coping in a climate-sensitive population: A qualitative study. *International journal of environmental research and public health, 19*(4), 2461. https://doi.org/10.3390/ijerph19042461

AlFath, A. M., Sujarwo, & Harun. (2021). The Impact of Educational Practices in Learning Comics and Video Media on Social Science Subjects as Alternatives in a Pandemic Period. *Educational Administration: Theory and Practice, 27*(3), 1125-1132. https://doi.org/10.17762/kuey.v27i3.257

Bahja, F., & Hancer, M. (2021). Eco-guilt in tourism: Do tourists intend to behave environmentally friendly and still revisit? *Journal of Destination Marketing & Management, 20*, 100602. https://doi.org/10.1016/j.jdmm.2021.100602

Bhandari, P. (2022). *What Is Quantitative Research? | Definition, Uses & Methods*. Scribbr. https://www.scribbr.com/methodology/quantitative-research

Bhuiyan, M. A. H., Hassan, S., Darda, M. A., & Habib, M. W. (2020). Aspects of sustainable tourism development and COVID-19 pandemic. *Preprints.org*, 2020080418. https://www.preprints.org/manuscript/202008.0418/v1

Ceylan, R. F., Ozkan, B., & Mulazimogullari, E. (2020). Historical evidence for economic effects of COVID-19. *The European Journal of Health Economics, 21*(6), 817-823. https://doi.org/10.1007/s10198-020-01206-8

Chesbro, G. A., Peterson, J. A., Black, C. D., Larson, D., & Larson, R. (2022). Social Distancing, Psychological Mood and Physical Activity Behavior During COVID-19 in the United States. *International Journal of Exercise Science, 15*(5), 313-329. https://digitalcommons.wku.edu/ijes/vol15/iss5/4

Corbisiero, F., & Monaco, S. (2021). Post-pandemic tourism resilience: changes in Italians' travel behavior and the possible responses of tourist cities. *Worldwide Hospitality and Tourism Themes, 13*(3), 401-417. https://doi.org/10.1108/WHATT-01-2021-0011

Finston, S. (2014). India's Healthcare Industry: innovation in delivery, financing, and manufacturing. *Journal of Commercial Biotechnology*, *20*(3), 60-62. https://doi.org/10.5912/jcb661

Davahli, M. R., Karwowski, W., Sonmez, S., & Apostolopoulos, Y. (2020). The hospitality industry in the face of the COVID-19 pandemic: Current topics and research methods. *International journal of environmental research and public health, 17*(20), 7366. https://doi.org/10.3390/ijerph17207366

El-Said, O., & Aziz, H. (2022). Virtual tours a means to an end: An analysis of virtual tours' role in tourism recovery post COVID-19. *Journal of Travel Research, 61*(3), 528-548. https://doi.org/10.1177/0047287521997567

Gowreesunkar, V., & Seraphin, H. (2019). Introduction: What smart and sustainable strategies could be used to reduce the impact of overtourism? *Worldwide Hospitality and Tourism Themes, 11*(5), 484-491. https://doi.org/10.1108/WHATT-06-2019-0044

Griffin, T., Giberson, J., Lee, S. H. M., Guttentag, D., Kandaurova, M., Sergueeva, K., & Dimanche, F. (2017). Virtual reality and implications for destination marketing. *Travel and Tourism Research Association: Advancing Tourism Research Globally*, 29. https://scholarworks.umass.edu/ttra/2017/Academic_Papers_Oral/29

Guttentag, D. A. (2010). Virtual reality: Applications and implications for tourism. *Tourism management, 31*(5), 637-651. https://doi.org/10.1016/j.tourman.2009.07.003

Jacoby, J. (2002). Stimulus-organism-response reconsidered: an evolutionary step in modeling (consumer) behavior. *Journal of consumer psychology, 12*(1), 51-57. https://doi.org/10.1207/S15327663JCP1201_05

Kibuacha, F. (2022). *How to Determine Sample Size for a Research Study*. GeoPoll. https://www.geopoll.com/blog/sample-size-research

Krajickova, A., Hampl, F., & Lancosova, E. (2022). Visitors' perception of overtourism impacts in a small destination. *Anatolia, 33*(2), 236-246. https://doi.org/10.1080/13032917.2022.2040915

Kumar, V., Alshazly, H., Idris, S. A., & Bourouis, S. (2021). Evaluating the impact of covid-19 on society, environment, economy, and education. *Sustainability, 13*(24), 13642. https://doi.org/10.3390/su132413642

Li, Y., Song, H., & Guo, R. (2021). A study on the causal process of virtual reality tourism and its attributes in terms of their effects on subjective well-being during COVID-19. *International Journal of Environmental Research and Public Health, 18*(3), 1019. https://doi.org/10.3390/ijerph18031019

Luo, J. M., & Lam, C. F. (2020). Travel anxiety, risk attitude and travel intentions towards "travel bubble" destinations in Hong Kong: Effect of the fear of COVID-19. *International Journal of Environmental Research and Public Health, 17*(21), 7859. https://doi.org/10.3390/ijerph17217859

Maymand, M. M., Farsijani, H., & Moosavi, S. S. T. (2012). Investigation of the key success factors in virtual tourism. *Indian journal of science and technology, 5*(7), 3073-3080. https://sciresol.s3.us-east-2.amazonaws.com/IJST/Articles/2012/Issue-7/Article26.pdf

Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. The MIT Press. https://mitpress.mit.edu/9780262630719

McCabe, S., & Johnson, S. (2013). The happiness factor in tourism: Subjective well-being and social tourism. *Annals of Tourism Research, 41*, 42-65. https://doi.org/10.1016/j.annals.2012.12.001

McKercher, B. (1993). Some fundamental truths about tourism: Understanding tourism's social and environmental impacts. *Journal of Sustainable Tourism, 1*(1), 6-16. https://doi.org/10.1080/09669589309450697

Meng, Y., Khan, A., Bibi, S., Wu, H., Lee, Y., & Chen, W. (2021). The effects of COVID-19 risk perception on travel intention: Evidence from Chinese travelers. *Frontiers in Psychology, 12*, 655860. https://doi.org/10.3389/fpsyg.2021.655860

Miller, S. M. (2014). Staking an advantage in an AIA world: practical patent tips for biotechnology companies. *Journal of Commercial Biotechnology*, *20*(3), 44-50. https://doi.org/10.5912/jcb652

Nanni, A., & Ulqinaku, A. (2021). Mortality threats and technology effects on tourism. *Annals of Tourism Research, 86*, 102942. https://doi.org/10.1016/j.annals.2020.102942

Narmadha, V., & Anuradha, A. (2021). Socioeconomic, Cultural and Environmental Impact of Covid-19 on Tourism in India. *Journal of Management Information & Decision Sciences, 24*(4), 1-9. https://www.proquest.com/openview/ebfb90d63bfeff2aa5cc4a5b5d7ab3d7

O'Connor, B., & Klaus, E. (2000). Pleasure and meaningful discourse: An overview of research issues. *International Journal of Cultural Studies, 3*(3), 369-387. https://doi.org/10.1177/136787790000300304

Pahlevi, A. S., Sayono, J., & Hermanto, Y. A. L. (2021). Design of a virtual tour as a solution for promoting the tourism sector in the pandemic period. *KnE Social Sciences*, 368-374. https://doi.org/10.18502/kss.v5i6.9226

Perdana Kusumah, E., Hurriyati, R., Disman, D., & Gaffar, V. (2022). Determining Revisit Intention: The Role of Virtual Reality Experience, Travel Motivation, Travel Constraint and Destination Image. *Tourism and hospitality management, 28*(2), 297-314. https://doi.org/10.20867/thm.28.2.3

Rainoldi, M., Driescher, V., Lisnevska, A., Zvereva, D., Stavinska, A., Relota, J., & Egger, R. (2018). Virtual reality: an innovative tool in destinations' marketing. *The Gaze: Journal of Tourism and Hospitality, 9*, 53-68. https://doi.org/10.3126/gaze.v9i0.19721

Rogers, A. H., Bogiaizian, D., Salazar, P. L., Solari, A., Garey, L., Fogle, B. M., Schmidt, N. B., & Zvolensky, M. J. (2021). COVID-19 and anxiety sensitivity across two studies in Argentina: Associations with COVID-19 worry, symptom severity, anxiety, and functional impairment. *Cognitive Therapy and Research, 45*, 697-707. https://doi.org/10.1007/s10608-020-10194-1

Seviç, M., & Başaran, Z. (2022). Investigation of Coronaphobia, Anxiety, Stress, and Mental Well-Being Levels According to Employees' Participation in Recreational Activities During the Covid-19 Pandemic. *Physical Culture and Sport. Studies and Research, 96*(1), 31-39. https://doi.org/10.2478/pcssr-2022-0017

Shin, H. H., & Jeong, M. (2021). Travelers' motivations to adopt augmented reality (AR) applications in a tourism destination. *Journal of Hospitality and Tourism Technology, 12*(2), 389-405. https://doi.org/10.1108/JHTT-08-2018-0082

Su, Y., Cherian, J., Sial, M. S., Badulescu, A., Thu, P. A., Badulescu, D., & Samad, S. (2021). Does tourism affect economic growth of China? A panel granger causality approach. *Sustainability, 13*(3), 1349. https://doi.org/10.3390/su13031349

Talwar, S., Kaur, P., Nunkoo, R., & Dhir, A. (2022). Digitalization and sustainability: virtual reality tourism in a post pandemic world. *Journal of Sustainable*

Tourism, 1-28. https://doi.org/10.1080/09669582.2022.2029870

Tsai, L.-L. (2022). Factors that influence virtual tourism holistic image: the moderating role of sense of presence. *Sustainability, 14*(1), 467. https://doi.org/10.3390/su14010467

Tussyadiah, I. P., Wang, D., Jung, T. H., & Tom Dieck, M. C. (2018). Virtual reality, presence, and attitude change: Empirical evidence from tourism. *Tourism management, 66*, 140-154. https://doi.org/10.1016/j.tourman.2017.12.003

UN. (2022). *Fragile economic recovery from COVID-19 pandemic upended by war in Ukraine*. United Nations. https://www.un.org/en/desa/fragile-economic-recovery-covid-19-pandemic-upended-war-ukraine

UNWTO. (2022). *International Tourism Back to 60% of Pre-pandemic Levels in January-July 2022*. The World Tourism Organization. https://www.unwto.org/news/international-tourism-back-to-60-of-pre-pandemic-levels-in-january-july-2022

Vieira, V. A. (2013). Stimuli–organism-response framework: A meta-analytic review in the store environment. *Journal of Business Research, 66*(9), 1420-1426. https://doi.org/10.1016/j.jbusres.2012.05.009

Yang, C., Yan, S., Wang, J., & Xue, Y. (2022). Flow Experiences and Virtual Tourism: The Role of Technological Acceptance and Technological Readiness. *Sustainability, 14*(9), 5361. https://doi.org/10.3390/su14095361

Yu, B., Barnett, D., Menon, V., Rabiee, L., De Castro, Y. S., Kasubhai, M., & Watkins, E. (2022). Healthcare worker trauma and related mental health outcomes during the COVID-19 outbreak in New York City. *PLoS One, 17*(4), e0267315. https://doi.org/10.1371/journal.pone.0267315

Yung, R., & Khoo-Lattimore, C. (2019). New realities: a systematic literature review on virtual reality and augmented reality in tourism research. *Current Issues in Tourism, 22*(17), 2056-2081. https://doi.org/10.1080/13683500.2017.1417359

Zaman, U., Koo, I., Abbasi, S., Raza, S. H., & Qureshi, M. G. (2022). Meet your digital twin in space? Profiling international expat's readiness for metaverse space travel, tech-savviness, COVID-19 travel anxiety, and travel fear of missing out. *Sustainability, 14*(11), 6441. https://doi.org/10.3390/su14116441

Zhong, L., Sun, S., Law, R., & Li, X. (2021). Tourism crisis management: Evidence from COVID-19. *Current Issues in Tourism, 24*(19), 2671-2682. https://doi.org/10.1080/13683500.2021.1901866