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RESEARCH ARTICLE

Barriers to Virtual Reality in Tourism Adoption among Chinese Elderly People: The Moderating Role of Personal Innovativeness

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ABSTRACT

The VR tourism industry has a significant impact on the well-being of the elderly, and aging has become a pressing concern.This study aimed to investigate the factors influencing non-adoption intention to VR tourism among Chinese elderly people.The conceptual framework was established based on IRT theory. The relationships among various variables of usage barrier, perceived price, lack of trust, image barrier, perceived health risk, and resistance, non-adoption intention, and personal innovativeness were examined.The data were collected through online survey questionnaire. The population was the elderly aged 55 and above in China. A total of 465 participants involved in the survey.The statistical technique used in this study was partial least squares structural equation modeling (PLS-SEM), which was performed using Smart-PLS 4.0.The results revealed that usage barrier, perceived price, lack of trust, image barrier, perceived health risk positively influenced resistance to using VR for tourism, which, in turn, positively influenced the non-adoption intention to using VR for tourism , Additionally, personal innovativeness moderated the association between resistance and non-adoption intention to using VR for tourism. This study contributes to VR tourism analyzing IRT theory among Chinese elderly people.This study's findings provided guidance for the government, relevant tourism enterprises, and VR suppliers.

Keywords: VR in Tourism; Innovation Resistance Theory(IRT); Resistance; Non-adoption Intention; Chinese elderly people

1. Introduction

In recent years, tourism has promoted the economic development of various countries [1]. Virtual Reality(VR) technology has flourished[2,3]. VR technology has been widely used in tourism, medical care, games, museums and other fields. VR tourism has become a marketing tool for many travel companies[4]. The aging of the global population has become a trend, and China's aging is becoming more and more serious [5]. There are more and more elderly people, and the silver-age economy is developing rapidly, which is highly valued by the government and enterprises [6]. The elderly are lonely and sick, especially the left-behind elderly [7]. They miss their old friends and want to revisit some places they have been in the past [8]. The elderly tourism market is a huge potential market [9]. The elderly problem has become a social problem and needs the attention of relevant government departments and related enterprises[10] . However, since some

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elderly people are not suitable for long-distance travel due to physical discomfort[11] , VR tourism has brought new hope to the elderly. By using VR tourism, the elderly can experience museums, parks, aviation, historical sites, and tourist destinations in an immersive way [12]. VR is a very complex 3D environment generated by computers [13] , which makes people immersed in it. Tourism-related companies have used VR tourism as an important marketing tool to promote tourism [14]. The literature on VR tourism has increased [3], but there is a gap in the research on the non-adoption intention of Chinese elderly people to VR tourism, and the research on the moderating role of personal innovation in the relationship between resistance and non-adoption intention is limited.

Therefore, to fill these research gaps, this study aims to explore the barriers to non-adoption intention to VR tourism among Chinese elderly people (above 55 years old) and analyze the relationship between usage barrier, perceived price, lack of trust, image barrier, perceived health risk, and resistance, non-adoption intention, and personal innovativeness. The variance-based structural equation modeling method (PLS-SEM) is used to test the hypothesized relationships between the research variables according to IRT theory. This study will help to gain a deeper understanding of how the elderly can better adopt VR tourism. It can also help marketers understand the specific barriers that prevent the elderly from resisting VR tourism, so as to formulate corresponding marketing strategies to target these barriers and enable VR to be accepted by more and more elderly people.The structure is as follows: after the introduction, the theory is first introduced, and the user experience based on virtual experience and related theories are introduced. Next, the conceptual model is proposed. Subsequently, each model test is analyzed separately, and the corresponding analysis results are given. Finally, the research results are discussed and implications are given.

2. Literature review

2.1. VR in tourism

Virtual reality (VR) is a three-dimensional graphic (3D) generated by a computer to simulate a real scene [15] . It is a virtual world that allows users to immerse themselves in it [16], which is characterized by immersion, interactivity and imagination [17].VR tourism is a process in which users wear VR devices, such as head-mounted displays, to immerse themselves in the tourism experience [18]. It can provide potential tourists with destination information in advance[19] and increase consumers' interest in the destination [20]. The VR tourism market is currently growing rapidly [21].

2.2. Theoretical foundation

The innovation resistance theory (IRT) was proposed by Ram and Sheth (1989)[22]. It is mainly about the main barriers of consumer innovation adoption, which are divided into active resistance, and passive resistance [23]. Active resistance includes usage barriers, value barriers and risk barriers, which are functional barriers, while passive barriers are mainly traditional barriers and image barriers, which are psychological barriers [22], [24]. Consumers will resist innovation due to value barriers, usage barriers, risk barriers, traditional barriers and image barriers to innovation [25]. IRT is mainly used to analyze consumers' resistance to innovation[22]. The advantages of IRT theory have been widely used in the study of consumers' resistance to various new technologies. For example,digital innovations [25], mobile ticketing applications[26], mobile payment solutions [27,28], smart home services[29], SMEs[30], digital technologies for a circular economy [31], sustainable smart hospitality[32], blockchain technology in supply networks [33], Big data management in healthcare [34], open innovation in healthcare[35] and metaverse products[36] . IRT theory has wide applicability and is applicable to different environments. IRT is a suitable theory for studying on resistance behavior in VR tourism. Therefore, this study will also take IRT theory as the theoretical basis, and explore the barriers

of VR tourism from the dimensions of usage barrier, perceived price, lack of trust, image barrier, perceived health risk. The conceptual framework in this study is presented in **Figure 1**.

Most current virtual reality (VR) research is based on adoption models such as UTAUT, focusing on identifying which factors can promote users' adoption of new technologies. The implicit premise of the UTAUT model is that the research subjects already have a certain degree of willingness to use the technology. However, in the context of VR tourism being applied to the elderly population, it is more about why the elderly resist VR tourism and form a non-adopting intention. Therefore, using the UTAU model may not be able to fully explain the non-acceptance and resistance behaviors of the elderly group. When facing complex digital technologies, the elderly are often more susceptible to usage barriers, value barriers, and risk barriers, and their decision-making process does not fully conform to the UTAUT model. Innovation Resistance Theory (IRT) starts from the user perspective and emphasizes the mechanism of psychological barriers in innovation decision-making, which can better reflect the resistance and non-adopting phenomena shown by the elderly towards VR tourism. In this research context, IRT has higher contextual adaptability and explanatory power compared to UTAUT. Further, UTAUT is more suitable for explaining the facilitating factors of technology adoption, while IRT helps to reveal the psychological resistance and barrier mechanisms of users in the early stage of technology diffusion. By focusing on the "barriers - resistance - non-adoption" action path, this study provides a complementary theoretical perspective for adoption-centered VR research literature, thereby expanding the understanding of the user behavior mechanism of VR tourism.

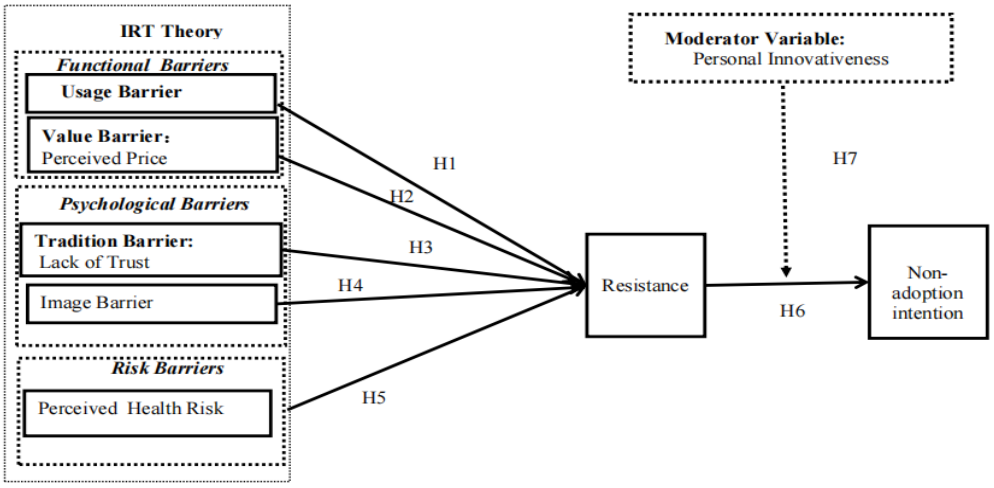

Figure 1. Conceptual framework

2.3. Hypothesis development

Usage barriers refer to the perception of great complexity in the process of using innovative technologies [28], especially the anxiety and resistance felt by the elderly when faced with complex innovative technologies [37]. Usage barriers refer to the inconsistency between the elderly's past needs, values and experiences [36], when using VR technology for tourism, which leads to anxiety and resistance. VR technology is a newly emerging technology that requires learning various operations and using various VR devices, such as various head-mounted devices, 3D glasses, etc. The elderly perceive that it is very difficult to learn these operations and wear these VR devices, and perceive usage barriers, which leads to technology anxiety and resistance. Nie et al. (2025)[36]have proposed that usage barriers are negatively correlated with the willingness to use metaverse products.Therefore, the hypothesis was constructed as follows:

H1: Usage barrier positively affects senior tourists' resistance toward to using VR for tourism

In the Innovation Resistance Theory (IRT), the value barrier reflects the subjective evaluation of consumers regarding whether the expected benefits brought by innovation match the efforts required. Chinese elderly people are very sensitive to prices, and their perception of prices is an important factor influencing the adoption of technology. Price is the most intuitive and core basis for judging whether an innovation is worthwhile. Based on the situational characteristic of the resistance of Chinese elderly people to VR tourism, this study takes "perceived price" as the representative operationalization indicator of the value barrier, which is the subjective cognition of the elderly regarding the trade-off between economic cost and perceived value of virtual reality (VR) tourism. In the context of the elderly group focused on in this study, the price barrier is the most direct and most explanatory manifestation of the value barrier.Price barriers refer to cost-effectiveness [22], weighing the benefits and costs of using innovative technologies [38].Al-Adwan(2024)[39]demonstrated that non-adoption intention towards meta-commerce is linked to perceived cyber risk, perceived regulatory uncertainty, perceived switching cost, and perceived technical uncertainty.When consumers do not perceive the benefits of using innovative technologies, they will think it is not worth it and the price is expensive, which will lead to resistance [40]. The price barrier in this study refers to the fact that the elderly feel that the price of VR tourism is low compared with traditional tourism, which leads to resistance. Using VR for tourism requires bringing VR equipment, which is currently expensive. It costs 50-100 RMB to experience VR once, which is a very important obstacle to resistance to VR tourism for the elderly. Nie et al. (2025) [36]proposed that value barriers are negatively correlated with the willingness to use metaverse products. When consumers believe that energy and money required exceed the benefits, they will resist this innovative technology. Therefore, the hypothesis was constructed as follows:

H2: Perceived price positively affects senior tourists' resistance toward to using VR for tourism

Trust is conceptualized as a positive expectation [41]. Technology serves as a crucial factor in fostering trust, which can minimize uncertainty or mitigate sources of uncertainty [42]. Trust is capable of fulfilling an expectation without compromising its vulnerability [43]. Trust is directly correlated in influencing users' adoption behavior [44]. The adoption to VR in tourism among older adults, facing significant challenges and lack of trust [45] . Trust is a foundational element in technology acceptance, influencing users' willingness to engage with new technologies [46] . Shin (2009) [47]sought to consumer acceptance of mobile payment with constructs of security and trust.Trust pertains to the perceived reliability, security, and overall credibility of the technology. When users lack trust, they are less likely to perceive VR experiences as safe, reliable, or beneficial, which directly affects their adoption intentions. Trust is a belief that reduces worry and panic, while a lack of trust creates doubt, resistance, and reluctance to use . Older people are suspicious of and distrustful of VR tourism because they fear innovation. They feel that there are many concerns and threats in VR tourism, a lack of trust, and a reluctance to use VR tourism . Thus, risk and trust factors are directly related to users' adoption behavior, sense of accomplishment, and service continuity. Indeed, a lack of trust creates further market resistance to mobile payment use [48] . Given that older tourists may have different levels of familiarity and trust with emerging technologies compared to younger populations, their reactions and attitudes towards VR can vary significantly. Therefore, the hypothesis was constructed as follows:

H3: Lack of trust positively affects senior tourists' resistance toward to using VR for tourism

Image barriers refer to the image issues that technological innovation brings to consumers. When consumers have a stereotypical and negative impression of innovative technology, they develop a resistance to innovation [22]. The negative image barriers of innovation have a positive impact on the resistance behavior

towards innovation [49]. In this study, the image barriers refer to the negative image of VR tourism among elderly users, such as the immature development of VR technology, potential harm to the body, high price, tendency to cause anxiety and eye fatigue , dizziness and disorientation [36]. These negative images may cause anxiety and concerns among elderly consumers regarding the use of VR tourism, thereby generating resistance towards the application of VR technology in tourism [36]. Therefore, the hypothesis was constructed:

H4: Image barrier positively affects senior tourists' resistance toward to using VR for tourism

Perceived risk refers to an individual's belief or subjective judgment about the likelihood of potential harm or loss when pursuing a desired outcome [50]. Specifically, a high perception of risk has been found to decrease users' continued intention to use wearable health technologies [51]. When users perceive a new technology as risky, they resist adopt it [35]. Among the different types of risk, perceived physical risk is considered a significant barrier. Al-Adwan et al. (2024) [52] revealed that perceived technological, regulatory, and cyber risks hinder consumer adoption intention in metaverse commerce, while performance expectancy, effort expectancy, perceived herd behaviour, hedonic motivation, and consumer innovativeness facilitate adoption.Some technologies raise fears of exposure to electromagnetic waves, radiation, or other unknown threats . Health-related concerns have long been identified as key contributors to innovation resistance[53] , particularly when they lead to anxiety and hesitation about adoption [54]. When seniors perceive high health risks in using ICT, they are more likely to feel anxious and avoid those technologies [55]. For the elderly, the higher the perceived risk when using ICT, the greater their anxiety [55]. Elderly people tend to feel anxious and uneasy when using VR devices for a long time, which may have an adverse effect on their health [56] . Long-term use of VR by people may have an adverse effect on the health of users. Perceived physical risks affect the willingness to adopt technology. Perceived physical risks negatively impact on using VR for tourism [56,57]. Perceived physical risks have a negative moderating effect on the relationship between perceived ease of use and willingness to adopt mobile AR games [56]. Perceived physical risks negatively impact on the willingness to adopt AR [58] . Consumers believe that using VR will damage their physical health because they need to wear VR headsets. Consumers are worried about hurting their eyes or brains. Wearing them for a long time will cause dizziness. The perceived physical risks of using VR technology negatively impact on the perceived value [59]. Thus, the hypothesis was constructed:

H5: Perceived physical risk positively affects senior tourists'resistance toward to using VR for tourism.

It is common for users to show hesitation or pushback before fully embracing it. In the early stages of innovation, companies often encounter consumer resistance, which can take the form of outright rejection, delayed decision-making, or active opposition [60]. Understanding what drives this resistance is crucial for businesses, as adoption and resistance often occur side by side during technological transitions [53] . Ram and Sheth (1989) [22]explain that resistance is a natural reaction to change. People might resist simply because they are comfortable with their current way of doing things, or because the new system challenges their values or expectations. This kind of resistance, particularly toward new technologies, can significantly hinder adoption efforts . In fact, resistance is a central issue in the literature on technology adoption . When new tools or systems are introduced, users may reject them if they feel their current approach works just fine [40]. In many cases, user resistance stems from a blend of rational evaluation and emotional response. "Resistance intention" refers to a person's deliberate decision not to engage with a new technology, based on concerns or perceived disadvantages. Older adults often struggle with such transitions, and their reluctance to embrace change is well documented . Resistance plays a role in shaping attitudes toward mobile payments, with those

expressing resistance less likely to adopt these innovations [23]. Emotional discomfort and skepticism can further fuel non-adoption behavior [28].This study posits that older users may experience both logical concerns and emotional hesitation when deciding to use VR tourism. The aim is to explore how both forms of resistance, whether based on calculated judgment or underlying anxiety, contribute to their reluctance. Since the IRT framework is grounded in the notion of rational decision-making, where perceived costs and benefits weigh heavily on outcomes (Szmigin & Foxall, 1998), this study proposes the following hypothesis:

H6: Resistance positively affects senior tourists' non-adoption intention to use VR for tourism

Personal innovativeness reflects a person's openness to change and try out technologies or experiences[61]. Some individuals are more eager than others to experiment with new products and are typically the first to adopt emerging technologies. In the context of information technology, Agarwal et al. (1998)[62] described personal innovativeness an readiness to engage with new tools. In the tourism space, this tendency plays a key role. Tourists who are naturally inclined toward innovation are more likely to embrace smart technologies during their travel experiences [63]. It has been found to negatively influence various barriers to technology adoption, including traditional barriers,value barriers, usage barriers, and risk barriers [26]. Those with lower innovativeness may stick to familiar routines and resist change, especially in settings like digital healthcare [35]. Recent studies examined the moderating effect of personal innovativeness on perceived barriers to emerging technologies such as metaverse products [36] .Given that VR is still an emerging technology, understanding how personal innovativeness shapes users' intentions to adopt it, especially for tourism, can offer deeper insight. The following hypothesis is thus proposed:

H7: Personal innovativeness moderates the relationship between resistance and non-adoption intention toward to use VR for tourism.

3. Methodology

3.1. Data collection

3.1.1. Research design

Scientific research is chosen by the researcher[64] . A paradigm is a scientific method [65]. Social research can be divided into three research paradigms: (1) positivism, (2) constructivism, and (3) critical research [66]. This study adopted a quantitative method [67]. In addition, this study requires a large sample size. This study proposed seven hypothesized relationships and to test them through empirical testing. This study collected data from Chinese elderly consumers through an online survey. The dataset contained 465 observations and was analyzed through PLS-SEM.We chose PLS-SEM instead of CB-SEM. Firstly, PLS-SEM is suitable for predictive-oriented research and theoretical expansion, which perfectly aligns with the exploratory nature of this study, which aims to explore the adoption barriers of virtual reality (VR) tourism among the elderly. Secondly, PLS-SEM does not require data to meet the assumption of multivariate normal distribution, while the data in this study do not fully meet the requirement of normal distribution. Therefore, using PLS-SEM is more appropriate. Thirdly, the model structure proposed in this study is relatively complex, including multiple latent variables and moderating effects. PLS-SEM demonstrates strong robustness in handling such complex models. All constructs in this study were modeled according to reflective constructs, which is consistent with existing research. Therefore, choosing PLS-SEM not only helps to obtain reliable parameter estimates but also maintains high flexibility in handling model complexity.

3.1.2. Population and sample

This study aimed to investigate the factors influencing non-adoption intention to VR tourism among Chinese elderly people, employing the IRT theory as its theoretical framework. The target demographics is elderly consumers in China aged 55 years and above. The sample size was determined using G-power 3.1. The minimum sample size is 160 [68]. This study requires at least 200 samples to conduct PLS-SEM [69].

3.1.3. Data collection procedure

A survey questionnaire was created to collect data using measurement scale items from previous studies.Data were collected through an online questionnaire survey. The survey questionnaire was distributed to the elderly through WeChat, and email. This study focuses on the application scenario of virtual reality (VR) tourism, which is based on digital technology. Respondents need to have a certain level of proficiency in using and understanding digital tools in order to accurately understand the questionnaire items and make effective judgments about the research context. During the initial offline interviews, we found that some elderly people had relatively low digital usage capabilities and lacked basic understanding of the VR concept, making it difficult for them to respond effectively to the related measurement items. Therefore, the research subjects of this study are defined as the Chinese elderly population aged 55 and above who have a basic understanding of VR. Under the scope and purpose of this research, the online survey method is appropriately applicable in this study, which helps to ensure the quality of data and the validity of measurement. A total of 515 questionnaires were collected in this study. During the process of data screening and quality inspection, questionnaires with incomplete filling, duplicates, excessive missing values, or obvious inconsistent response patterns were mainly excluded. The above processing was aimed at ensuring the reliability and validity of the measurement results. After data cleaning, 465 valid questionnaires were finally retained for subsequent analysis, with an effective rate of 90.3%.Back-translation approach was used in this study to ensure the accuracy of the survey [70]. The questionnaire was pre-tested so that the question set could be adjusted and confirmed as necessary. All respondents participating in the survey in this study signed an informed consent form. The survey was conducted online from May to July, 2025 The final dataset had 465 valid responses.Non-probability convenience sampling technique was used in the data collection process [71].

3.2. Survey Instruments

The questionnaire have two sections: Section A and Section B. Section A focused on the demographic characteristics, including gender, age, education level, work situation, and experience in tourism. Section B focused on related questions. This study scaled and contextualized previous literature, modifying it where necessary, such as Usage Barrier (UB) [72], Perceived price (PP) [40], Lack of trust (LT)[28] , Image barrier (IB) [73], Perceived health risk(RB) [40] , Resistance(RS)[40], Non-adoption intention(NI) [74] and Personal Innovativeness (PI) [36]. We adopt 7-point Likert scale,ranging from “strongly disagree (1)” to “strongly agree (7)”, with intermediate options including “mostly disagree (2)”, “partially disagree (3)”, “neutral (4)”, “partially agree (5)” and “mostly agree (6)”.

3.3. Common method bias

To identify common method bias (CMB), we tested CMB using the full collinearity test [75]. All the study structures were regressed on variance infation factors (VIF) values (**Table 1**). There was no presence of bias because all VIF values were lower than 3.3: Usage Barrier(UB)(2.408), Perceived Price(PP)(1.986), Lack of Trust(LT)(2.202), Image Barrier(IB)(2.248), Perceived Health Risk(RB) (2.054), Resistance(RS)(2.463), Non-adoption intention(NI)(1.705), Personal Innovativeness(PI)(1.035)(**Table 1**).

Table 1. Full collinearity test

	UB	PP	LT	IB	RB	PI	RS	NI
VIF Values	2.408	1.986	2.202	2.248	2.054	1.692	1.705	1.035

3.4. Multivariate normality

Using the Web Power online tool for multivariate normality testing [76]. Statistical tests showed that the p-values for both skewness and kurtosis were all less than 0.05, this result indicates that the data do not follow a normal distribution [77]. PLS-SEM with Smart PLS 4.0 is an effective approach to dealing with non-normality of the data [69].

3.5. Data analysis

The analysis was divided into two stages. First, the measurement model was quantified to determine its validity and reliability. It is generally believed that SEM provides accurate estimates than regression analysis [78] Therefore, this study used PLS-SEM, because it can manage small sample sizes without requiring normality assumptions,analyzing predictive models with complex constructs, and the structural and measurement model can be evaluated [69].

4. Results

4.1. Demographic characteristics

Based on this sample survey, **Table 2** shows the demographic information of 465 respondents. Males accounted for 44.1%, females accounted for 55.9%. In terms of education background, 30.3% have college degree or above, and 22.8% have bachelor's degree. In terms of age, 54.6% are 55-60 years old, and 20.9% are 61-65 years old. In addition, we examined the respondents' previous experience of searching for travel information every month, 29.7% searched 1-3 times every month, and 41.7% searched 4-6 times. In terms of occupation, 37.8% worked in private enterprises, 22.4% were self-employed, and 33.1% were retired. According to the annual expenditure on travel, 47.7% of them spent more than RMB2,000.

Table 2. Demographic Characteristics

		Counts	Percentage(%)
Gender	Male	205	44.1
	Female	260	55.9
Age	55-60	254	54.6
	61-65	97	20.9
	66-70	66	14.2
	⩾71	48	10.3
Educational level	High school and below	202	43.4
	College or higher vocational college	141	30.3
	Bachelor’s degree	106	22.8
	Master’s degree	12	2.6
	others	4	0.9
Monthly frequency in searching for tourism information	1-3 times	138	29.7
	4-6 times	194	41.7

		Counts	Percentage(%)
	7–9 times	84	18.1
	10 times or more than 10 times	49	10.5
Occupation	Government sector employee	29	6.2
	Private sector employee	176	37.8
	Self-employed	104	22.4
	Retired person	154	33.1
	others	2	0.4
Annual expenses on tourism activities	Less than RMB 2,000	243	52.3
	RMB 2,001–RMB 3,000	134	28.8
	More than RMB 3,000	88	18.9

4.2. Validity and reliability

The reliability analysis was conducted using the Cronbach's Alpha and the Combined Reliability (rho_a). The measurement results of all constructs were above the standard value of 0.7, indicating that the data of this study has a good level of internal consistency and reliability [69],[79]. The convergent validity was evaluated by average variance extracted (AVE) and external loading. The analysis results show that the AVE values of all variables are greater than 0.5, ranged from 0.781 to 0.843.and all external loads are higher than 0.7, which meet the recommended standards, indicating that the research model in this study has good convergent validity [69] (**Table 3**).

Table 3. Construct reliability and validity

Latent Constructs	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
IB	0.814	0.814	0.915	0.843
LT	0.877	0.877	0.924	0.803
NI	0.861	0.862	0.915	0.783
PI	0.872	0.873	0.922	0.797
PP	0.791	0.792	0.905	0.827
RB	0.791	0.798	0.905	0.827
RS	0.867	0.870	0.919	0.790
UB	0.907	0.909	0.934	0.781

The discriminant validity was tested using the Heterotrait-Monotrait Ratio (HTMT). All the HTMT ratios were below the threshold of 0.9(**Table 4**), indicating that the model has good discriminant validity. Moreover, the square roots of the average variance extracted (AVE) for all constructs exceeded their inter-construct correlations,all cross-loading values exceeded 0.5 (**Table 5**), which was higher than the corresponding loadings[80], thereby fulfilling the Fornell-Larcker criterion (**Table 6**) and further supporting discriminant validity [80].

Table 4. Heterotrait-monotrait ratio (HTMT)

Constructs	IB	LT	NI	PI	PP	RB	RS	UB
IB	0.843							
LT	0.763	0.803						

Constructs	IB	LT	NI	PI	PP	RB	RS	UB
NI	0.741	0.738	0.783					
PI	0.791	0.711	0.743	0.797				
PP	0.731	0.734	0.758	0.777	0.827			
RB	0.753	0.717	0.738	0.739	0.731	0.827		
RS	0.746	0.713	0.722	0.722	0.731	0.719	0.790	
UB	0.771	0.712	0.742	0.722	0.728	0.759	0.699	0.781

Table 4. (*Continued*)

Table 5. Cross loadings

Constructs	IB	LT	NI	PI	PP	RB	RS	UB
IB1	0.918	0.613	0.583	0.635	0.55	0.565	0.574	0.614
IB2	0.919	0.57	0.557	0.59	0.527	0.545	0.58	0.604
LT1	0.595	0.896	0.591	0.551	0.584	0.52	0.546	0.566
LT2	0.576	0.888	0.568	0.556	0.527	0.536	0.568	0.565
LT3	0.561	0.904	0.566	0.564	0.532	0.548	0.559	0.577
NI1	0.514	0.54	0.873	0.547	0.548	0.528	0.54	0.563
NI2	0.544	0.583	0.887	0.581	0.558	0.521	0.554	0.577
NI3	0.588	0.581	0.894	0.582	0.554	0.567	0.564	0.601
PI1	0.61	0.578	0.581	0.892	0.588	0.526	0.572	0.583
PI2	0.584	0.544	0.563	0.89	0.573	0.537	0.55	0.581
PI3	0.592	0.543	0.581	0.895	0.567	0.581	0.561	0.557
PP1	0.541	0.542	0.583	0.592	0.905	0.532	0.539	0.551
PP2	0.526	0.568	0.554	0.582	0.913	0.52	0.563	0.571
RB1	0.545	0.54	0.55	0.568	0.536	0.920	0.572	0.579
RB2	0.555	0.547	0.559	0.549	0.515	0.899	0.513	0.592
RS1	0.591	0.566	0.592	0.567	0.558	0.553	0.901	0.595
RS2	0.546	0.563	0.541	0.558	0.542	0.511	0.885	0.552
RS3	0.536	0.531	0.53	0.55	0.514	0.53	0.881	0.509
UB1	0.561	0.546	0.551	0.557	0.51	0.548	0.515	0.870
UB2	0.59	0.546	0.583	0.583	0.561	0.558	0.559	0.891
UB3	0.585	0.56	0.579	0.537	0.546	0.56	0.535	0.882
UB4	0.607	0.592	0.604	0.594	0.562	0.604	0.587	0.892

Table 6. Fornell-Larcker criterion

Constructs	IB	LT	NI	PI	PP	RB	RS	UB
IB	0.918							
LT	0.644	0.896						
NI	0.621	0.642	0.885					
PI	0.667	0.622	0.644	0.892				
PP	0.586	0.611	0.625	0.645	0.909			
RB	0.604	0.597	0.609	0.614	0.578	0.909		
RS	0.628	0.623	0.625	0.628	0.606	0.598	0.889	
UB	0.663	0.636	0.656	0.643	0.617	0.643	0.622	0.884

Table 7. Assesment of the structural model

Relationship	β	T value	97.5%	VIF	f2	P	Supported	R2	Q^2
IB -> RS	0.201	2.975	0.338	2.248	0.039	0.003	Yes	R^2 RS=0.546	0.532
LT -> RS	0.187	2.751	0.320	2.202	0.035	0.006	Yes		
PI -> NI	0.392	6.379	0.509	1.692	0.185	0.000	Yes		
PP -> RS	0.189	2.526	0.334	1.986	0.040	0.012	Yes		
RB -> RS	0.158	2.732	0.273	2.054	0.027	0.006	Yes	R^2 NI=0.510	0.523
RS -> NI	0.392	7.050	0.505	1.705	0.184	0.000	Yes		
UB -> RS	0.152	2.031	0.297	2.408	0.021	0.042	Yes		
PI x RS -> NI	-0.134	2.555	-0.028	1.035	0.030	0.011	Yes		

4.3. Hypothesis testing

This study employed the Bootstrapping method in SmartPLS 4 (with 5,000 samples) for hypothesis testing (**Table 7**, **Figure 2**). The R2 values for RS and NI were 0.546 and 0.510 (**Table 7**), indicating that all the variables collectively accounted for approximately 54.6% and 51% of the variance in RS and NI, RS explained 51% of NI, signified the higher explanatory ability of the model.Endogenous constructs with R^2 values of 0.26, 0.13, and 0.02 are classified as having large, moderate, and weak explanatory power, respectively [81] (**Table 7**). The results revealed that UB (H1: β = 0.152,t =2.031,p<5%), PP (H2: β = 0.189, t =2.526, p<5%), LT (H3: β = 0.187, t =2.751, p<1%), IB (H4: β = 0.201, t =2.975, p<1%), and RB (H5: β = 0.158, t =2.732, p<1%) significantly affected RS at at 5% level of significance. The association between RS and NI was determined to be positive (H6: β = 0.392, t =7.050, p<1%), indicating that RS had a positive impact on NI. The study found that PI (HM1:β=-0.134, t =2.555, p<5%) had a significant negative moderating effect in the association between RS and NI (**Table 7**), at 5% level of significance. Therefore, this study found that hypotheses (H1-7) were validated at the 5% level of significance (**Table 7**, **Figure 2**). Effect sizes are classified as follows: small when f^2 exceeds 0.02, medium when f^2 is greater than 0.15, and large when f^2 surpasses 0.35 (Cohen, 2013). It shows that thef^2 values range from 0.021 to 0.185 (**Table 7**), indicating medium effect sizes: IB (f^2 = 0.039), LT (f^2 = 0.006), PP(f^2 = 0.040), RB(f^2 = 0.027), UB (f^2 = 0.021), RS (f^2= 0.184) (**Table 7**). The outcome of moderation (**Table 7**) indicates that PI (HM1: β= -0.134, t=2.555, p<5%) moderated the connection between RS and NI . The theoretical basis is the Innovation Resistance Theory (IRT). The resistance of the elderly to innovation is caused by multiple psychological factors. Each of the obstacles has an independent impact on the resistance behavior, which shows a moderate effect size. This reflects the gradual process of influencing the resistance to innovation, not caused by a single determining factor, and is in line with the influence mechanism of the IRT theory. The usage barrier,value barrier,(perceived price),psychological barriers,risk barriers mainly indirectly affect non-adoption through the resistance behavior. This is through the mechanism of barriers-resistance-non-adoption. This indicates that reducing the resistance of the elderly to VR tourism cannot rely on a single intervention measure, but requires a multi-dimensional and systematic strategy combination.

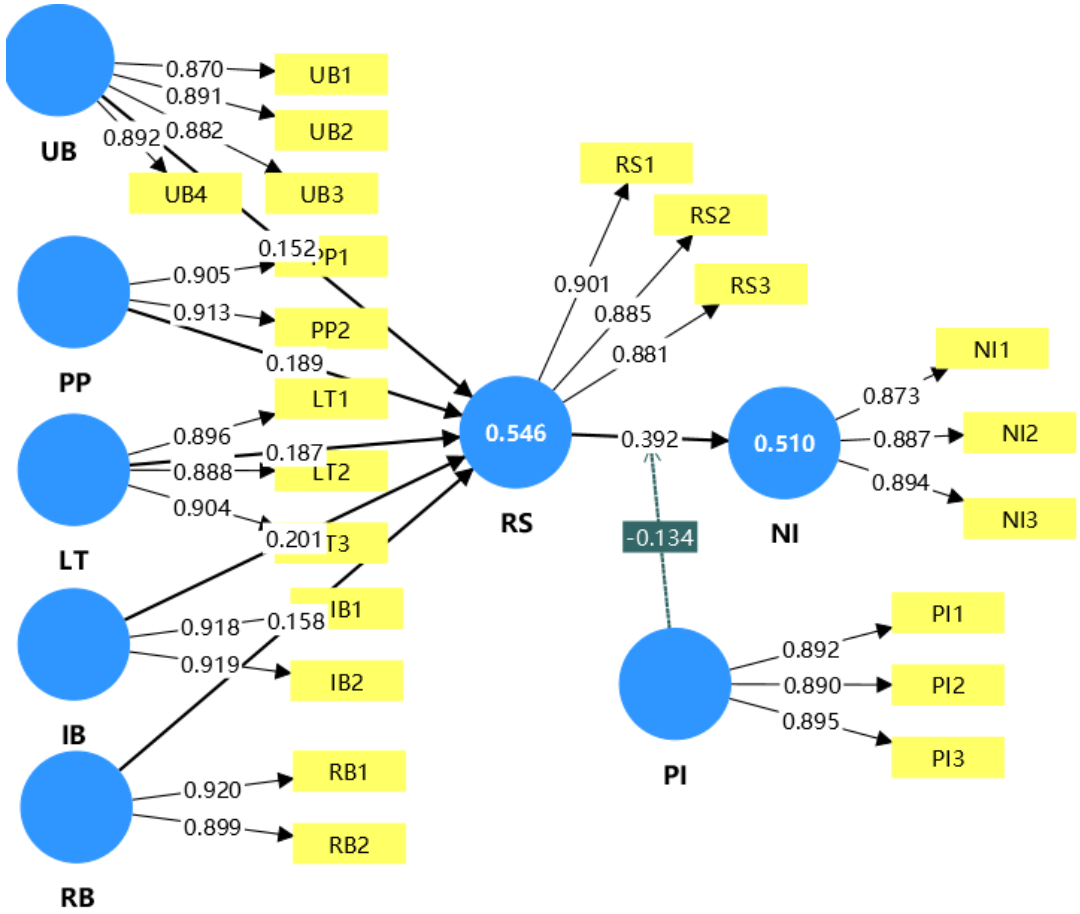

Figure 2. Measurement model

5. Discussion

This study investigated the relationship between usage barrier, perceived price, lack of trust, image barrier, perceived health risk, resistance, and non-adoption intention. The exogenous constructs impact on the endogenous construct, with an explanatory power of 51% for NI, 54.6% for RS,indicating a good model.

H1-5 involved the influences of resistance towards VR tourism. The hypotheses were accepted, indicating that usage barrier, perceived price, lack of trust, image barrier and perceived health risk positively affects on resistance toward VR tourism.Resistance positively impact on the elderly's non-adoption intention towards VR tourism.These results support previous studies[74],[82] . The positive impact of usage barriers and price perception on resistance behavior reflects the cognitive evaluation process emphasized in the Innovation Resistance Theory (IRT). Elderly people generally believe that VR tourism is operationally complex and has high learning costs, thus generating technological anxiety and low self-efficacy. This indicates that resistance is not only due to functional barriers but is also closely related to the emotional discomfort caused by encountering unfamiliar technology. At the same time, elderly people consider VR tourism to be costly, and perceive the benefits to be lower than the investment, which makes them more cautious when making decisions. Compared to younger groups, the price sensitivity of the elderly is higher, and this finding enriches previous research on innovation adoption.

The image barriers and the lack of trust indicate that social perception and technological image play a significant role in the resistance of elderly users. Many elderly people associate VR with games, young people's entertainment, or unverified technology, which easily leads to prejudice and makes them believe that VR tourism is less safe or less valuable than traditional travel. The lack of trust further exacerbates their doubts about the reliability of the technology, data security, and the authenticity of the VR scenarios. Research shows that for the elderly group, social image and trust factors may be more crucial than functional factors. Health risk perception or risk barriers (such as dizziness, visual fatigue, and physical discomfort) are significant psychological factors that hinder the adoption of VR tourism by the elderly. Unlike previous studies which regarded physical discomfort as a secondary barrier, this study found that the elderly consider health risks as one of the primary assessment criteria, which is closely related to their physiological sensitivity.

H6 proposed that there was a positive correlation between resistance (RS) and non-adoption intention (NI). Resistance (RS) positively impact on non-adoption intention (NI). These results support the previous studies [28],[40]. the significant impact of the resistance behavior on the non-adoption of the intention indicates that the elderly's non-acceptance of VR tourism is not caused by a single obstacle, but rather the result of the combined effect of multiple obstacles. Functional, psychological, and social barriers work together to form an overall negative attitude among the elderly, thereby strengthening the non-adoption intention. This provides more systematic empirical support for the theory of innovation resistance.

H7 proposes that personal innovativeness (PI) negatively moderates the relationship between resistance (RS) and non-adoption intention (NI). The empirical results support this hypothesis, indicating that personal innovativeness exerts a significant moderating effect. Specifically, among elderly individuals with higher levels of personal innovativeness, the positive relationship between resistance and non-adoption intention is significantly weakened.The moderation plot further reveals that, even when perceiving higher levels of resistance or barriers, elderly individuals with high personal innovativeness (PI) exhibit a lower intention to reject virtual reality (VR) tourism. In contrast, among individuals with low personal innovativeness, resistance has a stronger positive effect on non-adoption intention. These results suggest that elderly individuals with higher personal innovativeness are more open to new technologies and more confident in experimenting with novel experiences. Consequently, even when facing certain resistance, they remain more willing to adopt VR tourism.These findings are consistent with prior studies highlighting the buffering role of personal innovativeness in contexts of technological resistance [57] and further extend this moderating mechanism to the context of VR tourism adoption among elderly populations.

Descriptive statistics show that elderly respondents with higher levels of education typically exhibit lower resistance levels and a lower intention to adopt. This indicates that education may play a facilitating role in the adoption of virtual reality (VR) tourism by enhancing digital literacy and reducing uncertainty perception regarding emerging technologies. Similarly, age differences may also partly explain the changes in adoption intentions. The relatively younger elderly group typically shows a higher openness towards VR tourism, while the older group shows a relatively higher level of resistance.

6. Implication

6.1. Theoretical implications

This research expanded IRT. First, it integrates IRT theory on VR tourism. This study explain and predict NI on IRT theory. Second, barriers are five constructs. These barriers (usage Barrier,perceived price, lack of trust, image barrier, perceived health risk) influenced resistance towards VR for tourism, resistance

towards non-adoption intention. It fills a significant gap in previous studies. This study revealed that barriers have negative impact on adoption toward VR for tourism. It proposed that barriers are significant factor to adopt innovative technology. Third, this research highlights personal innovativeness(PI). It suggests that personal innovativeness (PI) serve as a moderator between resistance (RS) and non-adoption intention (NI). Forth, this study confirms the expected relationships between usage barrier(UB), perceived price(PP), lack of trust (LT), image barrier(IB), perceived health risk (RB) and resistance (RS). This support IRT. This study explored RS affected on NI. It shows the importance of personal innovativeness(PI) in VR tourism. Fifth, this study employ PLS-SEM in VR tourism.

6.2. Practical implications

This study identified the key factors that influence the resistance behavior and non-adoption intention of elderly users, providing important practical insights for virtual reality (VR) tourism practitioners (including VR tourism service providers, VR technology developers, and tourism destination marketing agencies). The research results show that usage barrier, perceived price , lack of trust, image barrier, perceived health risk all significantly enhance the resistance of the elderly to VR tourism, thereby further increasing their non-adoption intention.

From the perspective of management practice, reducing usage barriers should be the top priority. The VR tourism equipment designed for the elderly should focus on lightweight design, ergonomic comfort, and ease of operation. It should be equipped with a simplified user interface and clear usage instructions. Developers should minimize complex operation procedures, shorten the learning time, and prioritize enhancing the safety and comfort for the first-time use of elderly users.

Perception of price is also an important obstacle factor affecting adoption. Practitioners can consider adopting more affordable pricing strategies, such as offering low-cost trial experiences, bundling VR tourism with traditional tourism products, or conducting VR tourism experience programs at the community level, in order to lower the economic threshold for elderly consumers.

Furthermore, enhancing trust and improving the image of VR tourism are equally crucial. By providing transparent explanations regarding data security, privacy protection, and health safety standards, concerns related to trust can be effectively alleviated. Through authoritative endorsements, on-site demonstrations, and user education activities, it is also possible to reduce perceived health risks and improve the stereotypical perception of VR technology among the elderly.

The personal innovativeness regulatory effect indicates that elderly people with higher innovation capabilities are more likely to adopt VR tourism even when they perceive certain resistance. Therefore, a market segmentation strategy can be employed to prioritize the targeting of elderly groups with higher innovation capabilities as early adopters, thereby accelerating market expansion and indirectly stimulating the adoption intentions of the groups with higher resistance.

At the policy level, government departments and tourism authorities can promote VR as an innovative marketing tool, especially for tourism destinations with accessibility limitations . By formulating public policies that encourage the research and development of elderly-friendly VR technologies, providing financial subsidies or incentives, and supporting pilot projects in community activity centers, it is possible to promote the widespread adoption of VR tourism. Overall, this study provides actionable decision-making references for industry practitioners and policy makers, and helps to promote the sustainable development of China's VR tourism industry.

7. Conclusion

The results revealed that usage barrier, perceived price, lack of trust, image barrier, perceived health risk positively influenced resistance toward VR tourism, which, in turn, positively influenced the non-adoption intention to VR tourism. Additionally, personal innovativeness moderated the association between resistance and non-adoption intention to VR tourism. This study offers clear implications to the tourism industry: VR device manufacturers should prioritize improving the usability of devices to reduce users' perceived complexity. Meanwhile, tourism businesses and policymakers can collaborate to develop VR experiences with enhanced interpersonal interaction features.

While this study offers valuable insights on VR tourism among the elderly in China, there are limitations: The scope was limited to the elderly in China, the acceptance of VR technology between younger and older demographic segments warrants further investigation. When applying the research results,we should keep in mind the limitations of this study: the samples were Chinese elderly, It should be caution exercised when applying the research results outside of China.Future researchers should consider incorporating behavior theories to better elucidate tourists'adoption of VR technology.Although this study provides valuable insights into the acceptance and resistance behaviors of virtual reality (VR) tourism among Chinese elderly people, it still has certain limitations. Firstly, the sample of this study is limited to the elderly population in China, which to some extent restricts the applicability of the research conclusions in other cultures or regional contexts. Secondly, this study only focuses on the elderly group. The differences in the acceptance and adoption of VR technology among different age groups have not yet been examined, and future research is necessary to further explore this issue. Thirdly, the research data mainly come from self-report questionnaires. This data collection method may be affected by self-report biases such as social desirability bias and common method bias. Fourthly, this study did not include a real immersive VR tourism experience. The respondents mainly evaluated their adoption intention based on subjective perception rather than actual experience, which may to some extent affect the inference of actual behavior. Finally, this research model only examined a limited number of influencing factors. Other potentially important variables, such as social influence, previous technical usage experience, and other personality traits, were not included in the analysis. Future research can enhance the robustness and generalizability of the research conclusions by introducing experimental designs with real VR experiences, longitudinal data, and more diverse samples.

Future research can enhance the robustness and generalizability of the research conclusions by introducing experimental designs with real VR experiences, longitudinal data, and more diverse samples.Future research can be conducted in the following aspects: Firstly, it is advisable to expand the sample scope to include different countries, regions, and age groups to enhance the generalizability of the research results; Secondly, a longitudinal research method can be adopted to dynamically observe the changes in audience attitudes and adoption behaviors; Thirdly, it is suggested to combine mature behavioral theories, such as the Technology Acceptance Model (TAM), Unified Theory of Technology Acceptance and Use Model (UTAUT), or Innovation Diffusion Theory (IRT), to deeply analyze the adoption mechanism of VR technology by tourists; Fourthly, exploring more potential influencing factors, such as social influence, digital literacy, or immersion experience quality, can help to construct a more comprehensive VR tourism adoption model.

Data Availability Statement

Data sets generated during the current study are available from the corresponding author on reasonable request.

Conflict of interest

The authors declare no conflict of interest

References

1. Li, Y., Liu, Y., & Solangi, Y. A. (2024). Analysis of factors and strategies for the implementation of sustainable tourism in a green economic structure in China. Journal of Cleaner Production, 434, 140011.https: //doi.org/10.1016/j.jclepro.2023.140011.
2. Agarwal, P., Swami, S., & Malhotra, S. K. (2024). Artificial intelligence adoption in the post COVID-19 new-normal and role of smart technologies in transforming business: a review. Journal of Science and Technology Policy Management, 15(3), 506-529.https://doi.org/10.1108/JSTPM-08-2021-0122.
3. González-Rodríguez, M. R., Díaz-Fernández, M. C., Caber, M., & Albayrak, T. (2025). Determinants of user behavior in 360º virtual tours: a hybrid analytical approach with PLS-SEM and fsQCA. Journal of Travel & Tourism Marketing, 42(5), 627-644.https://doi.org/10.1080/10548408.2024.2436655.
4. Lo, W. H., & Cheng, K. L. B. (2020). Does virtual reality attract visitors? The mediating effect of presence on consumer response in virtual reality tourism advertising. Information technology & tourism, 22(4), 537-562. https://doi.org /10.1007 /s40558-020-00190-2.
5. Peng,X.(2011). China's demographic history and future challenges. science, 333(6042), 581-587.https: //doi.org / 10.1126 /science. 1209396.
6. Kohlbacher, F., Herstatt, C., & Levsen, N. (2015). Golden opportunities for silver innovation: how demographic changes give rise to entrepreneurial opportunities to meet the needs of older people. Technovation, 39, 73-82.https: //doi.org/10.1016 /j.technovation.2014.05.002.
7. Taylor-Gooby, P. (2004). Open markets and welfare values: welfare values, inequality and social change in the silver age of the welfare state. European societies, 6(1), 29-48.https://doi.org/10.1080/1461669032000176305.
8. Jungselius, B., & Weilenmann, A. (2023). Keeping memories alive: A decennial study of social media reminiscing, memories, and nostalgia. Social Media+ Society, 9(4), 20563051231207850.https://doi.org/10.1177/20563051231207850.
9. Kelly, N., Kelliher, F., Power, J., & Lynch, P. (2020). Unlocking the niche potential of senior tourism through micro-firm owner-manager adaptive capability development. Tourism Management, 79, 104081.https: //doi.org/10.1016 /j.tourman. 2020.104081.
10. Lu, L., Liang, C., Gu, D., Ma, Y., Xie, Y., & Zhao, S. (2021). What advantages of blockchain affect its adoption in the elderly care industry? A study based on the technology–organisation–environment framework. Technology in Society, 67, 101786.https://doi.org/10.1016/j.techsoc.2021.101786.
11. Kim, M. J., & Kang, Y. (2023). Older adults' user experience of virtual tourism: exploring presence and experiential value with respect to age difference. Virtual Reality, 27(4), 2967-2987.https://doi.org/10.1007/s10055-023-00849-1.
12. Siddiqui, M. S., Syed, T. A., Nadeem, A., Nawaz, W., & Alkhodre, A. (2022). Virtual tourism and digital heritage: an analysis of VR/AR technologies and applications. International Journal of Advanced Computer Science and Applications, 13(7).
13. Newman, M. A. R. K., Gatersleben, B., Wyles, K. J., & Ratcliffe, E. (2022). The use of virtual reality in environment experiences and the importance of realism. Journal of environmental psychology, 79, 101733.https: //doi.org /10.1016 /j.jenvp.2021.101733.
14. Guttentag, D. A., Litvin, S. W., & Teixeira, R. (2024). Human vs. AI: can ChatGPT improve tourism product descriptions?. Current Issues in Tourism, 1-19.https://doi.org/10.1080/13683500.2024.2402563.
15. Korkut, E. H., & Surer, E. (2023). Visualization in virtual reality: a systematic review. Virtual Reality, 27(2), 1447-1480.https: //doi.org/10.1007 /s10055- 023- 007 53-8.
16. Blackman, T. (2024). Virtual reality and videogames: immersion, presence, and the performative spatiality of 'being there'in virtual worlds. Social & Cultural Geography, 25(3), 404-422.https://doi.org/10.1080/14649365.2022.2157041.
17. Li, W., Zhu, J., Dang, P., Wu, J., Zhang, J., Fu, L., & Zhu, Q. (2023). Immersive virtual reality as a tool to improve bridge teaching communication. Expert Systems with Applications, 217, 119502.https://doi.org/10.1016/j.eswa.2023.119502.
18. Pratisto, E. H., Thompson, N., & Potdar, V. (2022). Immersive technologies for tourism: a systematic review. Information Technology & Tourism, 24(2), 181-219. https://doi.org /10.1007 /s40558-022-00228-7.
19. Tavitiyaman, P., Qu, H., Tsang, W. S. L., & Lam, C. W. R. (2021). The influence of smart tourism applications on perceived destination image and behavioral intention: The moderating role of information search behavior. Journal of Hospitality and Tourism Management, 46, 476-487.https://doi.org/10.1016/j.jhtm.2021.02.003.

20. Sigalat-Signes, E., Calvo-Palomares, R., Roig-Merino, B., & García-Adán, I. (2020). Transition towards a tourist innovation model: The smart tourism destination: Reality or territorial marketing?. Journal of Innovation & Knowledge, 5(2), 96-104.https://doi.org/10.1016/j.jik.2019.06.002.
21. Bec, A., Moyle, B., Schaffer, V., & Timms, K. (2021). Virtual reality and mixed reality for second chance tourism. Tourism Management, 83, 104256.https://doi.org/10.1016/j.tourman.2020.104256.
22. Ram, S., & Sheth, J. N. (1989). Consumer resistance to innovations: the marketing problem and its solutions. Journal of consumer marketing, 6(2), 5-14.https://doi.org/10.1108/EUM0000000002542.
23. Talwar, S., Talwar, M., Kaur, P., & Dhir, A. (2020). Consumers' resistance to digital innovations: A systematic review and framework development. Australasian Marketing Journal, 28(4), 286-299.https://doi.org/10.1108/IJOEM-03-2022-0529.
24. Ajina, A. S., Islam, D. M. Z., Zamil, A. M., & Khan, K. (2024). Understanding green IT adoption: TAM and dual-lens of innovation resistance. Cogent Business & Management, 11(1), 2403646.https://doi.org/10.1080/23311975.2024.2403646.
25. Talwar, M., Corazza, L., Bodhi, R., & Malibari, A. (2024). Why do consumers resist digital innovations? An innovation resistance theory perspective. International Journal of Emerging Markets, 19(11), 4327-4342.
26. Chen, C. C., Chang, C. H., & Hsiao, K. L. (2022). Exploring the factors of using mobile ticketing applications: Perspectives from innovation resistance theory. Journal of Retailing and Consumer Services, 67, 102974.https://doi.org /10.1016 /j.jretconser. 2022.102974.
27. Kaur, P., Dhir, A., Singh, N., Sahu, G., & Almotairi, M. (2020). An innovation resistance theory perspective on mobile payment solutions. Journal of Retailing and Consumer Services, 55, 102059.https://doi.org/10.1016/j.jretconser.2020.102059.
28. Cham, T. H., Cheah, J. H., Cheng, B. L., & Lim, X. J. (2022). I Am too old for this! Barriers contributing to the non-adoption of mobile payment. International Journal of Bank Marketing, 40(5),1017-1050.https://doi.org/10.1108/IJBM-06- 2021-0283.
29. Hong, A., Nam, C., & Kim, S. (2020). What will be the possible barriers to consumers' adoption of smart home services?. Telecommunications Policy, 44(2), 101867.https://doi.org/10.1016/j.telpol.2019.101867.
30. Indrawati, H. (2020). Barriers to technological innovations of SMEs: how to solve them?. International Journal of Innovation Science, 12(5), 545-564.https://doi.org/10.1108/IJIS-04-2020-0049.
31. Trevisan, A. H., Lobo, A., Guzzo, D., de Vasconcelos Gomes, L. A., & Mascarenhas, J. (2023). Barriers to employing digital technologies for a circular economy: A multi-level perspective. Journal of Environmental Management, 332, 117437.https://doi.org/10.1016/j.jenvman.2023.117437.
32. Zhang, Q., Khan, S., Khan, S. U., Khan, I. U., & Mehmood, S. (2024). Tourist motivations to adopt sustainable smart hospitality: an innovation resistance theory perspective. Sustainability, 16(13), 5598.https://doi.org/10.3390/su16135598.
33. Choi, D., Chung, C. Y., Seyha, T., & Young, J. (2020). Factors affecting organizations' resistance to the adoption of blockchain technology in supply networks. Sustainability, 12(21), 8882.https://doi.org/10.3390/su12218882.
34. Chen, P. T., Lin, C. L., & Wu, W. N. (2020). Big data management in healthcare: Adoption challenges and implications. International Journal of Information Management, 53, 102078.https://doi.org/10.1016/j.ijinfomgt.2020.102078.
35. Kumari, P., Shankar, A., Behl, A., Pereira, V., Yahiaoui, D., Laker, B., & Arya, V. (2024). Investigating the barriers towards adoption and implementation of open innovation in healthcare. Technological Forecasting and Social Change, 200, 123100.https://doi.org/10.1016/j.techfore.2023.123100.
36. Nie, Q., Ma, L., & Li, Z. (2025). Why are people reluctant to use metaverse products? Investigating barriers based on innovation resistance theory. Online Information Review.https://doi.org/10.1108/OIR-10-2023-0557.
37. Tsai, T. H., Lin, W. Y., Chang, Y. S., Chang, P. C., & Lee, M. Y. (2020). Technology anxiety and resistance to change behavioral study of a wearable cardiac warming system using an extended TAM for older adults. PloS one, 15(1), e0227270.https://doi.org/10.1371/journal.pone.0227270.Al-Adwan, A. S. (2024). The meta-commerce paradox: exploring consumer non-adoption intentions. Online Information Review, 48(6), 1270-1289. https://doi.org/10.1108/OIR-01-2024-0017
38. Wang, R. H., Barbieri, J. S., Nguyen, H. P., Stavert, R., Forman, H. P., Bolognia, J. L., & Kovarik, C. L. (2020). Clinical effectiveness and cost-effectiveness of teledermatology: Where are we now, and what are the barriers to adoption?. Journal of the American Academy of Dermatology, 83(1), 299-307. https://doi.org /10.1016/j.jaad.2020.01.065.
39. Al-Adwan, A. S. (2024). The meta-commerce paradox: exploring consumer non-adoption intentions. Online Information Review, 48(6), 1270-1289. https://doi.org/10.1108/OIR-01-2024-0017.
40. Mani, Z., & Chouk, I. (2018). Consumer resistance to innovation in services: challenges and barriers in the internet of things era. Journal of Product Innovation Management, 35(5), 780-807.https://doi.org/10.1111/jpim.12463.
41. Kim, M., & Kim, J. (2020). The influence of authenticity of online reviews on trust formation among travelers. Journal of Travel Research, 59(5), 763-776.https://doi.org/10.1177/0047287519868307.

42. Wang, L., Yeung, J. H. Y., & Zhang, M. (2011). The impact of trust and contract on innovation performance: The moderating role of environmental uncertainty. International journal of production Economics, 134(1), 114-122.https://doi.org/10.1016/j.ijpe.2011.06.006.
43. Taddeo, M. (2009). Defining trust and e-trust: from old theories to new problems. International journal of technology and human interaction (IJTHI), 5(2), 23-35.https://doi.org/ 10.4018/jthi.2009040102.
44. Hamakhan, Y. T. (2020). The effect of individual factors on user behaviour and the moderating role of trust: an empirical investigation of consumers' acceptance of electronic banking in the Kurdistan Region of Iraq. Financial Innovation, 6(1), 43.https://doi.org/10.1186/s40854-020-00206-0.
45. Sancho-Esper, F., Ostrovskaya, L., Rodriguez-Sanchez, C., & Campayo-Sanchez, F. (2023). Virtual reality in retirement communities: Technology acceptance and tourist destination recommendation. Journal of Vacation Marketing, 29(2), 275-290. https://doi.org/10.1177/13567667221080567.
46. Ukaegbu, O. C., & Fan, M. (2025). Examining the influence of personal eHealth literacy on continuance intention towards mobile health applications: A TAM-based approach. Health Policy and Technology, 101024.https: //doi.org/10.1016 /j.hlpt.2025.101024.
47. Shin, D. H. (2009). Towards an understanding of the consumer acceptance of mobile wallet. Computers in human behavior, 25(6), 1343-1354. https: //doi.org /10.1016 /j.chb.2009.06.001.
48. Leong, L. Y., Hew, T. S., Ooi, K. B., & Wei, J. (2020). Predicting mobile wallet resistance: A two-staged structural equation modeling-artificial neural network approach. International Journal of Information Management, 51, 102047.
49. Sajid, M., & Zakkariya, K. A. (2023). Reasons for resistance to e-waste recycling: evidence from an emerging economy. Asia Pacific Journal of Marketing and Logistics, 35(6), 1330-1348.
50. Arfi, W. B., Nasr, I. B., Khvatova, T., & Zaied, Y. B. (2021). Understanding acceptance of eHealthcare by IoT natives and IoT immigrants: An integrated model of UTAUT, perceived risk, and financial cost. Technological Forecasting and Social Change, 163, 120437.
51. Talukder, M. S., Laato, S., Islam, A. N., & Bao, Y. (2021). Continued use intention of wearable health technologies among the elderly: an enablers and inhibitors perspective. Internet Research, 31(5), 1611-1640.
52. Al-Adwan, A. S., Jafar, R. M. S., & Sitar-Tăut, D. A. (2024). Breaking into the black box of consumers' perceptions on metaverse commerce: An integrated model of UTAUT 2 and dual-factor theory. Asia Pacific Management Review, 29(4), 477-498.https://doi.org/10.1016/j.apmrv.2024.09.004.
53. Ram, S. (1987). A model of innovation resistance. Advances in consumer research, 14(1).
54. Mani, Z., & Chouk, I. (2017). Drivers of consumers' resistance to smart products. Journal of Marketing Management, 33(1-2), 76-97. https: //doi.org /10.1080/0267257X.2016.1245212
55. Reid, M., Aleti, T., Figueiredo, B., Sheahan, J., Hjorth, L., Martin, D. M., & Buschgens, M. (2024). Factors influencing seniors' anxiety in using ICT. Social Sciences, 13(9), 496.https://doi.org/10.3390/socsci13090496.
56. Faqih, K. M. (2022). Factors influencing the behavioral intention to adopt a technological innovation from a developing country context: The case of mobile augmented reality games. Technology in Society, 69, 101958.https: //doi.org /10.1016 /j.techsoc.2022.101958.
57. Sinha, N., Dhingra, S., Sehrawat, R., & Jain, V. (2025). Customers' intention to use virtual reality in tourism: a comprehensive analysis of influencing factors. Tourism Review, 80(3), 742-766.https://doi.org/10.1108/TR-07-2023-0488.
58. Alimamy, S., Deans, K., & Gnoth, J. (2017, June). An empirical investigation of augmented reality to reduce customer perceived risk. In Academy of Marketing Science World Marketing Congress (pp. 127-135). Cham: Springer International Publishing.
59. Vishwakarma, P., Mukherjee, S., & Datta, B. (2020). Antecedents of adoption of virtual reality in experiencing destination: A study on the Indian consumers. Tourism Recreation Research, 45(1), 42-56.https://doi.org/10.1080/02508281.2019.1638565.
60. Kleijnen, M., Lee, N., & Wetzels, M. (2009). An exploration of consumer resistance to innovation and its antecedents. Journal of economic psychology, 30(3), 344-357.https://doi.org/10.1016/j.joep.2009.02.004.
61. Rosen, P. A. (2005). The effect of personal innovativeness on technology acceptance and use. Oklahoma State University.
62. Agarwal, R., & Prasad, J. (1998). The antecedents and consequents of user perceptions in information technology adoption. Decision support systems, 22(1), 15-29.https://doi.org/10.1016/S0167-9236(97)00006-7.
63. Vishwakarma, P., & Mukherjee, S. (2019). Forty-three years journey of Tourism Recreation Research: a bibliometric analysis. Tourism recreation research, 44(4), 403-418.https://doi.org/10.1080/02508281.2019.1608066.
64. Maksimovic, J., & Evtimov, J. (2023). Positivism and post-positivism as the basis of quantitative research in pedagogy. Research in Pedagogy, 13(1), 208-218.
65. Cross, N., Naughton, J., & Walker, D. (1981). Design method and scientific method. Design studies, 2(4), 195-201. https: //doi.org /10.1016 /0142-694X (81)90050-8.

66. Primecz, H. (2020). Positivist, constructivist and critical approaches to international human resource management and some future directions. German Journal of Human Resource Management, 34(2), 124-147.https://doi.org/10.1177/2397002220909069.
67. Schutt, R. K. (2019). Quantitative methods. The Wiley Blackwell companion to sociology, 39-56. https://doi.org/10.1002/9781119429333.ch3.
68. Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior research methods, 39(2), 175-191.https://doi.org/10.3758/BF03193146.
69. Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). An introduction to structural equation modeling. In Partial least squares structural equation modeling (PLS-SEM) using R: a workbook (pp. 1-29). Cham: Springer International Publishing.https://doi.org/10.1007/978-3-030-80519-7_1.
70. Mohd Dzin, N. H., & Lay, Y. F. (2021). Validity and reliability of adapted self-efficacy scales in Malaysian context using PLS-SEM approach. Education Sciences, 11(11), 676. https://doi.org/10.3390/educsci11110676.
71. Stratton, S. J. (2023). Population sampling: Probability and non-probability techniques. Prehospital and Disaster Medicine, 38(2), 147-148.https://doi:10.1017/S1049023X23000304.
72. Jeon, S., Lee, S., & Xu, Y. (2024). Investigating tourists' mobile technology resistance behavior: An application of innovation resistance theory. Journal of Quality Assurance in Hospitality & Tourism, 1-22.https://doi.org/10.1080/1528008X.2024.2344634.
73. Sajid, M., & Zakkariya, K. A. (2023). Reasons for resistance to e-waste recycling: evidence from an emerging economy. Asia Pacific Journal of Marketing and Logistics, 35(6), 1330-1348.https://doi.org/10.1108/APJML-02-2022-0130.
74. Cham, T. H., Wei-Han Tan, G., Aw, E. C. X., Ooi, K. B., Jee, T. W., & Pek, C. K. (2024). Virtual reality in tourism: adoption scepticism and resistance. Tourism Review, 79(2), 337-354.https://doi.org/10.1108/TR-10-2022-0479.
75. Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of e-Collaboration (ijec), 11(4), 1-10. https://doi.org/10.4018/ijec.2015100101.
76. Web Power. (2018). Univariate and multivariate skewness and kurtosis calculation. https://webpower.psychstat.org/models/kurtosis/.
77. Batsidis, A., Martin, N., Pardo, L., & Zografos, K. (2013). A necessary power divergence type family tests of multivariate normality. Communications in Statistics-Simulation and Computation, 42(10), 2253-2271.https://doi.org/10.1080/03610918.2012.697238.
78. Stein, C. M., Morris, N. J., Hall, N. B., & Nock, N. L. (2017). Structural equation modeling. In Statistical Human Genetics: Methods and Protocols (pp. 557-580). New York, NY: Springer New York.https://doi.org/10.1007/978-1-4939-7274-6_28.
79. Dijkstra, T. K., & Henseler, J. (2015). Consistent and asymptotically normal PLS estimators for linear structural equations. Computational statistics & data analysis, 81, 10-23.https://doi.org/10.1016/j.csda.2014.07.008.
80. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of marketing research, 18(1), 39-50.https://doi.org/10.1177/002224378101800104.
81. Cohen J (2013) Statistical power analysis for the behavioral sciences, 2nd edn. Routledge, New York.https://doi.org/10.4324/9780203771587.
82. Zhang, Q., Khan, S., Khan, S. U., Mehmood, S., & Khan, I. U. (2024). Unraveling the barriers contributing to the seniors travelers' non-adoption intention of virtual reality. Leisure Sciences, 1-23.https://doi.org/10.1080/01490400.2024. 2373409.