LINKING SMART HOME DESIGN FOR THE ELDERLY WITH TOURISM AND GEOSITE EXPERIENCES: AN INTERCULTURAL COMMUNICATION APPROACH

Sen GAO [1,2] , Julina ISMAIL@KAMAL [1*] , Jinyuan FAN [1,2]

[1] Universiti Sains Malaysia, School of Arts, Penang, Malaysia; gaosen@student.usm.my (S.G.); julina@usm.my (J.I.K.); fanjinyuan@student.usm.my (J.F.)
[2] Chengdu Neusoft University, School of Digital Art and Design, Chengdu, China; (S.G.); (J.F.)

Abstract: This study examines the role of smart home design features in elderly tourism satisfaction and geosite experience in China. The effects of design, readiness, and communication on elderly travel outcomes are integrated by the research to explain the elder's travel behavior using the Technology Acceptance Model and intercultural communication theory. Smart home design is discussed in four major dimensions : safety, accessibility, usability, and supporting technology. The study further suggests the technology acceptance and intercultural communication effectiveness as important mediating mechanisms. Data were gathered from 114 Chinese senior citizens who had experience in both smart home technologies and tourism/geosite activities. A structured questionnaire based on validated previous studies was used both online and in paper form. The data were analysed using SmartPLS 4.0 and PLS-SEM. The measurement model provided satisfactory reliability, convergent validation and discriminant validity for all constructs. The results indicate that smart home designing features majorly increased the satisfaction of elders tourism and on elderly geosite experiences. Technology acceptance mediates the relationships between smart home design and tourism satisfaction and geosite experiences. Intercultural communication effectiveness has also been found to have a significant mediating effect on these relationships by enhancing confidence, understanding and cultural participation. The study extends the literature by establishing the links between smart ageing, tourism and intercultural communication through one interdisciplinary framework. Practically, the findings suggest that the use of age-friendly technologies and culturally responsive communication can help create more safe, inclusive, and rich tourism experiences for China's older population.

Keywords: smart home design, elderly tourism satisfaction, geosite experiences, technology acceptance, intercultural communication effectiveness

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INTRODUCTION

The increasing convergence of ageing well, smart home design, and cultural tourism has emerged as a critical research field in the wake of China's rapidly expanding ageing population and heightened demand for novel solutions to promote active ageing. As the Chinese population ages, the business community and government are committing investments in technologies that enhance the quality of life and social participation among older people (Zhang, 2023), Ramírez-Correa et al., 2023) identified safety systems, accessibility enhancements, usability-focused tools, and assistive technology as significant determinants of independence and ease of use for the elderly. Meanwhile, China's historical cultural heritage and geosites provide ageing-in-place tourism that is not just recreational but also social and culture-rich (Ge & Chen, 2024). Participation in tourism has been seen to be related to improved mental well-being, social integration, and life satisfaction among the older people, driving active and healthy ageing in society (Lu & Zhu, 2024). Incorporating smart home design factors into tourism and geosite visits is a novel way of managing the functional and cultural requirements of the elderly, i.e., through intercultural communication plans to enable participation and incorporation (Dai et al., 2023).

Previous empirical studies have actually proved that technology and accessible design increase the involvement of the elderly in tourist activities and heritage activities. For example, evidence shows that the older population's satisfaction with tourism depends largely on the degree of accessibility and safety provided by their domestic and travel surroundings (Zhao et al., 2023). China experiments have also shown that smart technology increase the activity confidence for transportation and leisure of elderly tourists and their engagement with cultural tourism (Choi et al., 2024). Even geosite tourism research has shown that older travelers not only like destinations' physical accessibility, but also the way of communication and cultural narratives that allow them to interact with heritage (Huynh, 2025). Moreover, technology acceptability research with elderly people indicates that easy-to-use and effective assistive technologies promote positive cultural engagement and travel attitudes (Xu et al., 2023). Individually, these results show a changing knowledge body in the sense of how technology design, well-being in old age, and tourism satisfaction are

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connected, particularly in ageing societies such as China. Despite research developments, not much is known regarding the synergetic impact of smart home planning and intercultural communication to geriatric tourism and geosite experience construction (Gamal et al., 2023). The majority of the research has addressed either the practical requirements of smart home technology or the experience of elderly tourist travelers but seldom their integration (Zhou et al., 2023). As highly as research has been studied for accessibility and usability separately, fewer have touched on how assistive technology, user-centric design, and safety converge to produce facilitators of elderly tourists' engagement in tourist environments (Liu et al., 2023). There has been little focus on procedures by which technology acceptance is a conduit between design attributes and substantial tourism satisfaction (Chakraborty et al., 2023).

This would mean that there is a requirement for an interdisciplinary perspective that will blend gerontology, technology studies, and tourism studies to craft an integrated vision for elderly tourists' participation. Another essential research requirement is the less researched area of intercultural communication effectiveness in older travelers' travel, especially geosite experience in China. While intercultural communication theory has been extended to tourism studies in general, empirical research that focuses particularly on older people is limited (Blyznyuk et al., 2024). Elderly tourists encounter distinct communication challenges like minimal digital literacy or lower language flexibility that can impede their involvement in cosmopolitan tourism environments (Jin, 2023). However, successful intercultural communication is critical for older tourists to decipher cultural stories, interact with heritage, and create sense-making connections when visiting geosites (Trang & Phuong, 2023). Recent studies ignore how intelligent home design elements, through improving familiarity with supportive technologies, indirectly support communication confidence and cultural interaction (Panigrahi & Shrivastava, 2024; Trang & Phuong, 2023; Xian, 2023). This neglect serves to underscore the importance of exploring intercultural communication effectiveness as a mediating construct that connects technological design with Chinese elderly tourism satisfaction and geosite experience in the country's multicultural setting.

The purpose of this research is to investigate how smart home design characteristics are associated with seniors' participation in tourism and geosite activities, with the potential mediating effects of technology acceptance and intercultural communication effectiveness. Precisely, the aims are to: (1) examine the effects of smart home design attributes—safety, accessibility, usability, and supportive technology - on elderly tourism satisfaction and geosite experience; (2) explore the mediating effect of technology acceptance on these relationships; (3) study the mediating effect of intercultural communication effectiveness on these relationships; and (4) suggest a conceptual framework that integrates smart home design, technology acceptance, intercultural communication, and elderly tourism outcomes in the Chinese context.

The contribution value of the study is its multi-disciplinary contribution value to technology, gerontology, and tourism studies in light of China's socio-culture. The research offers a better conceptualization of technology innovation's role in enhancing active ageing and cultural engagement through the merging of smart home design concepts with satisfaction and experience in geosites. In addition, by putting special emphasis on the mediating role of technology acceptance and intercultural communication competence, the current study offers new insights into the psychological and communicative processes through which elderly tourists may be benefits generated by tourism.

LITERATURE REVIEW
Smart Home Design Features and Elderly Tourism Satisfaction
Adhikary et al., 2024 define the characteristics of smart home design as utilizing technology-driven solutions to ensure elderly tourists' safety, accessibility, usability, and supportive living environments. Fall alarm and warning systems facilitate safety, but mobility and open spaces facilitate accessibility (Gozuoglu et al., 2024). Usability emphasizes straightforward controls and accessible systems, while supporting technology has health monitoring and assistance gadgets to enhance autonomy (Dai et al., 2023). Older person tourism satisfaction describes how enjoyable, comfortable, and responsive older individuals perceive their journeys to be (Zhang, 2023). Satisfaction in this aspect is characterized by both the physical presence of services and the subjective psychological security offered by facilitation technology (Zhao et al., 2023).

Empirical research indicates that elderly tourists are more likely to engage in tourist activities if they are facilitated by their home environments and feel comfortable in handling health or mobility limitations when outside the home (Liu et al., 2023; Reisinger et al., 2023; Zhou et al., 2023). Research has found that technologically enabled environments enhance the overall enjoyment and happiness of older people in travel and tourism contexts mainly by alleviating safety and access issues (Wu et al., 2024). By offering a sense of comfort and independence, intelligent home attributes can increase beneficial predispositions toward participating in tourism, ultimately contributing to improved travel experience quality (Wang et al., 2023). Hence, when elderly tourists enjoy greater safety, accessibility, and usability in everyday life, they will also exhibit greater satisfaction with tourism activities, as expected by the hypothesis that smart home design characteristics significantly influence elderly tourism satisfaction.

H1. Smart home design features have a significant impact on elderly tourism satisfaction.

Smart Home Design and Elderly Geosite Experiences
Geosite experiences are visits to cultural, natural, or heritage sites that provide elderly tourists with a chance for recreation, learning, and cultural experience (Ge & Chen, 2024). In elderly people, the nature of such experiences depends not just on the nature of the geosites but also on the extent to which enabling technologies alleviate physical and psychological impediments to engagement (Sukortprommee et al., 2025). Appropriate smart home design elements like supportive monitoring systems, accessible spaces, and intuitive assistive tools can provide an enabler environment that inspires older individuals to venture into geosites with confidence (Aggarwal et al., 2024). Thus, technology goes beyond the personal space of the household to

facilitate active interaction with external cultural and natural surroundings (Ghosh et al., 2023). Technology has been noted in earlier studies to enable mobility, boost confidence, and allow adaptive solutions for elderly tourists' involvement in heritage tourism (Li et al., 2023). When elderly tourists are safe and confident through the supportive aspects of their surroundings, they are more likely to undertake geosite visits, hence enriching their experiential experience and cultural attachment (Gökçe et al., 2024). Additionally, empirical studies suggest that inclusive design and technology application are the determinants of the depth of experiential fulfillment at heritage and geosite sites (Raj et al., 2024). Hence, smart home design features not just affect overall tourism satisfaction but also directly benefit elderly geosite experiences by facilitating participation, eliminating barriers, and promoting meaningful engagement with cultural and natural heritage.

H2. Smart home design features have a significant impact on elderly geosite experiences.

Technology Acceptance as Mediator

Technology acceptance is defined as a measure of individuals' predisposition to purchase and use technology on the basis of perceived usefulness, ease of use, and trust in the system (Li et al., 2023). Among older people, acceptability is often determined by intuitive design, ease of use, and the degree to which technology makes up for functional deficits (Xu et al., 2023). Simple-to-use smart home design functionality can be a major driver of elderly tourists' confidence and motivation to use technology, resulting in more satisfaction with travel experiences (Ramírez-Correa et al., 2023). Elderly tourists' satisfaction with tourism is not only an effect of the comfort and security of traveling, but also of the degree to which assistive technology facilitates becoming a part of daily life and allowing independence (Omar et al., 2023). Empirical studies reveal that technology acceptance is at the core of closing the gap between innovative design elements and satisfaction. Studies reveal higher satisfaction and happiness among elderly tourists when they accept and are accustomed to assistive technologies in tourist and recreation settings (Sukortprommee et al., 2025; Xia & Qiu, 2025; Xu et al., 2023). For instance, health monitoring or reassurance of safety technologies increase tourists' willingness to travel and thus increase tourism satisfaction (Kan et al., 2023). If not accepted, even the most advanced smart home capabilities may not be beneficial (Wu et al., 2024). Therefore, it can be inferred that technology acceptance is the mediator between smart home design features and elderly tourism satisfaction as the channel through which supportive design contributes to satisfactory travel experiences.

H3: Technology acceptance mediates the relationship between smart home design features and elderly tourism satisfaction

Later age-site experiences not only involve physical interaction with natural and cultural heritage, but also cognitive and emotional enrichment through participation (Gamal et al., 2023). Elderly tourists' wanting to be part of such activities is also associated with their embracing facilitative technology that alleviate hurdles and instill confidence (Aggarwal et al., 2024). Smart home design features such as security systems, usability improvement, and technology-enabling help make digital equipment familiarity and comfort possible, which adds to the probability of technology adoption in more integrated applications such as historical tourism. Such technologies' adoption allows the elderly to be capable and qualified to engage in geosite tourism, thereby increasing accessibility and cultural affiliation (Zhou et al., 2023). Research explains how acceptability makes a significant contribution to the definition of smart design features in terms of how much experiential experience in tourism and cultural heritage is shaped by such features (Adhikary et al., 2024; Dai et al., 2023; Liu et al., 2023; Zhou et al., 2023). If home technology is found to be convenient and advantageous by the elderly, then they will most likely embrace similar or wider technologies for use in geosite settings, e.g., electronic guides, monitoring surveillance, or translation software (Jeon et al., 2023). This is not only efficient at engaging the elderly but also enhances the experiential aspect by enabling the elderly to experience heritage and nature at a more experiential level (Cao et al., 2025). Hence, technology acceptance can be defined as a mediating variable describing the manner smart home design features are integrated into enjoyable and satisfactory geosite experiences for the elderly.

H4: Technology acceptance mediates the relationship between smart home design features to elderly geosite experiences.

Intercultural Communication Effectiveness as a Mediator

Effectiveness of intercultural communication is the capacity to transmit information, establish understanding, and engage in effective interactions across cultures (Jin, 2023). For older tourists, particularly in intercultural settings, communication clarity, cultural sensitivity, and accommodation largely determine the quality of their tourist experiences (Xian, 2023). Smart home design aspects like usability and supportive technology can indirectly impact tourism satisfaction by creating confidence in communication facilities like translation apps, culturally adaptive interfaces, or available digital platforms (Trang & Phuong, 2023). When elderly tourists feel that technology makes them more competent in communicating effectively while engaging in tourist activities, it builds their confidence and ensures increased levels of satisfaction (Zuparova, 2025).

Previous empirical research has revealed that effective intercultural communication strengthens the quality of tourist experiences through decreased cultural barriers, increased trust, and increased comfort in unknown contexts (Blyznyuk et al., 2024; Lee et al., 2023; Panigrahi & Shrivastava, 2024). For older travelers, communication tends to be associated with sensations of security, belongingness, and participation, all of which are important for tourism satisfaction (Trang & Phuong, 2023). Intelligent design characteristics, by endowing older people with accessible and adaptive technologies, enhance the potential for successful intercultural communication on the road (Jin, 2023). Thus, the effectiveness of intercultural communication serves as a mediator to translate the potential of smart home technologies into tangible improvements in the satisfaction of older people's tourism by closing cultural gaps and promoting the overall inclusivity of tourism experiences.

H5: Intercultural communication effectiveness mediates the relationship between smart home design features and elderly tourism satisfaction

Geosite experiences not only need physical access to heritage and natural places but also effective communication for connecting with the cultural stories and meanings in these places. Effectiveness in intercultural communication ensures the ability of older people to understand, engage, and relate to geosite contexts beyond cultural differences (Robina-Ramírez et al., 2023). Design elements of smart homes, through socialization of older people with enabling and accessible technologies, instill confidence in embracing digital technology like multilingual tours, translation technology, and virtual narrative applications, which elevate geosite experiences (Ge & Chen, 2024). By this avenue, intelligent homes indirectly enhance the richness and depth of geosite interaction by making it possible for the elderly to overcome communication barriers (Gamal et al., 2023).Empirical evidence revealed that communication barriers constitute a significant factor in constraining elderly engagement in heritage and cultural tourism, especially where there are multicultural environments (Jeon et al., 2023). Successful intercultural communication enhances inclusivity as well as the sense of cultural appreciation amongst geosite visits (Huynh, 2025). The effectiveness of intercultural communication enhances the experiential quality of geosite engagement by enabling elderly visitors to properly understand cultural stories and discuss them (Cao et al., 2025). Therefore, it would be reasonable that the effectiveness of intercultural communication acts as a moderator of the effect of smart home design feature on elderly geosite experience because it transforms conducive technological milieus into rich cultural milieus that promote participation, understanding, and satisfaction.

H6: Intercultural communication effectiveness mediates the relationship between smart home design features and elderly geosite experiences.

Theoretical Framework Guiding the Study

Theories underpinning this research are mostly grounded in TAM and intercultural communication theory, which, when merged, might offer a firm platform for examining the dynamics of old people's tourism satisfaction, smart home design attributes, older generation geosite experience, and mediating functions of technology acceptance and intercultural communication effectiveness. TAM also revealed that individuals' technology adoption is fueled by perceived utility and perceived ease of use, which have strong associations with older users who utilize smart home design features such as safety features, accessibility features, and assistive technology (Venkatesh et al., 2003). Such design features, if perceived as useful and suitable, boost older individuals' technology adoption that shapes their intention to participate in tourism and cultural activities. Intercultural communication theory, however, is the belief that successful cross-cultural communication leads to greater inclusion, comprehension, and participation in numerous situations (Gudykunst, 2004). For ageing tourists, especially those interested in intercultural tourism and geosite tourism, communication is a powerful tool for transforming smart home-enabling technology into pleasure and deep cultural experience (Ge & Chen, 2024). Synthesizing the mentioned theories, the model proposed here suggests that smart home design attributes directly affect the satisfaction of geosite experience and elderly tourism, and technology acceptance and intercultural communication effectiveness act as mediators explaining underlying processes of said effects. Through the process, the model not only identifies technology's instrumental use in the form of independence and security but also its cultural use towards the promotion of inclusiveness and depth of experience. The dual-theoretical framework thus suggests the interdisciplinary focus of the research by bringing together technology design, gerontology, tourism studies, and communication. Figure 1: conceptual framework provides such relationships by demonstrating the direct and indirect impacts of smart home design attributes on elderly tourism satisfaction and geosite experience, via the mediating role of technology acceptance and intercultural communication effectiveness, and this provides a clear representation of the mechanisms that influence elderly engagement in tourism and cultural heritage experience.
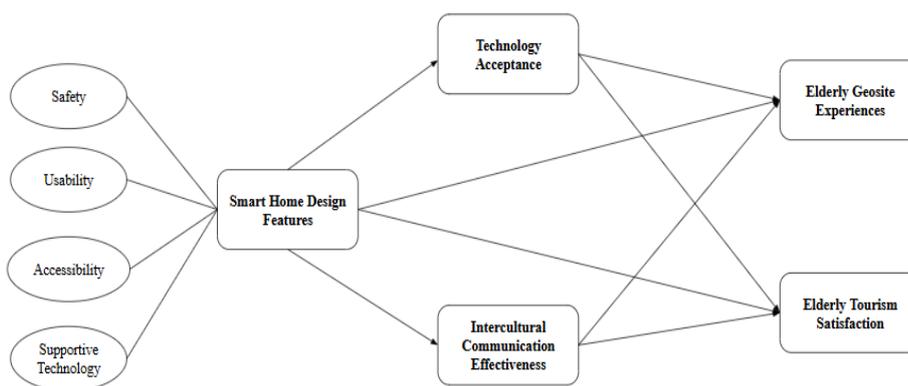
Figure 1. Conceptual Framework

METHODOLOGY
Research Design

This study employed a quantitative research design to establish the impact of Chinese elderly tourism satisfaction and geosite experiences with smart home design attributes, where technology acceptance and effectiveness of intercultural communication acted as intervening factors. A survey method was applied as it is well known to efficiently elicit the views and sentiments of participants regarding the use of technology, tourism satisfaction, and the effectiveness of intercultural communication (Katsamba, 2025; Li et al., 2023). The cross-sectional study design allowed for data collection at one point in time, and it was through such a design that hypothesized associations could be tested via structural equation modeling (SEM).

Population, Sample Size, and Sampling Technique

The population of interest was older inhabitants of Chinese towns and cities who had a prior experience with smart home appliances and were involved in tourism or culture-based activities like visiting geosites. The target population was selected to ensure that the chances were greater for respondents to have sufficient exposure to both tourism activities and smart home features. The sample of 114 participants was suitable for PLS-SEM analysis because it is especially robust for small samples vis-a-vis covariance-based SEM (Hair Jr et al., 2021). The number was also in excess of the "10-times rule" recommendation, which means that the minimum should be ten times the largest number of paths to a construct in the model. A purposive sampling technique was employed in selecting elder participants with the twin qualities of smart home experience and tourism engagement, and their responses made comparable to research objectives.

Data Collection

Data were collected from a standardized questionnaire built based on adapting scales from prior validated research studies. The smart home design theory had items for safety, accessibility, usability, and supportive technology operationally, grounded in research on technology and gerontology (Sukortprommee et al., 2025). Technology acceptance was operationally defined by perceived ease of use and perceived usefulness scores based on the TAM. Earlier tourism satisfaction was measured according to items adapted from tourism and leisure satisfaction studies (Xu et al., 2023), while earlier geosite experiences were measured according to measures of cultural involvement, accessibility, and enrichment (Cao et al., 2025). Intercultural communication effectiveness was measured according to scales taken into account clarity, adaptability, and cultural sensitivity (Gudykunst, 2004). The questionnaire was administered in both web and paper modes to accommodate respondents with varying degrees of digital literacy. Data collection took place over a period of two months to guarantee that the sample was representative of older respondents representing various socio-cultural backgrounds in China.

Data Analysis

Data were analyzed using SmartPLS 4.0 to estimate both the measurement model and structural model. Measurement model was checked for reliability, convergent validity, and discriminant validity against Cronbach's alpha standards, composite reliability, and average variance extracted (AVE) (Hair Jr et al., 2021). Outer loadings of indicators were also checked to confirm construct validity. After the measurement model was established, the structural model was confirmed to verify hypothesized relationships. Path coefficients, R^2 values, and effect sizes (f^2) were estimated to reflect the significance and strength of relationships between constructs. Mediation analyses were run to examine indirect effects of technology acceptance and intercultural communication effectiveness on smart home design features and elderly tourism satisfaction and geosite experiences. Bootstrapping with 5,000 resamples was used to estimate hypothesized paths for significance. This approach gave strong evidence of the predictive power of the model and mediating processes between the targeted relationships.

RESULTS

Table 1 and Figure 2 display reliability and validity testing results for all the study variables. All the indicators had high factor loadings of more than 0.60. The Cronbach's alpha of 0.835, composite reliability of 0.890, and average variance extracted (AVE) of 0.671 testified to internal consistency and convergent validity.

Table 1. Variables reliability and validity

Variables	Indicator	Original Sample	T Values	P Values	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Elderly Geosite Experiences	EGE1	0.850	27.755	0.000	0.835	0.890	0.671
	EGE2	0.886	40.925	0.000			
	EGE3	0.751	12.022	0.000			
	EGE4	0.781	14.623	0.000			
Elderly Tourism Satisfaction	ETS1	0.713	8.824	0.000	0.729	0.848	0.652
	ETS2	0.836	18.998	0.000			
	ETS3	0.865	22.715	0.000			
Intercultural Communication Effectiveness	ICE1	0.641	9.192	0.000	0.716	0.825	0.543
	ICE2	0.785	20.186	0.000			
	ICE3	0.737	10.124	0.000			
	ICE4	0.774	12.038	0.000			
Smart Home Design Features	SHDF1	0.869	26.516	0.000	0.923	0.940	0.723
	SHDF2	0.840	20.258	0.000			
	SHDF3	0.880	36.320	0.000			
	SHDF4	0.798	18.010	0.000			
	SHDF5	0.877	31.588	0.000			
	SHDF6	0.834	18.875	0.000			
Technology Acceptance	TA1	0.808	20.913	0.000	0.883	0.914	0.680
	TA2	0.843	29.663	0.000			
	TA3	0.831	13.743	0.000			
	TA4	0.860	24.452	0.000			
	TA5	0.781	12.342	0.000			

Older tourism satisfaction also demonstrated good reliability, with loadings of 0.713 to 0.865, Cronbach's alpha of 0.729, composite reliability of 0.848, and AVE of 0.652. Intercultural communication effectiveness demonstrated good outcomes, with loadings of 0.641 to 0.785, Cronbach's alpha of 0.716, composite reliability of 0.825, and AVE of 0.543, which surpasses the minimum benchmark. Smart home design constructs exhibited high reliability and validity, ranging from 0.798 to 0.880 on indicator loadings, 0.923 on Cronbach's alpha, 0.940 on composite reliability, and 0.723 on AVE. Technology acceptance, lastly, was highly reliable, with indicator loadings from 0.781 to 0.860, Cronbach's alpha of 0.883, composite reliability of 0.914, and AVE of 0.680. In all, the findings show that all constructs attained high measurement validity and reliability, validating them for structural model testing.
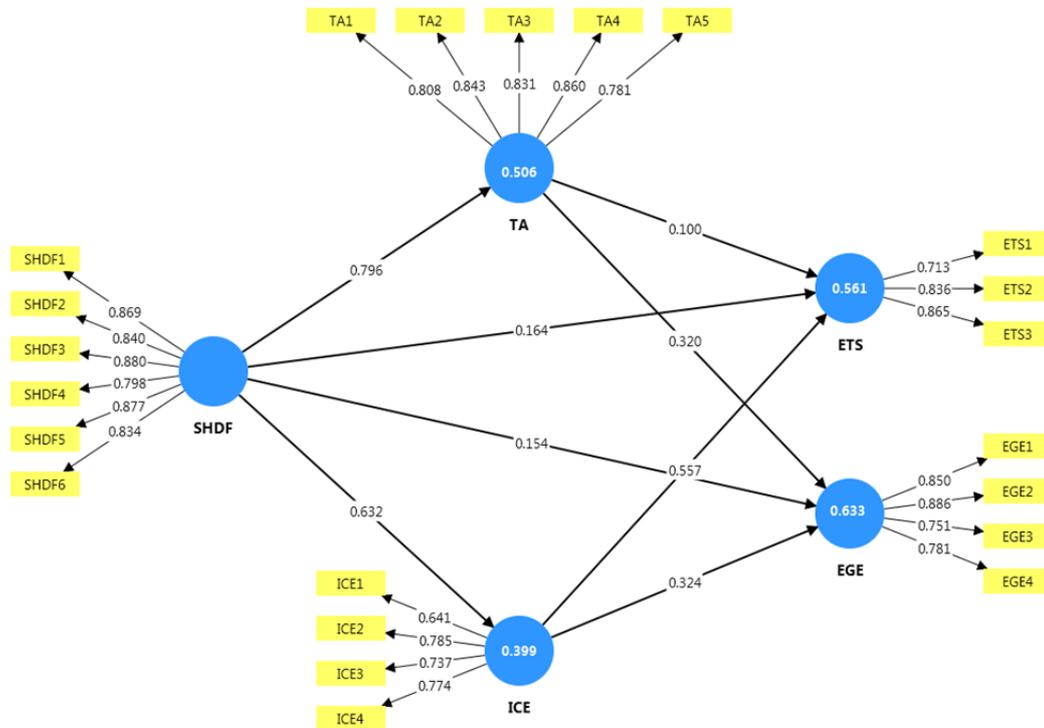

Figure 2. Estimated Model

Table 2 displays the discriminant validity of the constructs based on the HTMT criterion. The values varied between 0.602 and 0.834, all less than the widely used cutoff of 0.85, which shows that the constructs are conceptually different. Elderly tourism satisfaction and elderly geosite experiences recorded the highest HTMT value of 0.834, indicating a strong but viable relationship. Intercultural communication effectiveness also indicated significant correlations with elderly geosite experiences (0.802) and smart home design features (0.767), indicating significant but discriminant associations. Technology acceptance indicated moderate to strong associations with the rest of the constructs, especially with intercultural communication effectiveness (0.798). These results establish discriminant validity and indicate that the constructs while related are capturing something distinct about the research model.

Table 2. Heterotrait-Monotrait Ratio (HTMT)

	EGE	ETS	ICE	SHDF	TA
Elderly Geosite Experiences					
Elderly Tourism Satisfaction	0.834				
Intercultural Communication Effectiveness	0.802	0.602			
Smart Home Design Features	0.695	0.722	0.767		
Technology Acceptance	0.757	0.728	0.798	0.768	

Table 3. R-square, F-Square, and Model Fit Statistics

	F Square				R Square	
	EGE	ETS	ICE	TA	R Square	R Square Adjusted
Elderly Geosite Experiences					0.633	0.630
Elderly Tourism Satisfaction					0.561	0.549
Intercultural Communication Effectiveness	0.116	0.388			0.399	0.394
Smart Home Design Features	0.016	0.021	0.665	1.725		
Technology Acceptance	0.069	0.008			0.506	0.492
Model Fit						
	Saturated Model			Estimated Model		
SRMR	0.062			0.068		
d_ULS	19.375			20.649		

Table 3 presents the explanatory power and effect sizes of the structural model. The R-square values confirm high explained variance in endogenous variables, including elderly geosite experiences at 0.633, elderly tourism satisfaction at 0.561, effectiveness of intercultural communication at 0.399, and technology acceptance at 0.506.

These indicate that the model is explaining a significant percentage of variance for the outcomes of interest. The F-square values indicate that intelligent home design attributes exerted a major impact on intercultural communication effectiveness (0.665) and technology acceptance (1.725), but comparatively minor impacts on elderly geosite experiences (0.016) and elderly tourism satisfaction (0.021). Intercultural communication effectiveness indicated a moderate impact on elderly tourism satisfaction (0.116). The indices of model fit also buttress the goodness of the model, with the standardized root mean square residual (SRMR) values for both the saturated (0.062) and estimated (0.068) models within acceptable ranges. The d_ULS values were also near proximity, testifying to the fact that the structural model is a good fit with data. Technology acceptance and intercultural communication effectiveness significantly mediated the relationships between smart home design features and both elderly tourism satisfaction and geosite experiences.
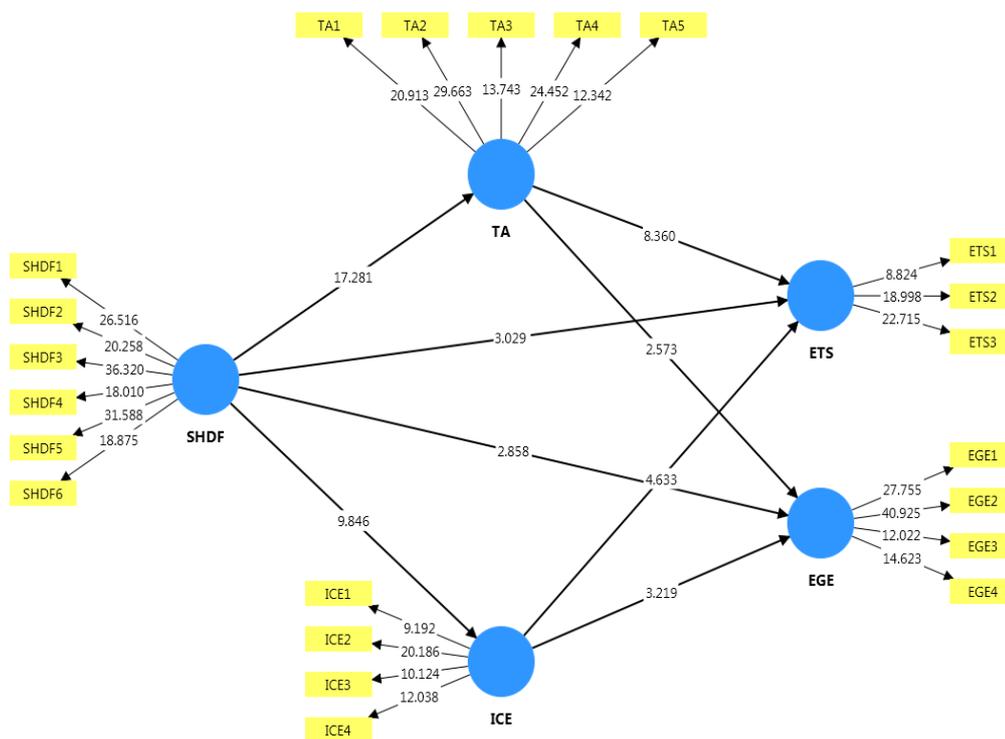

Figure 3. Structural Model for Path Analysis

Table 4 and Figure 3 show the results of the structural path analysis, all of which were significant, thus demonstrating the proposed relationships. For H1, smart home design features had a significant effect on elderly tourism satisfaction (β = 0.164, t = 3.092, p = 0.008). For H2, smart home design features had positive effects on elderly geosite experiences (β = 0.154, t = 2.858, p = 0.006). Mediation effects were also supported, with technology acceptance mediating between smart home design features and elderly tourism satisfaction (H3, β = 0.180, t = 1.982, p = 0.040) and elderly geosite experiences (H4, β = 0.255, t = 2.527, p = 0.006). Intercultural communication effectiveness also proved to be a good mediator, with strong mediation among smart home design elements and satisfaction of elderly tourists (H5, β = 0.352, t = 3.870, p = 0.000) and among smart home design elements and elderly geosite experiences (H6, β = 0.205, t = 2.910, p = 0.002).

Table 4. Path Analysis

Hypotheses	Original Sample	Standard Deviation	T Statistics	P Values
H1. Smart home design features has a significant impact on elderly tourism satisfaction	0.164	0.117	3.092	0.008
H2. Smart home design features has a significant impact on elderly geosite experiences	0.154	0.103	2.858	0.006
H3. Technology acceptance mediates the relationship between smart home design features and elderly tourism satisfaction	0.180	0.127	1.982	0.040
H4. Technology acceptance mediates the relationship between smart home design features and elderly geosite experiences	0.255	0.101	2.527	0.006
H5. Intercultural communication effectiveness mediates the relationship between smart home design features and elderly tourism satisfaction	0.352	0.091	3.870	0.000
H6: Intercultural communication effectiveness mediates the relationship between smart home design features and elderly geosite experiences	0.205	0.070	2.910	0.002

DISCUSSION

The results of the study identify the roles of technology, communication, and tourism in enhancing the well-being of China's older people. The research illuminates further on how older individuals may be engaged in geosite and tourism activities by investigating the roles of smart home design characteristics, technological acceptability, and efficient intercultural communication. All the suggestions being supported here are tending toward an interactive process whose foundation lies in design quality but the level of psychological preparedness and communicative skills dictates the level to which such an aspect yields positive returns.

The first hypothesis was strongly supported by the findings of the research, indicating that the design features of smart homes most influenced older people's enjoyment of traveling. It therefore follows that usability, accessibility, safety, and assistive technology are significant factors to consider in the promotion of travel satisfaction among Chinese senior citizens. This is attributed by TAM, which asserts that technology perceived as positive and easy to use will be used by more individuals (Venkatesh et al., 2003). In this case, elderly individuals who utilize smart home capabilities in their daily lives possess positive attitudes towards technology, which translates to them feeling more confident and content while engaging in tourist activities. These findings align with previous research in which elderly tourists' satisfaction was found to be highly related to settings that minimize physical barriers and maximize safety (Sari et al., 2024). In validating this correlation in China, the study highlights how the technologies of smart homes not only enhance living conditions at home but also enable more enriched experience in tourism through the promotion of autonomy and reduction of concern about mobility and safety.

The outcomes of the second test of the hypothesis also indicated that smart home design components significantly affected elderly tourists' geosite experiences. This is more than the integration of technology into interior design and a show of awareness in the use of cultural and natural heritage. Results display the TAM spirit in the sense that only older individuals who hold a belief that smart technology is helpful and within reach in everyday life have the nerve to go to geosites, when other usability concerns regarding security and navigation would otherwise discourage participation (Ge & Chen, 2024). In addition, since effective communication should appeal to the narratives, cultural symbols, and sense of place at geosites, intercultural communication theory also accounts for the outcome (Gudykunst, 2004). Elderly individuals with experience and proficiency in using assistive technology such as translation programs or accessibility tools are anticipated to facilitate cultural understanding and extend geosite experiences (Cao et al., 2025). In China, since geosites share intercultural significance and cultural heritage, the impact of smart home design features strengthens access along with cross-cultural interaction enrichment, reflective of experience richness in old people's ageing engagement with heritage travel.

The results confirmed the third hypothesis, which searched for a mediator between the enjoyment of elder tourists and technology adoption via design elements of smart home. As perceived ease of use and perceived utility are mediators for the extent to which technological innovation results in behavior change, their application is critical to TAM (Venkatesh et al., 2003). Relative to tourists, older Chinese who find smart home technology convenient to use are more likely to integrate it into their lives. This mediating role places the psychological channel in a prominent position where elements of design enhance satisfaction, demonstrating that value in smart home technologies is not inherent but instead dependent upon acceptance. On another level, intercultural communication theory also comes into play, since tourism satisfaction for older people frequently entails overcoming communicative and cultural differences in novel environments (Kan et al., 2023). Through facilitating acceptance of supportive technologies, elderly people are willing to use facilities that assist communication and cultural interaction while traveling, thus enhancing satisfaction.

In the Chinese case, where accelerated digitalization and ageing policies are prompting elderly groups to embrace smart technologies, these results illustrate how acceptance facilitates the relationship between design and satisfaction, bridging technological environments with cultural participation.

The findings strongly supported the fourth hypothesis suggesting intercultural communication mediates the relationship between the design features of smart homes and the experiences of the elderly geosites. The result shows that even though design aspects like accessibility and technological assistance lay the groundwork for enhanced experiences, it is the communicative aspect that allows elderly people to immerse themselves in the cultural value of geosites (Huynh, 2025). Theory in intercultural communication illuminates this process through an emphasis on how smooth communication leads to the reduction of uncertainty, increased understanding, and genuine interaction between cultures (Gudykunst, 2004). Older visitors in China, who can be challenged by issues involving language differences, cultural variations, or interpretation of heritage stories, are helped greatly when supportive smart technologies enable smoother communication. The elderly are able to engage in geosite environments at a greater level due to bridges such as translation facilities, accessibility aids, or culturally appropriate technology. Through the construction of intercultural communication as a mediating variable in the relationship between technology and tourism, our results further enhance the pool of research that suggests communication capability enhances visitor experience (Cao et al., 2025).

The technological adoption as an intermediary of smart home design variables and previous geosite experiences was also reinforced by the fifth verification of hypotheses. This illustrates the general principles of TAM, which assert that individuals' willingness to use and adopt technologies is motivated by their perceived usefulness and ease of use (Venkatesh et al., 2003). User-friendly design elements enhance favorable attitudes and enhance use intentions to employ such technologies at geosite destinations for older Chinese tourists who otherwise would perceive that technology settings are sophisticated. By embracing and incorporating such aid tools, older persons can navigate geosites more easily, handle safety issues, and interact with cultural heritage. The mediating influence establishes the value of psychological preparedness and faith in technology, demonstrating that the value of smart home functionalities bridges into tourism only where acceptance exists. Earlier research has also shown that technology adoption functions as a mediator between design

quality and user experiences (Li et al., 2023), and the present findings extend this by showing it holds for older geosite experiences in China, where policy and initiatives towards smart ageing are increasing.

The sixth hypothesis, which tested the dual mediating influence of intercultural communication and technology acceptance on the impact of smart home design features to the geosite experiences of the elderly, was also supported. This dual mediation suggests that design features by themselves do not provide a direct conversion of tourism experiences but operate through both communicative and psychological channels (Xu et al., 2023). Intercultural communication theory aims at reducing cultural uncertainty and promoting efficient interaction, whereas TAM is concerned with perceived ease of use and usefulness in acceptance formation (Xia & Qiu, 2025). The combined influence of communication and acceptance is illustrated by the fact that both methods of communication and acceptance facilitate access and the cultural richness of experience. These results have immediate applicability to China's tourism and smart city objectives because they provide concepts on how age-friendly design of technology can facilitate access to the country's overall objective of inclusive digitalization and cultural participation.

In conclusion, the results cumulatively show that elderly tourism satisfaction and geosite experiences are influenced by factors more than the availability of smart design elements; rather, they rely on how these elements are received and mediated through intercultural communication processes. The TAM accounts for the mechanisms by which elderly tourists build confidence in and embrace supportive technologies, whereas intercultural communication theory illuminates the way in which communication competence converts these technologies into instruments of cultural interaction. By verifying all six hypotheses, this research adds both theoretical innovation and applied value, demonstrating that the integration of design, acceptance, and communication can develop more inclusive and satisfactory tourism experiences among China's ageing community. Finally, the findings emphasize the need to develop environments that not only facilitate physical and technological requirements but also foster psychological preparedness and cultural affiliation so that older persons continue to be active stakeholders in tourism and heritage appreciation.

CONCLUSION

This research examined the relationship between smart home design features, technology acceptability, intercultural communication effectiveness, and tourism and geosite experience of ageing individuals in China, and the results contribute meaningfully to both theory and practice. The results, which confirm that smart home design features exert a positive influence on older tourist satisfaction and geosite experience, highlight the significance of clear, accessible, and assisting technology in enhancing the quality of life and travel engagement of elderly tourists. The mediating functions of technology acceptance and intercultural communication validate that design features are insufficient unless well accepted by users and supported by good communication and culture practices. This validates the importance of the Technology Acceptance Model and intercultural communication theory in all this. Collectively, these findings contribute to the literature by situating geriatric tourism in the larger frame of digital change and cultural participation. Additionally, it provides a pragmatic guide for policymakers, designers, and tourist managers who are grappling with creating inclusive, age-friendly destinations.

Finally, the study highlights the significance of integrating technology, communication, and cultural adjustment to facilitate older persons not only to be assisted in their daily living but also empowered to be involved dynamically in tourism and cultural experience, thereby facilitating social inclusion and cultural enrichment in China's rapidly ageing population.

Practical Implications

The implications of the research are important for Chinese legislators, urban planners, and tourism experts who have to address the prospect and challenge of ageing. Being aware that smart home design features play an important part in older tourists' satisfaction with geosite tour activities is like knowing that incorporating assistive technology in homes and tourist attractions can improve the well-being of elderly citizens. For tourists, it means that tourist destinations and historical sites are designed with accessible amenities, user-friendly technology, and appropriate communication devices to cater to the special needs of senior citizens. Technology businesses and travel agencies can collaborate to develop holistic systems utilizing smart tools to provide safety monitoring, navigation, and interpretation for senior travelers to feel comfortable and safe while moving around. Furthermore, technology uptake and intercultural communication go-between roles underscore the importance of creating training programs enhancing senior citizens' acquaintance with electronic devices as well as their ability to communicate across cultural divides as guides and staff. Integrating such programs into tourist management can facilitate stakeholders promoting inclusivity, expanding the senior travel market, and advancing China's overall agenda on smart ageing and digitization.

Theoretical Implications

The research extends the usage of the TAM and intercultural communication theory to a new interdisciplinary domain encompassing smart home design, aged care, and tourism studies. TAM has historically been used to predict technology adoption in organizational or consumer behavior settings, whereas TAM validation within elderly tourist settings represents the prowess of TAM to forecast psychological acceptance processes in non-traditional settings.

Similarly, the incorporation of intercultural communication theory is more nuanced in understanding how communicative competence acts as a go-between between technological design and cultural experience, noting the fact that effective communication and cultural adjustment are an integral part of technology-mediated tourism experience. Synthesizing these two theories, the study develops an inclusive model that illustrates how elderly tourists transition from passive reception of supportive technology to meaningful interaction with them within cultural and geosite

environments. This theoretical contribution not only enriches technology and tourism literature but also provides the foundation for further studies examining the intersection of ageing, design innovation, and intercultural interaction in international tourist environments.

Limitations and Future Directions

Despite offering valuable findings, this research is not without limitations. First, the sample population of 114 participants in China, while adequate for analysis in SmartPLS, may not be representative of the breadth of experience within the elderly population across regions, income groups, and cultures. Second, self-reporting is biased because participants exaggerate or underestimate how much technology they have adopted or enjoyed. Third, the research only looked at smart home design attributes and their connection to tourist and geosite experiences and omitted other intervening variables that are applicable like social support, health condition, and familiarity with culture.

These constraints mean that instead of being absolute facts, the findings must be interpreted warily and as a point of departure for further research. Further research can enhance this study by widening the sample, polling older Chinese citizens across the country, and conducting cross-national studies to examine cultural differences in technology use and tourism consumption. Researchers should also opt to use mixed approaches, which integrate quantitative and qualitative measures. In order to have an even better idea of how older tourists think about and make use of smart technology within the natural environment, researchers can also use a mixture of quantitative questionnaires and qualitative interviews. A better representation of the dynamics involved in terms of happiness with respect to senior tourism and geosite visiting might be achieved by conducting research on other mediators or moderators, including computer literacy, health, or social interaction. Furthermore, longitudinal studies would be more appropriate to track trends in technology utilization and intercultural communication effectiveness over time and produce more robust cause-and-effect evidence.

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