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Exploring success factors in cultural landscape conservation: Quantitative insights from the ancient city of Lijiang, China

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ABSTRACT

This study explored the factors affecting the success of preserving the heritage landscape in Shuhe Ancient Town, Lijiang. Using structural equation modeling (SEM), the research examined the influence of policies and regulations (PR), community involvement (CE), economic strategies (ES), and traditional knowledge (TK) on the success of historic landscape conservation (HLCS). The findings show that PR has a small but positive effect on HLCS. CE and TK were identified as key contributors, both strongly linked to better conservation outcomes. However, ES was negatively associated with HLCS, suggesting that better strategies are needed to balance heritage preservation with environmental sustainability. Unlike previous studies, this research highlights the negative impact of economic strategies on conservation, a factor often overlooked. The study's strength lies in its comprehensive approach, combining various influencing factors with SEM to offer a detailed understanding of their interaction. These findings provide useful insights for both policymakers and practitioners, helping to improve decision-making in heritage conservation worldwide. Future studies should expand this research to other heritage sites to generalize the results beyond Shuhe Ancient Town.

1. Introduction

Conservation of heritage landscapes is becoming increasingly important in the field of sustainable development. Preservation procedures safeguard the many cultural, historical, and ecological values that constitute our global heritage. These living archives serve as valuable resources for studying the connexions between humans and nature over different time periods. They provide insights into societal structures and how people manage the environment. One such location is the Shuhe Ancient Town, depicted in Fig. 1, which is located within the Lijiang Ancient City in Yunnan Province, China. This place has been recognized and inscribed on the esteemed UNESCO World Heritage List (Li et al., 2020).

To successfully conserve heritage landscapes, Conservation Planning for the World Heritage Site of Lijiang City is a significant and noteworthy undertaking (Su, 2010). A remarkable long-term strategy was implemented to effectively govern the city and its environs, with the aim of fostering development while minimizing adverse impacts. Its primary objective is to address the problems caused by urbanization, mass tourism, and other forms of pollution that diminish the natural quality and historical importance of the area (Xiao et al., 2022).

This study examines the factors that affect the outcome of cultural landscape conservation on a worldwide scale, providing valuable insights that are especially applicable to the preservation of the historical landscape in Shuhe Ancient Town. This study sought to examine and determine the essential elements required for effective conservation efforts. The purpose of this study is to gather accurate data on the impacts of these influential factors, thus contributing to a study using empirical data. By employing a quantitative method, this research guarantees an organized measurement of the positive effects and their collective influence on the integrity of heritage sites. This allows for evaluating a comprehensive perspective and the generation of analysis data that are well suited for a detailed and nuanced approach to conservation.

This study makes a significant contribution to the discourse on cultural landscape preservation by examining efficient conservation management

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options, particularly the "Shuhe approach." This study explores how these techniques can inform our understanding of the challenges and opportunities in implementing conservation strategies in culturally and ecologically diverse settings. By elucidating the principles and mechanisms that contribute to the success of the Shuhe model, this study establishes a foundation for flexible conservation management strategies that can be adapted to various historic landscapes worldwide.

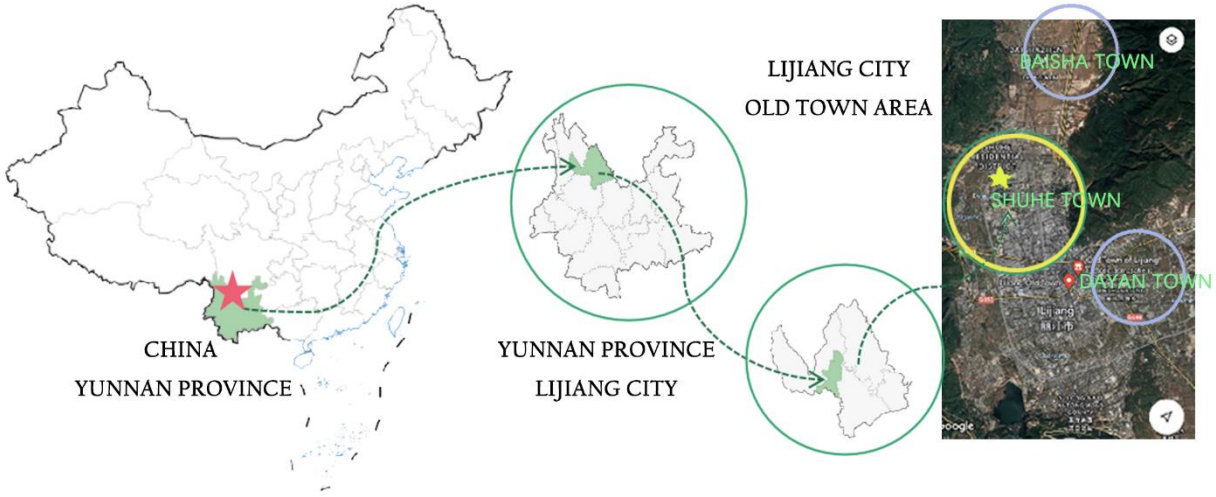

Fig. 1: Location of Shuhe Ancient town and Lijiang Ancient city

2. Literature review

2.1. Overview of factors influencing the conservation of heritage landscapes

An analysis of the literature was conducted to identify and explain the elements that impact the conservation of heritage landscapes. This study aims to establish a basis for developing a conceptual framework that supports the current study.

Based on the findings of Labadi et al. (2021), policies and regulations play a crucial role in determining the activities taken to conserve cultural landscapes. Policies at both the national and municipal levels establish a structure that allows for the implementation of necessary legal conservation actions and administrative efforts (Borrini-Feyerabend and Hill, 2015). The main emphasis is placed on the allocation of financial resources and the actions taken to preserve and sustain the subject in question. Furthermore, other global accords and treaties, such as the UNESCO Convention Concerning the Protection of World Cultural and Natural Heritage, function as guidelines and platforms for international collaboration in preserving heritage sites of exceptional universal significance (Cameron, 2020). The significance of an effective policy is crucial because it establishes the range of actions and the general ability and strategic approach to conservation projects.

Moreover, there is a growing trend in community-based conservation frameworks that highlight the crucial significance of engaging the local community and empowering them to play an active role in preserving landscape heritage (Wells et al., 2019). This topic is of increasing interest among scholars and practitioners. According to Kothari et al. (2013), community-based conservation combines human values and expertise with a scientific understanding of ecosystems. It also ensures a balanced power dynamic between local residents and external conservation experts. Communities deeply connected to their heritage landscapes can provide more fairness, local knowledge, and cultural sensitivity. This, in turn, improves the long-term sustainability of conservation initiatives (Vergunst et al., 2019; Lindström, 2019).

Another important aspect of the discussion on preserving cultural landscapes is the financial sustainability of the process. This is a major problem in contemporary scholarly research, as highlighted by Rossitti et al. (2021). The financial aspects of conservation initiatives encompass various components, with the primary determinant being the availability of sufficient financing from governmental and regulatory entities to sustain the endeavor (Kumar et al., 2024). Funds should be allocated not only to initiate conservation efforts but also to maintain the ongoing process. The financial plan also aims to ensure that investment in the process is essential for economic strategies to serve as the main tool in attracting long-term investment for the preservation of cultural landscapes. Typically, this type of investment requires cooperation among various entities, including government agencies, the private sector, and specialized authorities (Lambooy and Levashova, 2011).

Dans and González (2019) argued that sustainable tourism has considerable economic potential because it involves generating revenue to fund the preservation of two valuable types of resources: nature and culture. Therefore, both individuals face dual obstacles. To appeal to the market, these locations must find a delicate equilibrium between showcasing and preserving these two desirable environments. The definition acknowledges the intricate equilibrium and suggests a refined solution that demonstrates appreciation for

the interplay of economic structures and the safeguarding of the industry's purpose. In other words, if the sector generates profit without the ability to replenish nature and traditions that are beneficial to the market, it might be considered a temporary resolution. This dual method is equally applicable to other culture domains.

Traditional knowledge is recognized as a crucial aspect of achieving effective outcomes in the field of cultural landscape protection (Norberg and Fossum, 2011). Laird (2010) argued that traditional knowledge, which is based on long-standing wisdom and tested practices for environmental stewardship, provides a powerful combination of historical and practical insights that can motivate current conservation efforts and future aspirations. This extensive collection of native knowledge embodies a deep understanding of the interdependent connection between cultural traditions and the environment, providing vital approaches for sustainable administration and preservation. Abas et al. (2022) highlighted the significance of combining traditional wisdom with modern research, promoting its use as a fundamental element in the formulation of national conservation policy. This method guarantees that conservation measures are not only based on strong empirical facts but also align with the cultural and historical background of the specific region. Integrating traditional knowledge into policy frameworks strategically guarantees the persistence and robustness of conservation efforts (Goolmeer et al., 2022), surpassing political shifts and ensuring the preservation of practices based on profound ecological comprehension and cultural importance throughout changes in government.

Based on the pertinent scholarly discussion, the four key aspects that have been previously addressed are policies and regulations, community engagement, economic strategies, and the integration of traditional knowledge. These elements are vital for preserving cultural, historical, and ecological landscapes.

2.2. Policies and regulations and their impact on conservation success

The connections among policies, regulations, and the success of heritage landscape conservation emphasize the need for well-designed rules and regulations to effectively guide the conservation process. The scenario encompasses national policies and associated international agreements, such as the UNESCO World Heritage Convention, which establish a worldwide framework for collaboration in conservation and guidelines for safeguarding and overseeing different heritage assets (Hayajneh and Cesaro, 2022). These policies aid in recognizing predominant patterns, allocating resources, and adopting targeted protection interventions.

From the perspective of Lijiang Ancient City, Song et al. (2020) stated that the conservation of Lijiang heritage landscapes has greatly benefited from the implementation of a comprehensive set of policies. This approach has evolved on the basis of the opportunities and difficulties presented by the expansion of tourism and urbanization. They also found that the implementation of the Lijiang Master Conservation Plan and the establishment of the Heritage Conservation and Management Committee resulted in a systematic approach to protecting the cultural and historical features of the town. These measures have been implemented to ensure the preservation of the old town while facilitating the development of new regions. The Lijiang Heritage Site has gained significant global attention and support because of its inclusion in the UNESCO World Heritage Site Initiative (Yang, 2018). This policy trip was first undertaken solely by the development of Lijiang, but it has since acquired worldwide significance and now requires preservation efforts from both local cultivators and visitors.

2.3. Community engagement's role in heritage landscape conservation

Community engagement is another crucial aspect of conserving cultural landscapes (O'Donnell, 2017), which indicates the deliberate and significant participation of local communities in the conservation process. This active participation not only enhances the docket by incorporating indigenous knowledge and practices but also fosters a sense of ownership of the heritage site within the local community, as they have a deep connection to the region. Community involvement ensures that conservation strategies align with the cultural and socioeconomic aspects of the local population, thus increasing the acceptability and effectiveness of these strategies (Senghor et al., 2023).

Local populations play a role in several ways (Braaksma et al., 2016; Wells et al., 2019), allowing them to have a greater impact on more effective and flexible conservation efforts. This is particularly significant in regions where life and cultural customs are strongly connected to the land being preserved. Engaging local individuals in the conservation process is beneficial for the protection and advancement of heritage sites (Rosilawati et al., 2020). This is because they possess a direct connection and comprehension of the ideals associated with conservation. Engaging the community will also strengthen capacity building and education by empowering local areas to form meaningful collaborations and combine conservation activities.

2.4. Economic strategies as determinants of conservation sustainability

According to Nocca (2017), economic strategies play an important role in ensuring the long-term economic sustainability of historic landscape conservation, and these methods are closely linked to both financial viability and the preservation of cultural and natural aspects.

Sustainable tourism is a strategy that utilizes cultural and natural heritage to promote economic growth while ensuring the long-term viability and sustainability of these heritage assets (Kim et al., 2021). Sustainable tourism is founded on the principle of ensuring the long-term viability of tourism operations to encourage conscientious travel, foster cultural understanding, and preserve local traditions and ecosystems (Eiseman, 2018). It offers the potential to generate income that may be used to support the preservation of heritage, improve infrastructure, and promote economic and social development in local communities. This creates a sustainable cycle of support for the property and its host community. Nevertheless, the achievement of sustainable tourism necessitates meticulous strategizing and administration to mitigate the negative consequences of excessive tourism and the possible commodification of culture for the purpose of attracting tourists, hence reducing tourism to profit-driven enterprises.

Moreover, public-private partnerships serve as an additional economic mechanism for conservation (Marx, 2019). The public sector focuses on knowledge and regulatory functions and can collaborate with the private sector, which has innovative and financial capabilities to make substantial investments in historic conservation. The private sector can enhance the visitor experience by improving infrastructure and providing profitable economic possibilities for local people. However, to prioritize conservation aims, partnerships must be carefully designed, which involves creating thorough agreements that outline the precise roles, duties, and benefits for all stakeholders involved (Brouwer et al., 2019). Economic incentives play a crucial role in motivating and promoting the preservation of cultural assets (Lordkipanidze et al., 2005). These incentives encompass tax exemptions, subsidies, and financial support to encourage property owners and investors to participate in conservation efforts, guaranteeing their economic benefit and long-term viability.

2.5. Influence of traditional knowledge on conservation outcomes

On the basis of Uprety et al.'s (2012) findings, the value of traditional knowledge in achieving conservation outcomes has been a prominent topic of interest in the field of historic landscape conservation. The traditional knowledge of indigenous peoples, which is derived from their extensive experience and commitment to their surroundings, is an invaluable reservoir of information regarding sustainable environmental conservation and safeguarding. This repository of knowledge and practices that have been handed down from one generation to another encompasses practical expertise, cultural rituals, customs, and spiritual encounters, which have played a crucial role in enabling individuals to live in harmony with their surroundings and safeguard cultural landscapes (Getahun, 2016). Therefore, the integration of traditional knowledge into modern conservation approaches enhances the conservation process by incorporating established practices and local solutions while also guaranteeing that these practices are culturally suitable and respectful.

Furthermore, the rights of indigenous and local communities to actively participate in environmental protection are acknowledged and safeguarded, fostering a sense of pride and accountability within these groups. In addition, traditional knowledge offers a comprehensive understanding of conservation, encompassing the preservation of biodiversity, sustainable management of resources, appropriate use of landscapes, and safeguarding of sacred sites (Sinthumule, 2023). Empirical evidence demonstrates that the implementation of traditional knowledge effectively ensures the sustainability and efficiency of conservation activities (Reyes et al., 2020), and the readily available knowledge and skills of individuals from the local community can be more easily applied, combined, and enhanced to enhance the durability of cultural sites. Hence, Indigenous communities are more readily involved in such initiatives, and their expertise and customs are valued and adjusted to meet their specific requirements.

2.6. Research gap

This review identifies a key research gap in studying effective heritage landscape management, focusing on policies, community involvement, economic strategies, and traditional knowledge within Shuhe, Lijiang. The project bridges a digital divide by quantitatively examining how these factors interact to impact preservation efforts, aiming to clarify their mechanisms and effectiveness. Despite recognizing the importance of community participation for adaptable preservation, limited quantitative analysis exists on its specific impacts, as well as on integrating self-supporting methods and traditional knowledge into conservation, despite theoretical interest. Addressing these gaps, the study offers practical recommendations to improve global heritage preservation, fostering more informed, effective, and accessible conservation in similar regions.

2.7. Conceptual framework and research hypotheses

This paper presents a conceptual framework for analyzing the various elements that affect the protection of heritage landscapes on the basis of the comprehensive analysis discussed in the literature review above. The framework depicted in Fig. 2 comprises policies and regulations, community engagement, economic approaches, and traditional knowledge as influencing factors. These elements are combined to understand the collective impact on heritage landscape conservation success. The framework provides a systematic solution for

determining the specific approach to the study technique and analysis. This allows for an investigation of how each aspect contributes significantly to the preservation process of cultural landscapes. On the basis of the conceptual framework that outlines the interaction of important factors that affect the preservation of cultural landscapes, we propose research hypotheses following the goal of developing a strong analytical model for this study, as shown in Fig. 3.

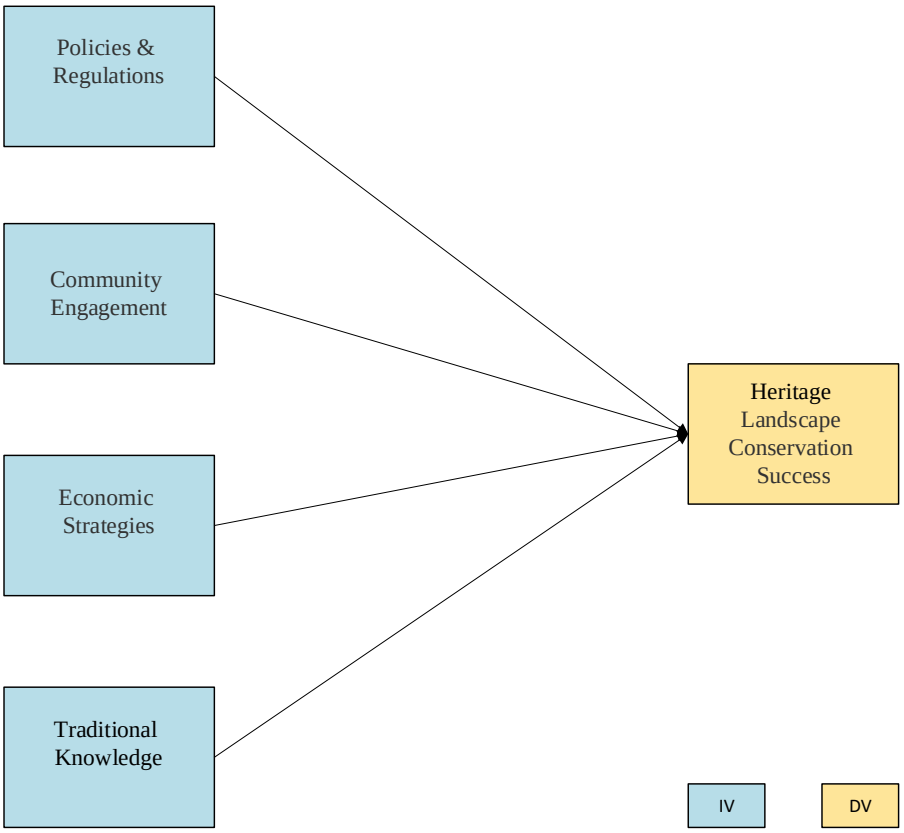

Fig. 2: Conceptual framework

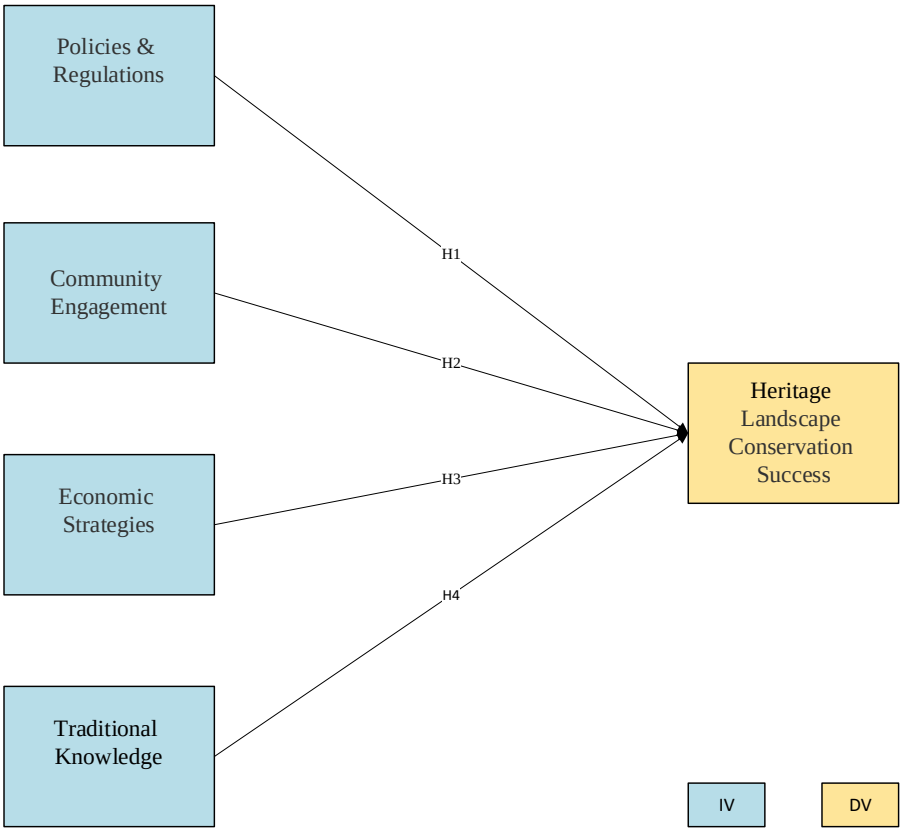

Fig. 3: Hypothesis development

Thus, the following four hypotheses can be used to methodically examine the separate and combined impacts of legislation and regulations, community involvement, economic strategies, and traditional knowledge on the effectiveness of heritage conservation initiatives.

H1: There is a positive relationship between comprehensive policies and regulations and the success of heritage landscape conservation, where well-established governance frameworks are associated with better conservation outcomes.
H2: Community engagement has a positive impact on the success of heritage landscape conservation, suggesting that active participation and inclusion of local knowledge and values enhance the effectiveness of conservation efforts.
H3: Economic strategies that balance sustainable development with conservation priorities positively influence the success of heritage landscape conservation, indicating that financial sustainability is integral to long-term preservation efforts.
H4: Integration of traditional knowledge into conservation practices positively affects the success of heritage landscape conservation, as this knowledge contributes to culturally sensitive and ecologically sound preservation strategies.

3. Methodology

3.1. Research design

This study employs a quantitative research approach, utilizing a structured questionnaire survey to collect numerical data on the conservation achievements of a heritage landscape in Shuhe Ancient Town, Lijiang Ancient City, China. The quantitative method enables objective measurement and statistical analysis of the specified variables that are hypothesized to influence conservation outcomes.

Furthermore, the investigative study employed a cross-sectional survey methodology to gather time-stamped data, aiding in comprehending historical conservation dynamics and evaluating the efficacy of this strategy. Therefore, this approach helps identify the interconnected linkages and directionality, such as the correlation between the degree of community involvement and economic indicators or the impact of policies on raising awareness.

The data collected from the questionnaire survey are analyzed using statistical methods to evaluate and test research ideas. This method aims to establish the correlation and regression impact of the independent variable on the dependent variable, which is conservation success. The main advantage of this method lies in its ability to provide responses that are applicable to various situations and are based on objective criteria. These responses may then be used to provide evidence for propositions and recommendations in the fields of policy and practice.

3.2. Population and sampling

This quantitative study focussed on the conservation of the heritage landscape in Shuhe Ancient Town, Lijiang Ancient City. The specific population includes various stakeholders, such as local government officials, conservancy practitioners, and members of the local community, including residents, business operators, and tourists. Because of the heterogeneous composition of the target population, it is challenging to determine the precise ratios of each category in relation to the overall population. To obtain a reliable sample size, we employed a presumed percentage of 50% for the different subgroups in relation to the entire population. This proportion is considered appropriate for determining an estimated population size that is significantly greater at the 95% confidence level. This ensures that the study has sufficient statistical power to identify any differences or correlations within or outside the population.

Using this estimated proportion, along with a 95% confidence level (Z value of 1.96) and a 5% margin of error (E), the formula (Cochran, 1977) for calculating the sample size is as follows:

$$n = \frac{Z^2 \times p \times (1 - p)}{E^2}$$

Substituting the values into the formula gives us:

$$n = \frac{1.96^2 \times 0.5 \times (1 - 0.5)}{0.05^2} = 384.16$$

Overall, this calculation suggests a minimum sample size of 384 respondents to ensure that the study results are statistically significant and representative of the broader population's views and experiences with heritage conservation in Shuhe Ancient Town, Lijiang Ancient City. This sample size is based on the assumption of a maximum variability scenario (p=50%), which is a common practice in sample size determination to enhance the study's validity and reliability across diverse stakeholder groups.

3.3. Questionnaire design

The questionnaire used in this study was used to assess the conservation of landscape heritage in Shuhe town, Lijiang, through a rigorous and thorough development process to ensure its academic and practical significance. The instrument is divided into two primary sections: Demographic and scale questions.

The purpose of the demographic component is to gather fundamental background information about the participants, including their age, gender, occupation, and specific connection to the heritage property. It is essential to consider this information when analyzing reported replies because it allows for a thorough interpretation that takes into account different perspectives from stakeholders. The

purpose of this section is to uncover and explain patterns or variations in how different demographic groups perceive and approach heritage conservation. This approach enhances the comprehensiveness and extent of the data analyzed in this study.

Following the demographic section, the subsequent questions focus on the primary factors of the study, namely, policies and regulations, community engagement, economic strategies, and traditional knowledge. These items were designed using a 5-point Likert scale to quantitatively quantify the respondents' views of statements that reflect the complexity of the conservation landscape. This scale is highly compatible with the survey architecture because it provides a clear and structured yet adaptable method for assessing stakeholders' opinions and gathering a comprehensive dataset for subsequent statistical analysis.

During the process of creating the questionnaire, the authors of the study analyzed the information gathered from a literature review. As a result, the questions in the questionnaire are based on both academic discussions and the aims of the study. The inclusion of practical and implementation-related concerns in the questionnaire was crucial to the authors, as they aimed to encompass not only the academic components of conserving cultural landscapes but also the real-world considerations identified in the background research.

Expert consultation provided an alternative perspective on the creation of the item. This eased the review process, where a panel of heritage conservation specialists assessed the draft items based on criteria such as clarity, relevance, and comprehensiveness. The experts judged whether the items adequately covered all the necessary aspects. The collaboration with experienced field specialists strengthened the importance of the instrument, ensuring that the items are based on both academic and practical perspectives on Shuhe's conservative efforts. The experts' commentaries facilitated the revision and improvement of item scales by incorporating measures that would enable extensive exploration of the analytical aspects of heritage conservation. This significantly enhanced the ability of the instrument to produce valuable and practical data.

3.4. Data collection instrument and procedure

The primary objective of this study was to collect data to assess the elements that impact the effectiveness of heritage landscape protection in Shuhe Ancient Town, located in Lijiang Ancient City. The data-gathering procedure was organized, and digital methods were prioritized for use as tools for gathering data. The questionnaires were distributed via the Wenjuanxing platform (wjx.cn). It is a widely acknowledged internet-based survey tool that allows respondents to complete and submit questionnaires. Furthermore, the application facilitates a streamlined data analysis procedure, enhancing its efficacy in academic research across many contexts, including Shuhe Town.

To facilitate respondents' access to the questionnaire, we distributed the electronic version by scanning a QR code and utilizing WeChat contacts. This approach ensured a high degree of participant engagement and convenient accessibility. The distribution methods were strategically implemented at the ticket office of Shuhe Town (26.91 N, 100.21 E), attracting a wide range of potential participants. The distribution and collection of these methods occurred at specific times within a set period. These methods target local residents, tourists, business owners, and conservation practitioners who are either visiting or residing in the area.

3.5. Data analysis

The data analysis step was performed in detail using SPSS and structural equation modeling (SEM) to thoroughly examine each element of the data. The reliability and validity of the questionnaire were assessed using SPSS. Cronbach's alpha was used to test internal consistency, and exploratory factor analysis was conducted to validate the construct of the variables, specifically the independent and dependent variables. Once the questionnaire's analytical validity was verified, SEM was employed to examine the connexions between these parameters and their influence on conservation success. By combining SPSS for preliminary analysis and SEM to examine the correlations between the two, a more profound understanding of the conservation process in Shuhe was achieved. The abovementioned methods were performed using SPSSPRO professional online data platform (Version 1.0.11).

4. Results

4.1. Demographics

The study included a sample of 402 questionnaires, of which 214 were completed by males and 188 by females. The respondents were predominantly 18-44 years old, and most of them were tourists. The demographic profile of the respondents in Shuhe Town, Lijiang, as shown in Table 1, revealed a largely young, fairly well-educated population that was balanced and dynamic in terms of gender distribution and provided a substantial number of visitors who participated in the survey.

This distribution suggests that the views on heritage conservation presented in the research should be viewed through the lens of the younger generation, aged 18-44, which might be more open to innovative conservation approaches because they have not been shaped by the legacy approach to the issue. Simultaneously, the respondents' high level of primarily higher education also suggests a high level

of general awareness of conservation issues, which might have shaped responses about the importance and explanations of different approaches. Finally, the visitor focus suggests acknowledging the importance of viewing and assessing the visitor perspective and its impact on conservation, which supplements the insights of local stakeholders who are aware of the dynamics of Shuhe's heritage.

4.2. Reliability and validity

As shown in Table 2, Cronbach's alpha coefficient reported for the questionnaire is 0.951, with a standardized Cronbach's alpha of 0.948 across 15 items in a sample of 402 respondents. These values are exceptionally high, indicating the excellent internal consistency and reliability of the scale used in the study. A Cronbach's alpha above 0.9 suggests that the items within the questionnaire are highly correlated and measure the same underlying concept effectively, which in this context relates to the various facets of heritage landscape conservation.

Table 3 presents the results of the Kaiser–Meyer–Olkin (KMO) test and Bartlett's test of sphericity, which are preliminary indicators used to assess the suitability of the data for factor analysis. The KMO value is a measure of sampling adequacy that indicates the proportion of variance among variables that might be common variance. With a KMO value of 0.912, the sample is considered highly suitable for factor analysis because KMO values above 0.9 are deemed excellent. The test yields a chi-square (approximate chi-square) value of 7139.707 with 105 degrees of freedom and a p-value of 0.000, which is significant at the 1% level (indicated by ***). This significant result rejects the null hypothesis, suggesting that the variables are correlated to a degree suitable for factor analysis.

Table 1: Demographic summary

Category	Options	Gender		Total
		Female	Male	
Age	Under 18	28(57.1%)	21(42.9%)	49
	18-24	30(39.0%)	47(61.0%)	77
	25-34	31(45.6%)	37(54.4%)	68
	35-44	51(58.6%)	36(41.4%)	87
	45-54	26(44.1%)	33(55.9%)	59
	55-64	16(36.4%)	28(63.6%)	44
	65 years or older	6(33.3%)	12(66.7%)	18
Education background	Diploma or less	68(50.0%)	68(50.0%)	136
	Bachelor's degree	89(45.2%)	108(54.8%)	197
	Master's degree or above	31(44.9%)	38(55.1%)	69
Relationship with Shuhe town, Lijiang	Business owners in heritage areas	8(66.7%)	4(33.3%)	12
	Conservation practitioner	7(53.8%)	6(46.2%)	13
	Government official	13(61.9%)	8(38.1%)	21
	Local resident	10(55.6%)	8(44.4%)	18
	Researcher	10(55.6%)	8(44.4%)	18
	Visitor/tourist	140(43.8%)	180(56.3%)	320

Table 2: Reliability

Cronbach's α coefficient	Standardized Cronbach's α coefficient	Items	Samples
0.951	0.948	15	402

Table 3: KMO test and Bartlett's test

KMO value		0.912
Bartlett Sphericity test	Approximate chi-square	7139.707
	df	105
	P	0.000***

***: represents the 1% level of significance

Table 4 provides the mean-variance extracted (AVE) values and composite reliability (CR) values for each of the following factors: Policies and regulations (PR), community engagement (CE), economic strategies (ES), traditional knowledge (TK), and heritage landscape conservation success (HLCS). These metrics are essential for assessing the quality of the measurement model in structural equation modeling.

The AVE value reflects the level of variance explained by the latent variables. AVE values greater than 0.5 indicate that, on average, the construct explains more than half of the variance of its indicators, which is generally considered acceptable (Götz et al., 2009). In this study, all factors met this criterion, with AVE values ranging from 0.581 for PR to 0.879 for ES, indicating a good level of explained variance. The CR values indicate the reliability of the latent construct. A CR above 0.7 is considered acceptable, a CR above 0.8 is considered good, and a CR above 0.9 is considered excellent (Mhunpiew et al., 2021). All factors in this study exhibited CR values well above 0.7, with PR at the lower end remaining strong at 0.794 and ES and TK demonstrating excellent reliability, with values of 0.956 and 0.952, respectively. The HLCS also shows a high level of reliability, with a CR value of 0.931.

4.3. Exploration of factor relationships

Table 5 shows that PR, CE, and TK have positive impacts on HLCS, with PR having a smaller effect (β=0.154, $p<0.01$), CE having a moderate effect (β=0.289, $p<0.001$), and TK having the most

substantial effect (β=0.751, p<0.001). This suggests that while all three contribute positively to conservation success, traditional knowledge exerts the strongest influence among them. Notably, ES appears to have a small but statistically significant negative impact on HLCS (β=-0.138, p<0.05), indicating that the economic strategies, as they are currently implemented, might not align with conservation success. In addition, standard errors and Z values provide insight into the precision and reliability of these estimates, with smaller standard errors and higher Z values indicating more reliable estimates. The significance levels denoted by asterisks highlight the confidence in these results, with triple asterisks (*), indicating a high level of significance at the 1% level, and double asterisks (**) indicating significance at the 5% level.

Table 4: Assessment of construct validity and reliability for conservation factors

Factor	Mean-variance extracted from AVE values	Combined reliability CR value
PR	0.581	0.794
CE	0.752	0.901
ES	0.879	0.956
TK	0.869	0.952
HLCS	0.818	0.931

Table 5: Model regression coefficients

Independent variable	→	Dependent variable	Non-standardized coefficients	Standardized coefficients (β)	Standard errors	Z	P
PR	→	HLCS	0.407	0.154	0.135	3.013	0.003***
CE	→	HLCS	0.411	0.289	0.074	5.542	0.000***
ES	→	HLCS	-0.157	-0.138	0.073	-2.166	0.030**
TK	→	HLCS	0.744	0.751	0.059	12.701	0.000***

*** and **: represent the 1% and 5% level of significance, respectively

As shown in Fig. 4, the measurement model delineates robust factor loadings across all constructs, affirming the potency of each manifest variable in capturing the essence of its corresponding latent construct. PR, with manifest variables PR_1 through PR_3, reveals loadings that assert the construct's foundation in the model. CE follows suit, with CE_1 to CE_3 demonstrating substantial loadings that articulate a strong correlation with conservation success. ES presents a notable exception; despite significant loadings for ES_1 to ES_3, the construct negatively impacts HLCS. TK, through TK_1 to TK_3, stands out with particularly high loadings, underscoring its essential role in shaping successful conservation efforts. The data for HLCS, operationalized through HLCS_1 to HLCS_3, exhibit high loadings and encapsulate the endogenous variable with commendable precision. Collectively, these results reflect an academic interpretation of the SEM path diagram, highlighting the intricate interrelations and affirming the validity of the constructs within the heritage conservation context of Shuhe Town.

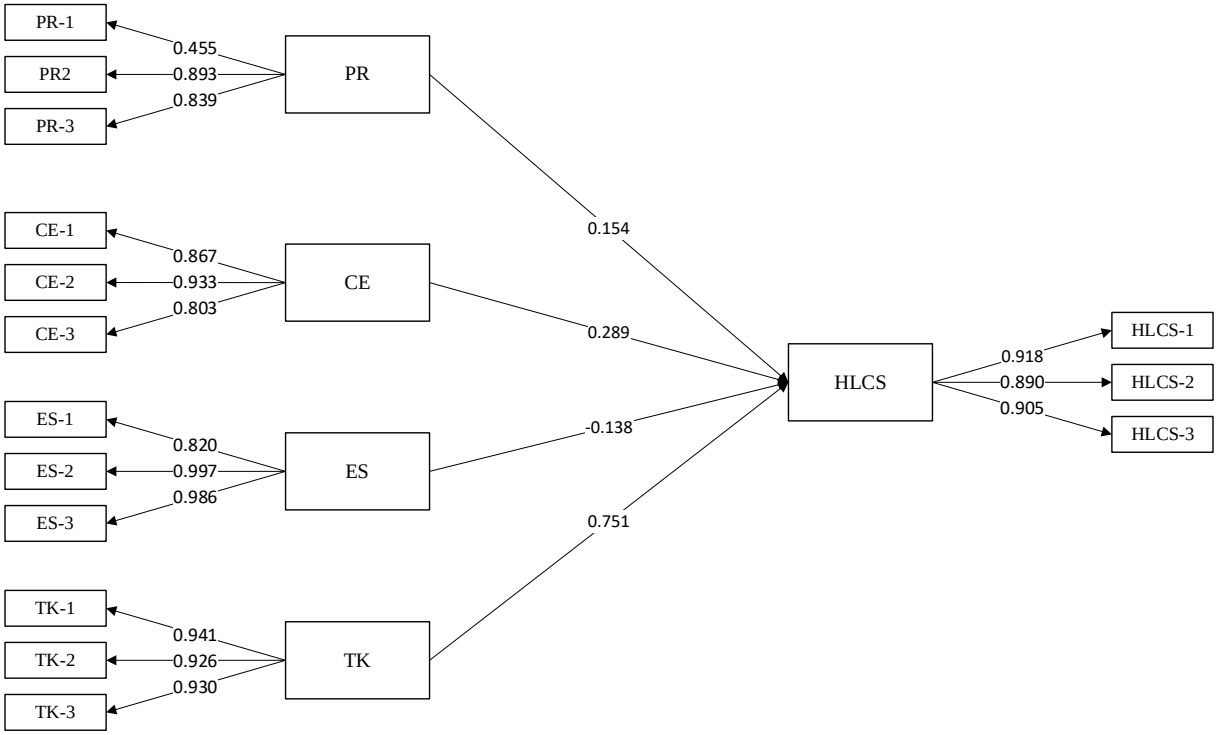

Fig. 4: SEM path diagram

5. Discussion

In the fabric of heritage conservation, PR is presented as the pillar of preservation efforts. According to the findings of the present study, while PR has a positive effect on HLCS, the coefficient, which is relatively low, would allow it to be increased. Hence, policies should be flexible and adaptable for Shuhe Town, which has a unique cultural and natural environment and specific historical conservation priorities. This finding may lead to the claim that policy frameworks should be adaptable to historical conservation needs, as discussed by Li and Shao (2005). Furthermore, CE has emerged as a considerable positive influence on HLCS. This finding is consistent with sources that stress the significance of public involvement in sustainable heritage conservation (Wells et al., 2019; O'Donnell, 2017). Thus, communities mold their heritage revival pathways through active involvement and inclusion of local knowledge and values, which makes them powerful actor. In opposition to the hypothesis presented, ES shows a negative index towards HLCS. This result echoes concerns in the literature about the challenges of balancing economic development with heritage preservation (Nocca, 2017; Marx, 2019). The unexpected negative impact of economic strategies on conservation success highlights the need for a deeper investigation or a discussion on the complexities of integrating economic and conservation goals. This finding suggests that economic initiatives might, at times, undermine conservation efforts, calling for a more nuanced approach to economic planning in heritage contexts.

Another notable discovery was the shockingly powerful effect of TK on HLCS, dovetailing with what Laird (2010) and Norberg and Fossum (2011) learned about the importance of indigenous knowledge systems in managing and preserving heritage landscapes. This implies that conservation policies and practices ought to not only respect but also incorporate traditional wisdom and practices.

However, the study's focus on a specific geographical and cultural context may limit the generalizability of the findings. Future research should consider comparative studies across different settings to enhance the generalizability of the model. Extending research beyond the Shuhe Ancient Town can provide a broader perspective and validate the applicability of the findings in diverse contexts.

Hence, the outcomes of the study demonstrate that the Shuhe model might present a significant contribution to heritage conservation globally. The proponents, axiomatic principles, and essential steps that encompass community and reliance on traditional knowledge, critical approach to economic solutions, and realization of flexible implications are the ones designed to maintain heritage conservation's credibility. It could be possible to argue that the Shuhe model, as a reality, can be developed into a model for global use. Nevertheless, it is important to appreciate the following complicating factors of relations between economic priorities and heritage protection, empowerment of communities, and reliance on traditional knowledge.

6. Conclusion

This study validates several key hypotheses about factors influencing heritage landscape conservation success. Policies and regulations show a moderate correlation with conservation outcomes, suggesting the need for more adaptable governance systems, thus supporting Hypothesis 1, which links strong governance frameworks to better results. Community involvement and the integration of traditional knowledge emerged as crucial to conservation success, confirming Hypothesis 2, which proposed that local participation and knowledge improve conservation effectiveness. Hypothesis 4, which posited a positive effect of traditional knowledge integration, was also confirmed. Interestingly, economic strategies had a negative impact on conservation success, contrary to Hypothesis 3, which suggested that strategies balancing sustainable development and conservation would enhance success. This finding emphasizes the need to clarify how financial strategies align with conservation goals. Overall, this analysis highlights the complexities in balancing diverse cultural elements and suggests that successful conservation strategies should include adaptable policies, community engagement, aligned financial incentives, and traditional knowledge integration.

Compliance with ethical standards

Ethical considerations

Informed consent was obtained from all participants, and confidentiality and anonymity were assured. Data was securely stored and used exclusively for research purposes, following ethical guidelines approved by Universiti Sains Malaysia.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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