Influencing Factors of Kulangsu Ancient Architecture Protection Based on Structural Equation

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Abstract. Ancient buildings are witnesses of history and cultural treasures. As a world-wide architectural complex with unique charm, Kulangsu is an outstanding representative of China's cultural heritage value. This paper takes Korla city as the research object, and recovers a total of 1052 actual valid questionnaires according to five subjects, and finally selects 29 indicators after many times of testing, constructs the structural equation model, and objectively analyzes the factors that have the greatest influence on the level of protection of the ancient buildings in Korla city, so as to achieve the effect of reflecting the public's cognition on the level of protection of the ancient buildings. The conclusion of the model can be obtained that the government factors have the greatest influence on the protection of ancient buildings in Korla City, in which the government's economic support for ancient buildings has the most significant effect, and combined with the field research to provide the corresponding decision-making suggestions.

Keywords: Factor analysis, Structural equations, Kulangsu, Conservation of ancient buildings, Sustainable development, Heritage community.

1 Introduction

Ancient architecture is not only a witness of history, but also a carrier of national memory. Kulangsu is an island located in Xiamen, Fujian Province.In September 2017, the then Director-General of UNESCO, Ms. lrina Bokova, personally visited Kulangsu to present the World Heritage Certificate, and she highly affirmed the heritage value of Kulangsu. As one of China's 52 World Heritage Sites, Kulangsu's ancient architectural complex represents rich historical, cultural and artistic values, and its preservation is crucial to enhancing cultural confidence.

Academics have conducted extensive research on the impacts, challenges, and technical issues of ancient building conservation. Li Hongfei (2020) proposed that traditional villages are continuously damaged by "destructive, developmental, and tourist" in the process of rapid urbanization [1]; Mariana Correia (2015) proposed that the conservation of ancient architectural heritage is extremely complex, and that no combination of any single conservation procedure can guarantee success [2]. Scholars' studies are diverse in perspective and rich in empirical evidence, but there are fewer studies on the conservation of historical buildings in Kulangsu. Therefore, it takes Kulangsu as

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the research object, and further evaluates the degree of objective influence of each subject's behavior by constructing a structural equation model, so as to provide a reference for the future development of sustainable conservation measures for ancient buildings.

2 Status of conservation of ancient buildings on Kulangsu

The Kulangsu Historic International Community was pioneered in the late Song and early Yuan dynasties, and there are a total of 391 existing historical buildings on the island, including 117 buildings under key protection, which have been jointly influenced by a diversity of cultures, such as those of Western and Asian countries, and present multicultural characteristics and a variety of architectural styles.

Based on the positioning of "heritage site + community + scenic spot" in Gulang County, how to take into account the multiple sustainable development of heritage protection and tourism economy has increasingly become a core issue for the development of heritage communities in Kulangsu.[3] In the process of fieldwork, it was found that there is a lack of professionals in ancient building restoration; diversification of property ownership[4], part of the historical buildings are unmanaged and in disrepair; the industrial model is single, and at the same time, keeping the original appearance of the ancient buildings and the modernization of the residents' lives are in conflict, and the views expressed by many scholars on the current development of the Kulangsu reached a consensus.

3 Analysis of influential factors on the protection of ancient buildings based on structural equations

3.1 Design the default model

In this study, structural equation modeling was used to assess the extent to which governmental, social, merchant, demographic, and tourist factors in the conservation measures of ancient buildings in Korla influence the level of conservation of ancient buildings. Validated factor analysis, fitting and correction of the measurement model for each research subject were conducted to derive the results of the study and to establish the initial hypotheses. The theoretical model is shown in Figure. 1.

H_1: Social factors have a significant impact on the protection of ancient buildings.

H_2: Merchant factors have a significant impact on the protection of ancient buildings.

H_3: Residents' factors have a significant impact on the protection of ancient buildings.

H_4: Tourist factors have a significant impact on the protection of ancient buildings.

H_5: Government factors have a significant impact on the protection of ancient buildings.

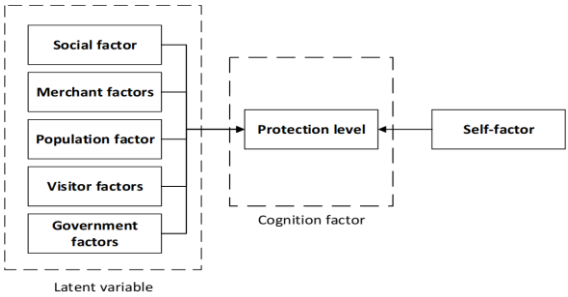

Fig. 1. Default Model

3.2 Questionnaire Design

In order to ensure the quality of the questionnaire, the paper combines the modification and supplementation of the previous literature after the development of the initial measurement items, as well as the pre-survey and expert interviews, and optimizes the questions in the questionnaire to form the final scale. Twenty-nine measurement indicators were selected from the six factors of government, society, residents, merchants, tourists and themselves as shown in Table 1.

Table 1. Variable Construction

Factors	NO.	Measurement item
Government factors	ZF1	Government economic support for ancient buildings
	ZF2	Regulation on the protection of ancient buildings
	ZF3	Diversified development of Ancient Buildings
	ZF4	Regular inspection of buildings by professionals
	ZF5	Daily dynamic monitoring of government departments
Social factor	SH1	Mass media
	SH2	Physical offline publicity and promotion
	SH3	Spontaneous protection actions by social organizations
	SH4	Professional practice related to ancient architecture
	SH5	Reserve professional talent echelon building
Merchant factors	SJ1	Cooperation with the government
	SJ2	Cultural and creative IP co-branding
	SJ3	Routine repairs to old buildings
	SJ4	Consciously regulate business
	SJ5	Cultural promotion of ancient architecture
Population factor	JM1	Creating an atmosphere of protection buildings
	JM2	Cooperation with the government
	JM3	Residents' living habits
	JM4	Publicize and warn
	JM5	Daily inspections
Visitor factors	YK1	Ancient architecture knowledge base
	YK2	Cooperate with local excursion regulations
	YK3	Conservation awareness and behavior of ancient buildings
	YK4	Awareness in the promotion of ancient buildings
	YK5	Participation in relevant on-site interactive activities
Own factors	WAX	Overall integrity of ancient buildings
	WDX	Safety and Stability of ancient buildings
	YMCD	Degree of preservation of ancient buildings
	MGX	Overall aesthetics of ancient buildings

3.3 Questionnaire collection and data testing

This study adopts multi-stage sampling, in the first stage, stratified sampling of people in each status and calculating the specific sample size; in the second stage, systematic sampling and convenience sampling are adopted for different statuses. The survey was conducted over a period of approximately three months, from February through April, through "online + offline" synchronization in the nationwide formal questionnaire collection, a total of 1,127 questionnaires, screening questionnaires and remove invalid questionnaires, and finally recovered the actual valid questionnaires 1,052 questionnaires, questionnaire validity rate of 93.35%.

Expanding the test of reliability and validity, using Cronbach Alpha of reliability with KMO and Bartlett Sphericity test of validity, the Cronbach coefficient of each level is 0.886, KMO value 0.926, significance (P-value) < 0.001, all reach the ideal level.

3.4 Model fitting and testing

This paper utilizes AMOS 28.0 software to test the fit of the theoretical model, and the output of the overall fit indicators is shown in Table 2. From the table, it can be seen that the fitting values of the indicators are within a reasonable range, indicating that the influence of each subject on the protection of ancient buildings in Korla City reaches the expected level of fit, indicating that the actual data of the scale matches the theoretical model and can be used to verify the hypothesis.

The validity of the hypotheses was evaluated by discriminating whether the parameters reached the level of significance ($P<0.05$)[5] ,so the hypotheses are valid. The results of the main model test are shown in Figure 2.

Table 2. Unstandardized Regression Coefficients and Their Significance Test Table

Hypothesis	Impact relationship			Estimate	S.E.	P	Conclusions
H_1	Protection Level	<--	Society	.336	.030	***	Support
H_2	Protection Level	<--	Business	.309	.028	***	Support
H_{13}	Protection Level	<--	Resident	.352	.025	***	Support
H_4	Protection Level	<--	Visitor	.249	.036	***	Support
H_5	Protection Level	<--	Government	.475	.029	***	Support

Note: ***p<0.001, **p<0.1

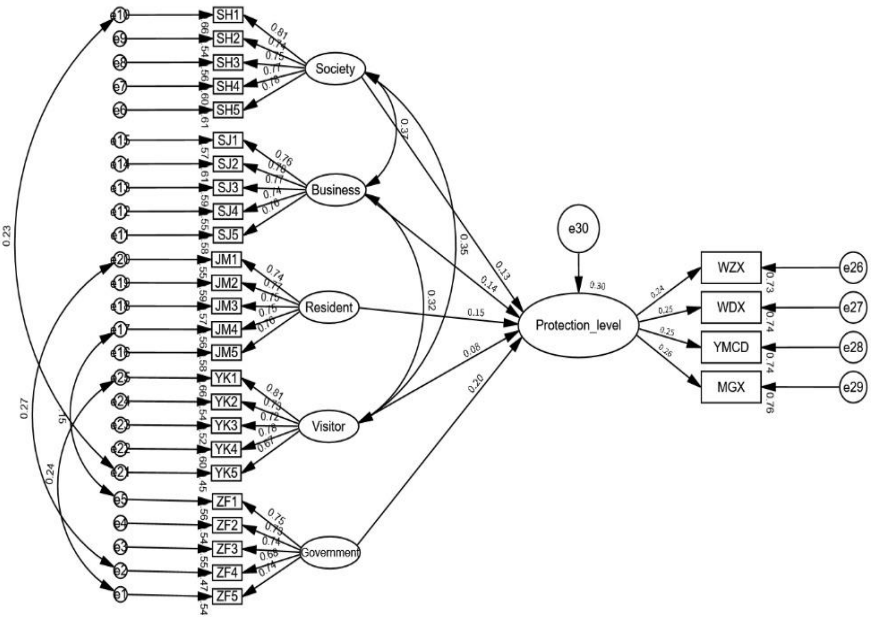

Fig. 2. Results of The Main Model Test

3.5 Analysis of model results and reasons

Firstly, the path coefficient of social factor is 0.13, which indicates that social factor has positive influence. The path coefficient of SH1 is 0.81, which indicates that mass media plays an important role in the conservation of ancient buildings, and the mass media has the characteristics of high communication efficiency and large size, which can disseminate the information of conservation of ancient buildings, which is in line with the actual situation.

Then, the path coefficient of residents' factor is 0.15, ranking second, which may be due to the fact that residents, as the direct occupants around the ancient buildings, are more likely to establish an emotional connection with the ancient buildings and produce the consciousness of protecting and respecting the ancient buildings.[6]

Third, the tourist factor: its path coefficient is 0.08, indicating that tourists do not have a high degree of influence on the protection of ancient buildings in Kulangsu, which may be due to the fact that tourists usually stay in the local area for a shorter time, and the degree of participation in the protection action is limited, and tourists usually pay more attention to the sightseeing and experience, which is in line with the real situation.

Most importantly, the path coefficient of the government factor is 0.20, indicating that the government factor has the greatest influence on the level of protection of ancient buildings in Kulangsu.ZF1 has the highest path coefficient of 0.75, indicating that the government's economic support for ancient buildings has the greatest influence on protection, and the protection of ancient buildings requires a large amount of capital

investment, and the government's active participation in providing financial subsidies can provide a sustained financial security, which is in line with the actual situation.

4 Suggestions for Further Improving the Conservation of Ancient Buildings on Kulangsu

For the above ancient architecture structural equation path analysis model can be seen in the government, residents, society in the protection of ancient architecture plays a greater role, so that the protection of ancient architecture should be:

4.1 Let the policy "alive and kicking"

on-site management agencies and related governments in China should carefully translate the doubled designations into responsibilities. [7] At present, the laws relating to the protection of Kulangsu buildings are relatively general, so a hierarchical protection responsibility system should be established. Need to improvement of the procedures of filing, documentation, popularisation, management and protection of architectural heritage. [8] Secondly, the implementation of ancient buildings and cultural relics monitoring system, the need for the overall pattern of changes in ancient architecture, disease and other conditions for regular inspections. Third, to open up diversified funding channels, the protection of ancient architecture requires a large amount of capital investment, through the organization of various types of exhibitions on Kulangsu to absorb outside investment, the implementation of government investment and private investment.

4.2 Make residents happy

In addition to traditional listed protection and repairs, relevant ancillary protection should also be carried out to protect the ecological and humanistic landscape clusters in the vicinity of ancient dwellings. The basic living needs of the people should be taken into account in the overall consideration, such as the practical problems of ancillary facilities and house reinforcement. buildings with pre-eminence given to maintenance rather than sporadic major repair.[9] The government can carry out multi-departmental consultation and cooperation, actively listen to feedback, effectively solve the residents' living problems, improve residents' satisfaction, and retain the fireworks.

4.3 Let the community "move" up

Efforts to protect the inheritance of craftsmanship, so it is necessary to accelerate the pace of research on the protection of ancient architecture, improve the level of practical operation, and inject fresh blood into the protection of ancient architecture. At the same time, the government can give professional craftsmen higher social welfare to attract them.

To raise public awareness of conservation, major museums and ancient building sites can also carry out thematic interactive exhibitions, virtual scene experience and other activities. Kulangyu Island is a combination of a "community living center" and a "community museum".[10] In addition, communities and colleges and universities can set up ancient building protection organizations to carry out regular flash mob activities and volunteer services for ancient building protection, and to publicize the significance and value of ancient building protection.

5 Conclusion

This study focuses on the level of conservation of ancient buildings in the World Heritage Site of Kulangsu. By conducting a questionnaire survey and constructing a structural equation model, the relationships between five key agents and the protection level of ancient buildings were examined. The combined model analysis indicate that government, residents, and businesses have significant influences on the protection level, with Standardized factor loading of 0.20, 0.15, and 0.14 respectively. Derived from modeling results, several recommendations are proposed: strengthening the enforcement of protection policies and establishing a hierarchical responsibility system; protecting the ecological environment near historic residences and considering residents' needs; and focuses on passing on the craftsmanship of ancient buildings while raising public awareness of conservation.

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References

1. Li, H., He, Y., Tang, X., Pan, L., & Zhang, L. (2020). Fire prevention research on traditional wooden structure buildings in Chinese traditional villages. China Forest Products Industry, 57(10), 5. 10.19531/j.issn1001-5299.202010013.
2. Correia, M., Guerrero, L., & Crosby, A. (2015). Technical strategies for conservation of earthen archaeological architecture. Conservation and Management of Archaeological Sites, 17(3). 10.1080/13505033.2015.1129799.
3. Hao, H. (2022). Research on the protection and renewal of the Inner Courtyard Oyster Area in Gulangyu from the perspective of resilience theory. Industrial Design, 005(000). https://kns.cnki.net/kcms2/article/abstract?v=rNedIcCUb LB Tc4z Zpw 4lRX gu8g8 jXIY c3tFN1P_aOp_iJwIvT0Nb8N5fl-sSKRMaGFxLOwvIkTYswzGEtL43E-PhHbuNvdoQhX FY_pjNy5LepA8d7dufz8d-Bd 2H1WwbTYCYXLNS9Uo=&uniplatform = NZ KP T&f lag=copy.

4. Cai, S., Zhang, N., & Li, Y. (2023). Exploring the Path of Sustainable Development in the Heritage Community of Gulangyu Island in the Context of Multiple Identity. Chinese Cultural Heritage, (04), 121-125. https:// kns. cnki. net/kcms2/article/abstract?v=rNedIcCUbLBV_e2lSdX-IG4c X5X2 9y7n Kbca Vwsb 9xH HhQ YI3 1LO nFM xnPQ Ygol3 wQM_2MtgiyI4QfBNlJ5ArkVxh5mWxqBIva-IeDzsHdg UQjYt4 wxs8o NS14 Jhwem FR_2Xl0eCNvU=&uniplatform=NZKPT&flag=copy.
5. Casella, G., & Berger, R. L. (2002). Statistical Inference. Duxbury Press.
6. Giannakopoulou, S., & Kaliampakos, D. (2016). Protection of architectural heritage: attitudes of local residents and visitors in Sirako, Greece. Journal of mountain science, 13, 424-439. 10.1007/s11629-015-3482-1.
7. Wang, L. (2007). Multi-designated geoparks face challenges in China's heritage conservation. Journal of Geographical Sciences, 17(2), 187-196. 10.1007/s11442-007-0187-6.
8. Kepczynska-Walczak, A. (2005). A method proposed for adoption of digital technology in architectural heritage documentation. In Computer Aided Architectural Design Futures 2005: Proceedings of the 11th International CAAD Futures Conference held at the Vienna University of Technology, Vienna, Austria, on June 20–22, 2005 (pp. 73-82). Springer Netherlands. 10.1007/1-4020-3698-1_6.
9. Lazarus, D. (2007). Maintenance of heritage architecture: implementation and practice. WIT Transactions on The Built Environment, 95. 10.2495/STR070301.
10. Wang, W. S. (2017). Community Life Preservation and Architectural Revitalization of World Heritage Site Gulangyu. Shanghai Urban Planning, 6, 5. CNKI: SUN:HCSG.0.2017-06-008.

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