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Multifactor evaluation of architectural value in historical and cultural heritage area——the case of Dingzi Street, Hanzhong, Shaanxi, China

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Abstract: Historical and cultural heritage areas gradually disappear due to rapid urbanization, urban renewal, and transformation. With China's urban development shifting from incremental planning to stock optimization, protecting historical and cultural landscape areas has gained considerable attention. The development and preservation of these areas have become pivotal research issues. A multi-value-oriented evaluation index system has been established to recognize the haphazard and scientifically unfounded updating and reforming of buildings within historical and cultural landscape areas. This system draws upon and organizes evaluation indices for historical buildings from domestic and international contexts. An empirical test assessed the protection efforts in the Dingzi Street Historical and Cultural Landscape Area in Hanzhong, Shaanxi Province. The results emphasize that the protection of buildings in historical landscape areas should consider the potential for development and construction, the enhancement of residents' living environments, and the economic impact on neighboring areas. In the renewal construction of historical landscape areas, the evaluation of most buildings focuses on economic value, utility, and the feasibility of renovation implementation. The study's conclusions are essential for enhancing the scientific and practical aspects of renewal and renovation methods for buildings in historical and cultural landscape areas. This research provides valuable insights into balancing development and preservation in the evolving urban landscape of China

Keywords: *Architectural value, Historical and cultural heritage Area, Index system.*

1. Introduction

A historical and cultural heritage area designates a locale characterized by the concentrated presence of historical buildings(Gao, Z. (2023).). These structures exhibit architectural styles, spatial arrangements, and neighborhood landscapes that holistically capture the cultural traits of a particular historical era within the city(Li et al., M. (2021).). Serving as tangible testimony, these areas witness the city's enduring continuity and centuries-long cultural amalgamation. Simultaneously, their spatial configurations offer a distinctive interpretation and understanding of the region from a unique perspective (Luo et al., M. (2023).). The preservation and development of historical and cultural heritage areas resonate with the present-day imperative in China to uphold the legacy of exceptional traditional Chinese Culture and address the pragmatic desires of residents for an enhanced quality of living environment. Researching their value assessment is a pivotal prerequisite and guiding principle (Wang et al., Y. (2021).). An objective evaluation of the architectural value within historical and cultural heritage areas is indispensable for systematically conserving and utilizing these valuable resources.

Amidst China's urban renewal process, it has predominantly undergone rapid developmental phases characterized by "exchanging resources for development" and "exchanging space for time." (Zong, X. (2020).). Historical and cultural heritage areas safeguard many architectural features reflecting historical

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and cultural significance. They accommodate numerous original residents, uphold traditional neighborhood cultures, and encapsulate specific cultural memories as pivotal historical and cultural resources in urban landscapes. However, while developing historical and cultural heritage areas, they gradually vanish under the banners of "renewal" and "transformation." Taking Hanzhong City as an illustration, streets like Dongguan Street and Beiguan Street are progressively losing their original character during development. Against the backdrop of the new normal in development, there exists a critical opportunity to safeguard and promote exceptional traditional Culture, ensuring the sustained historical continuity of urban development.

In numerous historical and cultural cities across China, consecutive initiatives have been aimed at protecting and developing historical and cultural heritage areas and exploring ways to safeguard these sites(Zhang, M. (2019).). However, there needs to be more mature and readily applicable methods and measures(Zuo et al., Y. (2017).). Evaluation criteria for the buildings within historical and cultural heritage areas must be present, leading to a lack of consensus on whether these structures should be preserved or demolished. In some regions of China, extreme situations have emerged(Wang et al., C. (2020).). On the one hand, there is a tendency to preserve everything without sufficient financial support, making protection efforts impractical and resulting in the ongoing deterioration of the environment in heritage areas. On the other hand, there is a trend towards complete demolition and redevelopment, erasing the historical values of these areas and causing damage to the overall urban landscape.

These challenges stem from an unclear understanding of the architectural value of buildings in historical and cultural heritage areas and a need for recognition and judgment regarding the core structures in these areas. In today's rapidly developing urban landscape, there is an urgent need to establish a more scientifically and reasonably grounded set of evaluation standards for buildings in historical and cultural heritage areas. Only through this can we comprehensively and objectively appreciate the value of these significant cultural and historical sites.

2. Literature Review

Foreign scholars have embraced a dynamic and cyclical approach to evaluating historical and cultural heritage areas. This method entails regular monitoring conducted by relevant departments, annual reports, and other assessment mechanisms to deliver timely updates on the urban development status(Wang et al., J. (2020).). Swift adjustments to short-term action plans are implemented to navigate uncertainties in the planning and construction phases of the subsequent stages of urban development(Wang et al., C. (2020).). While ensuring planning effectiveness and a certain degree of flexibility, this approach is

responsible for monitoring the direction and level of urban development. It is advantageous for comprehending long-term development dynamics and addressing future challenges(Tian, C. (2022).).

The assessment emphasizes the "balance of preservation and use." Indicators like building vacancy rates, site utilization efficiency, and vibrancy levels are employed to gauge the utilization of buildings and spaces within the preservation area(Sun, Y. (2017).). Drawing from survey findings, proposed incentive measures include preferential treatment for the use of vacant buildings, redevelopment of unused spaces, and encouragement for revitalization and reuse.

Chinese scholars have devised an assessment framework for evaluating historical and cultural heritage areas. The assessment types are categorized into three main approaches: blueprint-based scheme assessment, process implementation assessment (dynamic monitoring of the process), and planning performance assessment. Two notable trends in assessment methods have emerged: a shift from rational evaluation to the interactive utilization of qualitative judgments and quantitative measurements. This involves establishing an overarching framework of "implementation effectiveness assessment - process implementation assessment - improvement strategy" (Chen Yue, 2019).

Through the integration of a comprehensive evaluation system that includes "residents' activities - socio-economic factors - built environment," along with spatial simulation and analysis methods such as

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urban space operation simulation, factor flow network analysis, and systematic coordination analysis, a holistic framework for urban planning assessment has been developed(Lin et al., J. 2019). This framework entails integrating data, technological collaboration, and cooperative participation from multiple stakeholders (Xi Guangliang et al., 2017).

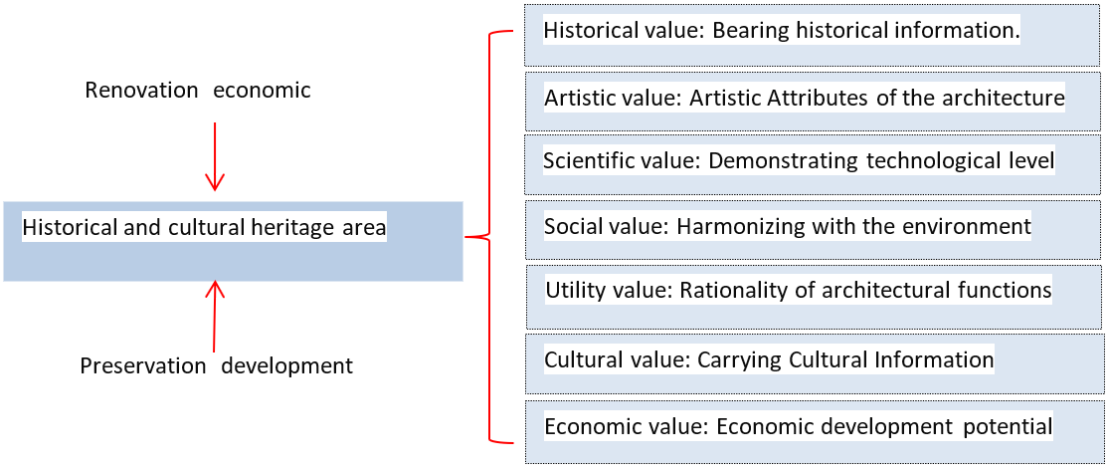

Figure 1.
Comprehensive value evaluation system.

3. Methodology

3.1. System Construction

The revitalization of historical and cultural heritage areas demands a holistic approach that takes into account various needs, such as preservation, development, residents' utilization, and economic growth (An, X. (2023).) ". Ensuring that architectural functions align with modern living requirements is crucial, all while meeting the objectives of sustainable renewal construction (Figure1).

Firstly, the historical and cultural heritage area contains a relatively small number of historical buildings, resulting in a lower concentration of cultural value. Nevertheless, there is an overall well-preserved spatial texture and architectural character. Some buildings even hold significant traditional cultural value.

Secondly, the development needs of the historical and cultural heritage area must be comprehensively considered. Unlike historical districts primarily focused on preservation, economic feasibility must be considered.

Thirdly, a significant portion of the historical and cultural heritage area is occupied by original residents who play a crucial role as culture carriers. However, they face the practical challenge of poor living conditions, necessitating considering the residents' living needs during the renewal construction process.

By comprehensively drawing on relevant domestic and international architectural preservation evaluation methods, considering the practical requirements of traditional heritage areas, and seeking expert opinions through multiple consultations, a comprehensive framework for evaluating historical and cultural heritage area buildings has been established.

3.2. Determine Weights

The user opts to create an assessment framework employing the Analytic Hierarchy Process (AHP), which involves the following steps. Firstly, create three levels: the goal level (O level), the evaluation project indicator level (A level), and the evaluation project factor level (C level). Secondly, invite ten experts (each expert's weight is set as 0.1) to individually compare the indicators of the evaluation project level (A level) and the factors of the evaluation project level (C level) by constructing

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comparative judgment matrices for each (Fi/Fj). The resulting F values serve as comparison values (Table 1), concerning Table 1 for these comparison values.

Table 1.
Standard value of the indicator.

Fij assign	Significance
Fij=1	Elements i and j have the same importance for the higher-level factor.
Fij=3	Element i is slightly more critical than element j.
Fij=5	Element i is significantly more important than element j.
Fij=7	Element i is much more important than element j.
Fij=9	Element i is critically compared to Element j
Fij=2, n=1,2,3,4	The importance of element I relative to element J falls between them

By incorporating expert evaluations and employing YAAHP software for computation, we have initially generated judgment matrices and weight values for both the A and C layers of the evaluation project. The definitive weights for architectural assessment indicators in historic and cultural districts are determined following consistency checks, as outlined in Table 2.

Table 2.
Value evaluation of buildings.

Objective layer	Criterion layer		Indicator layer		Integrated weight
	Level one indicator	Weight coefficient WI	Level two indicator	Weight coefficient WI	
Architectural value of historical and cultural heritage area (O)	Historical value	0.2542	Building period	0.5493	0.1396
			Historical relevance	0.4507	0.1146
	Artistic value	0.1736	Building facade	0.3353	0.0582
			Building decor	0.6647	0.1154
	Scientific value	0.2844	Structural style	0.7351	0.2091
			Building materials	0.2649	0.0753
	Social value	0.0611	Emotional acceptance	0.6452	0.0394
			Architectural coordination	0.3548	0.0217
	Cultural value	0.0632	Cultural expression	0.5274	0.0333
			Cultural essence	0.4726	0.0299
	Utility value	0.1267	Structural integrity	0.7418	0.0940
			Functional rationality	0.2582	0.0327
Cultural essence	Economic value	0.0368	Renovation cost	0.5049	0.0186
			Development potential	0.4951	0.0182

3.3. Quantifying Indicators

Indicators for the buildings in the historical and cultural landscape area of Dingzi Street in Hanzhong City have undergone data standardization by introducing a four-level standard. Assessments are now based on the current condition of the buildings, utilizing a system that selects the appropriate grade rather than assigning direct scores. This approach aims to reduce the influence of subjective factors on the assessment results. The specific standards can be found in Table 3.

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Table 3.
Standardization of indicators.

Indicators		Level one (5)	Level two (3)	Level three (1)	Level four (0)
A1	C1	Ming and Qing dynasties	Minguo Era	1980s	20th century
	C2	Significant direct relevance	Directly relevant	Indirectly related	No
A2	C3	Enrich	Good	Ordinary	No
	C4	Exquisite	Good	Ordinary	No
A3	C5	Wooden structure	Brick and timber structure	Brick and concrete structure	Concrete structure
	C6	Rammed earth and timber	Brick and wood	Brick and concrete	Concrete
A4	C7	Extremely useful	Significant useful	Some impact	No
	C8	Extremely useful	Significant useful	Some impact	No
A5	C9	Exquisite	Good	Ordinary	No
	C10	Exquisite	Good	Ordinary	No
A6	C11	Complete	Good	Ordinary	Incomplete"
	C12	Reasonable	Good	Ordinary	Unreasonable
A7	C13	Low	Ordinary	Relatively high	High
	C14	Exquisite	Good	Ordinary	Low

4. Results and Discussion

4.1. Baseline Data Survey for Buildings in the Historical and Cultural District of Dingzi Street

Dingzi Street Historical and Cultural District, situated in Hantai District, Hanzhong City, retains its ancient streets and markets, radiating a profound historical ambiance. Despite this, the current condition of historical building preservation needs to catch up. Numerous historic structures within the district have deteriorated or collapsed, and the site itself is desolate, necessitating prompt attention for protection and restoration. The district has been systematically divided into designated zones, with a thorough survey and mapping carried out on the numbered buildings (A-H) within the cultural district to facilitate comprehensive research (Figure 2).

Conducting surveys that encompass measurements of architectural plans, elevations, and other dimensions, we implemented a scoring system to evaluate pertinent indicators that impact the value of the buildings (refer to Table 6). These factors encompass the construction era, historical significance, overall form, detailed design, architectural expression, structural form, building materials, structural integrity, functional use, environmental coordination, social and emotional significance, functional applicability, and development potential. Following the quantification standards outlined in Table 3, 10 experts specializing in the historical and cultural district actively participated in scoring, offering assessments for each indicator.

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Figure 2.
Building numbering diagram(A-H).

4.2. Classification Protection Measures

"The values for each building in the Dingzi Street Historical and Cultural District were determined by multiplying the weights assigned to individual criteria with their respective building ratings. The summation of these products provides the overall value assessment, as presented in Table 4 below."

Table 4.
Building value score.

Building ID	Score	Building ID	Score
A	1.35	E	3.56
B	3.24	F	1.47
C	4.85	G	6.27
D	5.09	H	1.82

Taking cues from the classification of measures in the preservation of historical buildings, protective measures for the architectural heritage in the Dingzi Street historical precinct are classified into four levels: preservation, restoration, refurbishment, and demolition. Protective strategies are determined based on the assigned scores for each building. For buildings with a value score of ≥4 points, it is recommended to undergo protective restoration, preserving the architectural form and appearance without alteration; for buildings with a value score of 2 to <4 points, refurbishment is advised, with the extent determined by the current state of the building. Changes may be made while ensuring coordination with the preserved appearance. For buildings with a value score below 2 points, demolition is recommended, with the possibility of creating public spaces or redeveloping (Chi et al., 2020) based on the overall appearance of the street.

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5. Conclusion

(1) The paper commences by delving into the distinctive nature of architectural preservation in historical and cultural heritage districts. It underscores the importance of considering factors such as the district's development potential, enhancement of residents' living environments, and the economic influence on the surrounding areas. The suggested approach advocates for a comprehensive perspective beyond a singular focus on preservation value, incorporating diverse value orientations. Employing the evaluation system outlined in the paper, an empirical analysis was conducted on the Dingzi Street Historical and Cultural District. The obtained results reasonably align with the actual situation, providing initial confirmation of the feasibility of the proposed indicator system.

(2) According to the evaluation results, the buildings achieving the highest scores are C#, D#, and G#. These structures, characterized as traditional residential buildings, reflect a prevailing emphasis on historical values within the entire evaluation system. These buildings demonstrate artistic, scientific, social, cultural, utility, and economic values. Those buildings scoring ≥3 points encompass all seven types of values, aligning well with the anticipated outcomes of the indicator system. Buildings with a score of 2 points ≤ a < 4 points, such as B# and E#, play a crucial role in harmonizing the overall architectural landscape. On the other hand, buildings scoring less than 2 points, including A#, F#, and H#, exhibit a relatively deteriorated appearance. These structures lack coordination with the surrounding environment regarding architectural style, texture, and scale.

(3) The developed indicator system in the thesis has been validated through the historical and cultural landscape of Dingzi Street, demonstrating strong alignment with the actual conditions. The seven proposed evaluation indicators comprehensively address crucial aspects like historical preservation, resident utilization, and future development within the historical landscape area. With multiple indicator types, the system exhibits a certain degree of superiority over a single-indicator evaluation system, enabling a more objective representation of the comprehensive value of buildings in the historical and cultural landscape area.

(4)Determining indicator weights and quantifying factor scores were conducted through expert ratings involving experts from various backgrounds. The goal was to ensure that the weights and factor scores aligned more closely with the interests and demands of all parties, striving for objectivity. However, due to time constraints, the number of experts involved in the research is relatively limited (10). In the next steps of the study, there is room for expanding and broadening the participation of individuals, enhancing the objectivity of data processing.

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