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RESEARCH ARTICLE

# Architectural Identity and Cultural Preservation: Evaluating National Cultural Expression in Suzhou Museum

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**ABSTRACT**

This study aims to construct an evaluation model to identify expressions of national culture in contemporary Chinese architectural design, exploring the mechanisms of traditional culture's inheritance and transformation within modern architecture, thus providing theoretical support for architects to integrate national culture into their designs. Through a systematic review of relevant literature and case studies, core factors were initially identified, including building materials, spatial layout, light and shadow effects, symbols, and cultural elements. An expert scoring method was then applied to systematically evaluate 27 design factors, ensuring the model's scientific validity and reliability. Additionally, a theoretical model centered on "external architectural form factors" was developed using grounded theory to explain how traditional Chinese culture is applied in modern architectural design. The findings indicate that expert scoring helped refine and optimize the key design factors, making the model more practical and applicable. This model illustrates how cultural connotations are conveyed through architectural forms, providing clear guidance for architects to achieve national cultural expression in contemporary designs.

## INTRODUCTION

A nation's people can draw strength and identity from its national culture, and it can also unite them during happy or sad occasions. One of I.M. Pei's final significant works was the Suzhou Museum. Suzhou Museum, an architectural and artistic museum located in Suzhou, was created by renowned architect Ieoh Ming Pei and is now recognized as one of the important cultural relic entities protected by the Chinese government (Parrinello, 2020). He created an inventive, distinctive pictorial advancement in the centuries-old custom of Chinese gardens while steeped in the history and setting of the area. For Pei, the Suzhou Museum was not the finish but rather a crucial link to the next stage. Economic advantages might also come from national culture. Due to the fact that individuals are frequently drawn to a country's distinctive culture and customs, it might aid in attracting tourists and foreign investment. National culture can also encourage innovation since it fosters a vibrant and diversified environment that encourages problem-solving creativity in peopl(BORGOGNI, 2017)e. The operational parts of the new Suzhou Museum are divided to promote traditional culture while also embracing modern culture.

Deviating from the previous studies and the perspectives, the present study aims to fulfill the research gaps in cultural architect studies. The focus of the researcher is one Suzhou museum which is considered a masterpiece delivered from the hands of I.M Pei(Ferguson, 1999). The basic design of the museum compliments the ancient architect of Zhong Wang Fu. This architectural project posed a serious challenge to Mr. Pei as it was developed as a modern museum in harmony with traditional architecture and cultural values. The cultural responsibility endured by the designer drew attention toward the role of relevant stakeholders, i.e., cultural experts, administrations, and cultural heritage analysts, to contribute to preserving cultural values by ensuring authenticity, validity, and truthfulness through cultural representation. The cultural symbols that are used in the museum setting should be interpreted by cultural analysts to identify the cultural similarity that the sites possess. The sustenance of such monuments is dependent on the solidity of the cultural roots which provide the base for design and structure. The incorporation of cultural values regulated by an extensive body of administrators and experts cannot be questioned easily. In order to avoid cultural disorientation, it is, therefore, necessary to assess the cultural value of such monuments before bringing them on practical terms(Henderson, 2012).

Drawing on the theoretical perspectives, the research gaps would be covered by taking into consideration the role of external actors, i.e., cultural experts, political institutions, and administrative bodies. The deterioration and modification of cultural values can be reduced by taking such steps. The present study, therefore, views the cultural sensitivity of museum architecture from a broader perspective that is helpful in getting a clear picture of cultural limitations in individual architectural designs. Moreover, to enhance cultural connectivity, the inspection of designs in the hand of cultural experts is crucial in modern architecture(Steinhardt, 2014). The cultural confusion created by individual cultural beliefs will also be investigated by the researcher in the context of the Suzhou Museum. The study thus provides a novel perspective in the architectural domain by highlighting the importance of non-architectural actors in design formation and processing. The study is also motivated by the loopholes in modern architecture that do not support cultural infusion, thus leading the architect to adapt the cultural elements in accordance with the requirement. The involvement of cultural experts in this regard restricts such practices, which gives cultural popularity to the monuments based on cultural objectives.

## LITERATURE REVIEW

### Cultural Identity in Architecture

Bright and Bakewell (2022) explained that architecture is usually observed as a type of art and a path for expressing creativity. Architecture plays an important role in shaping cultural identity. Researchers argue that the structures and buildings in a society act as a symbol and reflectors of the heritage, values, and beliefs of the community, and the unique identity of any place is designed through their designs. Different research articles have been observed that centered their main idea on exploring the role of architecture in shaping "cultural identity" (Lopes & bin Mohd Hasnan, 2022; Vale, 2014). Architecture can show a sense and belongingness of to a place and history and the way it can be utilized for reinforcing social norms and cultural values(Jiang et al., 2022). One of the most relevant illustrations of architecture that entail cultural identity is "Antoni Gaudi's La Sagrada Familia" in Spain Barcelona as shown in Figure 2.1 (FAIRCLOTH; Marine-Roig, 2015). The church is still under construction since 1882. But it is still not completed. Gaudi was potentially provoked by the "Catalan Modernisme Movement" which required the incorporation of artistic traditions and local culture in modern design (Nogué & Vicente, 2004). Consequently, numerous features were displayed by "La Sagrada Familia" that reflected these including local saint's sculptures, a varied blend of Art Nouveau and Gothic styles. After the incorporation of cultural identity in this architectural project, the cathedral has been known as a beloved identity and symbol for Barcelona. It is also one of the most popular forms of tourist attraction(Xie, 2013). The unique cultural identity of Catalonia has been embodied in it and it serves as evidence of the architectural potential for identity expression.

**Figure 1. Antoni Gaudi's La Sagrada Familia**

**Evaluation of Suzhou Museum from a natural culture perspective**

Suzhou Museum is recognized as a natural cultural heritage site that delivers an exceptional cultural experience to visitors. Viewing the museum design from the Chinese cultural perspective gives a broader picture of the setting and locality of the museum. As the place is surrounded by rivers on three sides, the manifestation of Suzhou City's cultural and traditional values is done rightly through this design. Suzhou City always remained the center of attraction due to the ancient heritage value it possesses (Sun, 2019). In harmony with this city, the museum provides an interactive value that indicates the interactive significance of humans and nature on more specific grounds. The site has numerous historical and cultural relics, which makes its design distinctive from the rest of the cultural monuments(Han, 2009). The design techniques and characteristics of the classical garden in the museum make it an aesthetic blend of modern architectural designs and natural landscapes.

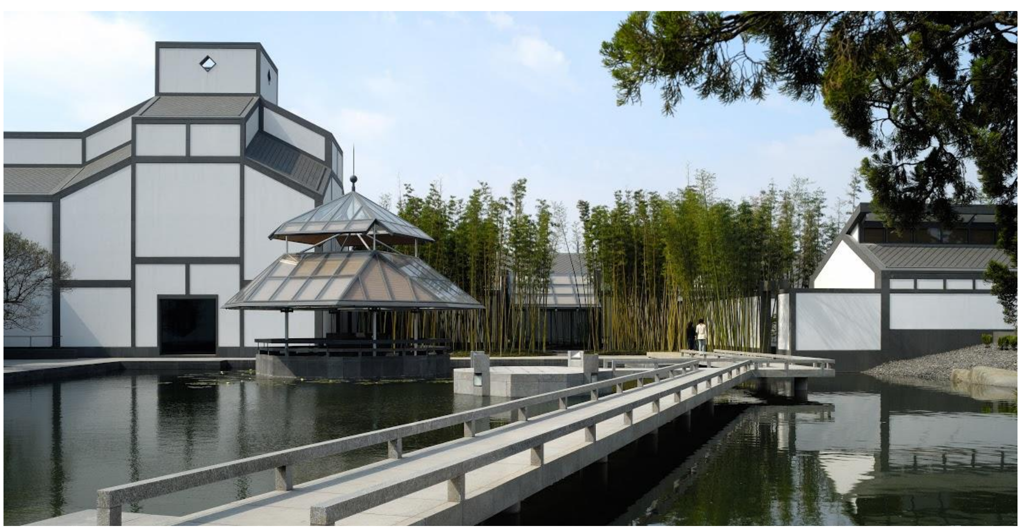

**Figure 2. Suzhou Museum (Novas)**

Yang (2022), while explaining the urban history of museums, placed the Suzhou Museum in the sphere of modern aesthetics, fitting perfectly into the modern landscape by integrating the cultural values and beliefs of the respective community. The innovative cultural experiments done on the site make it more appealing and culturally attractive to visitors. The use of Chinese paintings, calligraphy, and ancient handmade craft make it evident that the museum's architectural form was established to present the Chinese culture through the architectural culture(Lai, 2014). The exhibition of the museum with Wu leads Suzhou City's identity to the tradition and historical orientation, which narrates a heritage history in the form of designs and spaces in the museum (Zhang et al., 2021). The narrative construction is also regulated by ideological and cultural beliefs, which found practical grounds in the form of a museum. The design of the museum complements the ancient architecture of Zhong Wang Fu. Therefore it is remarkable in its construction and cultural presentation.

## METHODOLOGY

This study proposes corresponding evaluation principles and methods and selects primary and secondary evaluation indicators to assess Suzhou Museum. First, the evaluation model is used to assess the architectural details of Suzhou Museum, identifying an initial set of representative architectural elements. Second, based on in-depth research on these architectural elements, their current status is systematically reviewed, and their cultural and historical value, along with existing issues, are analyzed. Finally, each architectural and design element of Suzhou Museum is comprehensively re-evaluated, and based on the results, their significance and protection levels are classified, providing a scientific basis for future preservation and reuse efforts.

Since architectural evaluation involves complex, multi-dimensional issues, the choice of evaluation direction and post-use assessment often encompasses numerous factors that cannot be directly quantified. In most cases, these factors are challenging to assess or grade with specific numerical values, and the evaluation process frequently employs qualitative survey methods such as literature research, field observation, and questionnaires, thus having certain characteristics of ambiguity. Therefore, the combination of qualitative and quantitative methods in the evaluation process is particularly important to quantify vague concepts and obtain more scientific and objective results.

Research on relevant literature reveals that currently available evaluation methods are diverse(a Denton, 2005). For instance, Wang Zongjun broadly categorizes comprehensive evaluation methods, both domestic and international, into expert evaluation methods, economic analysis methods, operational research methods, and other mathematical methods. Scholar Chen Yantai and others further subdivide commonly used evaluation methods into nine categories, including qualitative evaluation, statistical analysis, fuzzy mathematics, and intelligent evaluation methods, with detailed explanations and comparisons(De Rosa et al., 2018). With advances in science and technology, the trend of cross-disciplinary integration has become more significant, and comprehensive evaluation methods increasingly reflect mutual learning, improvement, and even combined use. The evaluation methods in this chapter are as follows:

### Expert Survey Method

The Expert Survey Method, also known as the Delphi Method, originated in the late 1950s and is a subjective, qualitative group decision-making approach. Its fundamental principle is to conduct multiple rounds of anonymous surveys and consultations with experts who do not interact with each other directly(Sun, 2019). Experts adjust their opinions after each round of feedback, ultimately converging on a consensus. The selected experts should have extensive professional knowledge and practical experience to ensure the objectivity and scientific validity of the results. This method is widely used across various research fields and has played an active role in historical building value assessments in recent years.

### Analytic Hierarchy Process (AHP) Method

The Analytic Hierarchy Process (AHP), proposed by American operations researcher T.L. Saaty in the 1970s, is primarily used to solve complex decision-making problems through quantitative analysis(Du & He, 2023). This method decomposes and stratifies a problem to construct a multi-level structural model. Based on the hierarchical relationships, it ranks the importance of each element using weight allocation, simplifying the decision-making process. The AHP is widely applied in building evaluations and other complex decision fields, valued for effectively handling the relationships among multiple factors.

### Fuzzy Evaluation Method

The Fuzzy Evaluation Method, introduced by American control theorist Zadeh in 1965, is an integrated evaluation approach based on fuzzy mathematics. Relying on the membership theory in fuzzy mathematics, this method converts qualitative assessments into quantitative evaluations. The results are not single point values but rather fuzzy vectors, clearly depicting the degree of membership of each evaluation level. The Fuzzy Evaluation Method is particularly suited for ambiguous and hard-to-quantify issues, providing richer information and a systematic approach, and is thus widely used in building evaluations and other complex assessments.

## DATA COLLECTION

### Selection Process for Primary Indicators:

The selection of primary evaluation indicators follows three main steps. First, relevant domestic and international standards and literature were reviewed to identify representative and independent design factors, removing those with low relevance and consolidating similar ones. Second, on-site research at the Suzhou Museum was conducted to analyze and validate the suitability and relevance of each design factor. Finally, feedback from experts was incorporated to screen and assess candidate indicators, resulting in four primary evaluation indicators: building materials, spatial and landscape design, light and shadow effects, and symbols and cultural elements.

### 4.2 Selection Process for Secondary Indicators:

The selection of secondary evaluation indicators involves four steps: (1) Content analysis and literature review identified various cultural aspects of the Suzhou Museum's architecture, analyzing 110 relevant documents and focusing on 96 highly relevant ones for in-depth study; (2) Consolidation of similar secondary indicators from the literature, such as combining "lattice windows," "port windows," and other window elements under "windows," while excluding unrelated factors; (3) Integration of on-site findings, adding courtyard and environmental factors into the consideration; and (4) Prioritization of candidate factors to finalize the secondary evaluation indicators suitable for assessing the Suzhou Museum.

**Table 1**

| Target | Primary Indicators | Secondary Indicators |
|---|---|---|
| Evaluation Indicator System for National Cultural Identity in Suzhou Museum | Building Materials | white walls and black tiles |
| | | Entrance door |
| | | Glass |
| | | Steel structure |
| | | Leak window |
| | Spatial and Landscape Design | Spatial layout |
| | | Courtyard design |
| | | Rocks |
| | | Water features |

| | | |
|---|---|---|
| | | Bridges |
| | | Plants |
| | | Corridors |
| | Light and Shadow Effects | Natural lighting |
| | | Light-shadow interaction |
| | | Light guidance |
| | Symbols and Cultural Elements | Screens |
| | | Traditional Chinese landscape painting |
| | | Carvings and decorations |
| | | Borrowed scenery techniques |

**Determining Weights of Evaluation Indicators**

The Analytic Hierarchy Process (AHP) is a structured decision-making tool. It first breaks down complex decision problems into multiple levels, including objectives, criteria, and so on. By constructing a judgment matrix, it establishes the relative importance between factors at each level. Then, it calculates the weights of each factor and performs a consistency check to ensure the rationality of the weight distribution. This method helps decision-makers understand the problem more clearly and make decisions based on more comprehensive information. The specific steps are as follows:

**Constructing the Hierarchical Model**

The hierarchical model is primarily based on breaking down complex decision problems into multiple levels, including the highest level (decision objective), intermediate level (criteria or factors), and the lowest level (options or measures). This model clarifies the interconnections and affiliations among levels to form a multi-level analytical structure.

**Constructing the Judgment Matrix**

Experts are invited through questionnaires to compare and score the factors at each level. In this study, a 1-9 scale is used to score the pairwise comparisons between factors, with the factors being compared labeled as i and j. The scale is shown in Table 2.

**Table 2: Judgment Matrix Scale Values and Descriptions**

| Scale Value | Meaning |
|---|---|
| $a_{ij}=1$ | Equal importance between factor i and factor j. |
| $a_{ij}=3$ | Slightly more important: factor i is slightly more important than factor j. |
| $a_{ij}=5$ | Factor i is significantly more important than factor j. |
| $a_{ij}=7$ | Strongly more important: factor i is strongly more important than factor j. |
| $a_{ij}=9$ | Absolutely more important: factor i is absolutely more important than factor j. |
| $a_{ij}$=2,4,6,8 | Intermediate importance: the importance of factor i relative to factor j lies between the levels described above. |
| Reciprocal | If the relative importance scale of element i to element j is $a_{ij}$, then the relative importance scale of element j to element i is $a_{ji}=1/a_{ij}$。 |

The pairwise comparison judgment matrix established according to the hierarchical evaluation indicator system is as follows:

$$A_{n\times n}=\begin{bmatrix} a_{11} & a_{12} & a_{1..} & a_{1n} \\ a_{21} & a_{22} & a_{2..} & a_{2n} \\ a_{..} & a_{..} & a_{..} & a_{..} \\ a_{n1} & a_{n2} & a_{n..} & a_{nn} \end{bmatrix} \quad (1)$$

**To merge the expert matrices**

The geometric mean method is used. The scoring judgment matrices formed by m experts (m=1,2,..k)are multiplied element-wise, and then the m-th root is taken to obtain the integrated judgment matrix $I_{n\times n}$， the formula is as follows:

$$I_{n\times n}==\left(\prod_{k=1}^{m} a_{ij}^{k}\right)^{\frac{1}{m}}=\begin{bmatrix} i_{11} & i_{12} & i_{1..} & i_{1n} \\ i_{21} & i_{22} & i_{2..} & i_{2n} \\ i_{..} & i_{..} & i_{..} & i_{..} \\ i_{n1} & i_{n2} & i_{n..} & i_{nn} \end{bmatrix} \quad (2)$$

**Calculation of Indicator Weights**

The calculation of indicator weights is the core aspect of the Analytic Hierarchy Process (AHP). This paper employs the product-sum method to calculate the weights. First, the n column vectors of the integrated judgment matrix I are normalized to obtain $B=(b_{ij})_{n\times n}$, as follows:

$$b_{ij}=\frac{i_{ij}}{\sum_{i=1}^{n} i_{ij}} \quad (3)$$

Next, sum the row vectors of the normalized matrix to obtain $M_i$：

$$M_i=\sum_{j=1}^{n} b_{ij} \quad (4)$$

Finally, normalize the sum vector to obtain the weight vector $W_i$:

$$W_i=\frac{M_i}{\sum_{i=1}^{n} M_i}=\begin{bmatrix} W1 \\ W2 \\ \dots \\ W_n \end{bmatrix} \quad (5)$$

**Consistency Check of the Judgment Matrix**

The consistency check of the judgment matrix is a crucial step to ensure that the weight distribution of the elements within the matrix is reasonable and logically consistent. When the order of the judgment matrix is greater than 2, it is necessary to calculate the Consistency Index (CI) and the Consistency Ratio (CR). If the CR is less than 0.1, the judgment matrix is considered to have satisfactory consistency, and its weight distribution can be accepted. If the condition is not met, the matrix elements need to be adjusted until consistency requirements are satisfied.

The formula for calculating the Consistency Index (CI) is:

$$CI=\frac{\lambda_{max}-n}{(n-1)} \quad (6)$$

$\lambda_{max}$ is the largest eigenvalue of the judgment matrix. The calculation formula is as follows:

$$\lambda_{max}=\sum_{i=1}^{n}\frac{[IW]_i}{nW_i} \quad (7)$$

The Consistency Ratio (CR) is related to the Consistency Index (CI) and the Random Index (RI). The expression for CR is:

$$CR=\frac{CI}{RI} \quad (8)$$

The following table shows the standard values of the Random Index (RI), as presented in Table 3:

**Table 3: Average Random Consistency Index (RI) Values for Judgment Matrix**

| Order of the Matrix | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RI | 0 | 0 | 0.52 | 0.89 | 1.12 | 1.26 | 1.36 | 1.41 | 1.46 | 1.49 | 1.52 | 1.54 |

Consistency testing is a key step in the Analytic Hierarchy Process (AHP) to verify the rationality of the judgment matrix. It stipulates that when the consistency index (CI) is less than or equal to 0.1, the pairwise comparison matrix is considered to have reasonable consistency, indicating that the expert scoring results are reliable and the matrix exhibits good judgment consistency. However, if CI > 0.1, it implies poor matrix consistency, indicating significant deviations in expert pairwise comparisons of indicators, leading to unreasonable judgment results. In such cases, pairwise comparisons and judgments must be redone to ensure that the weight distribution of evaluation indicators is rational and scientific.

Through consistency testing, subjective errors in the expert scoring process can be effectively minimized, ensuring the accuracy and scientific validity of the data in applying AHP to the design evaluation of Suzhou Museum. Only when the consistency test is passed can the weights of each level indicator be finalized, ensuring that these weights are suitable for subsequent evaluation and decision-making processes.

## DATA CALCULATION

In this study, we utilized the yaahp 12.5 AHP software to input the hierarchical model and, based on the experts' ratings using the 1-9 scale, calculate the weights of the evaluation indicators at each level for Suzhou Museum. Expert selection involved considerations from two aspects: the appropriateness of the number of experts and the representativeness and authority of their professional expertise.

First, according to probability principles and the operability of the evaluation system, the number of experts should neither be excessive nor too few. Too many experts increase coordination and synthesis difficulties, while too few may compromise the representativeness and scientific validity of the evaluation results. Studies show that a moderate number of experts better ensures the rationality of the judgment matrix and the precision of the evaluation.

Second, the selected experts should have a deep understanding of Suzhou Museum's architectural design and related historical and cultural aspects. In particular, when addressing Suzhou's historical and cultural background, regional geographic conditions, urban development planning, ancient city patterns, and architectural heritage, the experts' in-depth research is crucial. Additionally, to ensure the objectivity, scientific validity, and comprehensiveness of the evaluation results, experts from diverse disciplines and fields were invited to participate in the assessment. This approach not only guarantees the professionalism of each evaluation dimension but also fosters a more scientific and comprehensive evaluation system through multi-perspective viewpoints.

Based on these principles, 9 experts were selected for this study (Table 9-8). These experts filled out the relevant judgment matrix based on the primary evaluation indicators. Through their professional judgments, we can calculate the weight of each indicator at various levels, providing a scientific basis and reliable quantitative data for the design evaluation of Suzhou Museum.

### Calculation of Primary Indicator Weights

For the primary indicator elements in the evaluation system of national cultural identity in Suzhou Museum, the matrix was assembled for the elements: A1 (Materiality), A2 (Spatial and Landscape Design), A3 (Light and Shadow Effects), and A4 (Symbols and Cultural Elements). After verifying that each matrix meets the consistency requirements, the geometric mean of the nine judgment matrices was calculated and combined according to Formula 2. The resulting integrated matrix is shown in the following table:

**Table 4：Integrated Judgment Matrix for Primary Indicators A1-A4 in the Evaluation System of National Cultural Identity for Suzhou Museum**

| A | A1 | A2 | A3 | A4 |
|---|---|---|---|---|
| A1 | 1 | 0.5444 | 0.5641 | 0.4707 |
| A2 | 1.8369 | 1 | 1.2915 | 0.5109 |
| A3 | 1.7726 | 0.7743 | 1 | 0.4136 |
| A4 | 2.1246 | 1.9574 | 2.4177 | 1 |

（1）Based on the table above, the integrated judgment matrix I is obtained：

$$I = \begin{bmatrix} 1 & 0.5444 & 0.5641 & 0.4707 \\ 1.8369 & 1 & 1.2915 & 0.5109 \\ 1.7726 & 0.7743 & 1 & 0.4136 \\ 2.1246 & 1.9574 & 2.4177 & 1 \end{bmatrix}$$

（2）Each column vector of the integrated matrix I is normalized to obtain matrix B：

$$B = \begin{bmatrix} 0.1446 \\ 1.212 \\ 0.5677 \\ 10.0545 \end{bmatrix}$$

（3）To obtain the eigenvector M from a new vector B, each component of B is raised to the fourth power. This process can be mathematically represented as follows:

$$M = \begin{bmatrix} 0.6166 \\ 1.0492 \\ 0.868 \\ 1.7807 \end{bmatrix}$$

（4）The vector M is normalized to obtain the weight vector W：

$$W = \begin{bmatrix} 0.1429 \\ 0.2432 \\ 0.2012 \\ 0.4127 \end{bmatrix}$$

（5）To calculate the maximum eigenvalue λmax：

$$IW = \begin{bmatrix} 1 & 0.5444 & 0.5641 & 0.4707 \\ 1.8369 & 1 & 1.2915 & 0.5109 \\ 1.7726 & 0.7743 & 1 & 0.4136 \\ 2.1246 & 1.9574 & 2.4177 & 1 \end{bmatrix} \times \begin{bmatrix} 0.1429 \\ 0.2432 \\ 0.2012 \\ 0.4127 \end{bmatrix} = \begin{bmatrix} 0.5831 \\ 0.9764 \\ 0.8135 \\ 1.6788 \end{bmatrix}$$

$$\lambda_{max} = \frac{1}{n}\sum_{i=1}^{n}\frac{[IW]_i}{W_i} = \frac{1}{4}\left(\frac{0.5831}{0.1429} + \frac{0.9764}{0.2432} + \frac{0.8135}{0.2012} + \frac{1.6788}{0.4127}\right) = 4.0515$$

（6）Consistency Check of the Judgment Matrix CR

$$CI = \frac{\lambda_{max} - n}{(n-1)} = \frac{4.0515 - 4}{4 - 1} = 0.0172$$

$$CR = \frac{CI}{RI} = \frac{0.01717}{0.89} = 0.0193 < 0.1$$

According to the above calculation process, the weights and consistency check results for the four primary evaluation indicators in Suzhou Museum, as determined by experts, are as follows: Symbols and Cultural Elements (A4) has a weight of 0.4127, ranking first, indicating that symbols and cultural elements occupy the most crucial position in Suzhou Museum's design. As a building embodying deep historical and cultural heritage, Suzhou Museum uses symbolic elements such as borrowed scenery, Chinese landscape painting, carvings, and decorations to convey the essence of traditional culture and cultural identity. Secondly, Spatial and Landscape Design (A2) has a weight of 0.2432, ranking second, showing its key role in shaping the spatial layering and fluidity of the museum. Through elements such as layout, courtyards, and water features, functionality and aesthetics are perfectly combined to provide visitors with a rich visual experience. Light and Shadow Effects (A3) has a weight of 0.2012, ranking third. Although relatively lower in importance, design elements such as natural lighting, light guidance, and light-shadow interaction add dynamism and layering to the space, enhancing the overall artistry and experiential quality. Materiality (A1) has a weight of 0.1429, ranking fourth. Despite being the least important, the application of materials such as white walls, black tiles, glass, and steel structures still has a significant impact on the museum’s design, reflecting a blend of tradition and modernity. Overall, experts consider Symbols and Cultural Elements to be the most critical factor in Suzhou Museum’s design, while Spatial and Landscape Design, Light and Shadow Effects, and Materiality each play supporting roles in different aspects, providing a scientific basis for evaluating the museum’s design. The summary of matrix weights and consistency check results is as follows:

**Table 5: Weight Calculation Results for A1-A4**

| Evaluation Indicator | Weight | Ranking | λmax | CI | CR |
|---|---|---|---|---|---|
| A4 Symbols and Cultural Elements | 0.4127 | 1 | 4.0515 | 0.0172 | 0.0193<0.1 Consistency check passed |
| A2 Spatial and Landscape Design | 0.2432 | 2 | | | |
| A3Light and Shadow Effects | 0.2012 | 3 | | | |
| A1Building Materials | 0.1429 | 4 | | | |

**Calculation of Secondary Indicator Weights**

For the secondary indicators within the Materiality group (A1), the matrix was assembled for the elements: A11 (White Walls and Black Tiles), A12 (Entrance door), A13 (Glass), A14 (Steel Structure), and A15 (Leak Windows). After verifying that each matrix meets the consistency requirements, the geometric mean of the nine judgment matrices was calculated and combined according to Formula 2. The resulting integrated matrix is shown in the following table:

**Table 6: Integrated Judgment Matrix for Secondary Indicators A11-A15 under Materiality**

| A1 | A11 | A12 | A13 | A14 | A15 |
|---|---|---|---|---|---|
| A11 | 1 | 2.4784 | 1.6273 | 2.1447 | 2.484 |
| A12 | 0.4035 | 1 | 0.559 | 0.5875 | 0.7587 |

| | | | | | |
|---|---|---|---|---|---|
| A13 | 0.6145 | 1.7888 | 1 | 1.269 | 1.6487 |
| A14 | 0.4663 | 1.7022 | 0.788 | 1 | 2.0356 |
| A15 | 0.4026 | 1.318 | 0.6065 | 0.4913 | 1 |

According to formulas 3, 4, 5, 6, 7, and 8, the weight and consistency calculations for the integrated matrix of A11-A15 yield the following ranking: White Walls and Black Tiles > Glass > Steel Structure > Leak Windows > Entrance Doors. Specifically, the weight of White Walls and Black Tiles is 0.342, ranking first, indicating that it is the most important material element in Suzhou Museum. Glass, with a weight of 0.2187, ranks second, highlighting the significance and application of modern materials in the museum. Steel Structure has a weight of 0.1943, ranking third, emphasizing its role in enhancing the building's stability and modern appeal. Leak Windows, with a weight of 0.128, ranks fourth, showing that although it holds cultural significance, its relative importance is slightly lower than the top three materials. Entrance Doors, with a weight of 0.117, ranks fifth, indicating its relatively limited application in the design.

Therefore, in the expert evaluation of the material elements in Suzhou Museum, White Walls and Black Tiles are regarded as the most important design element, followed by Glass and Steel Structure, while Leak Windows and Entrance Doors have relatively lower importance. The results of the weight calculations are shown in the following table:

**Table 7: Weight Calculation Results for A11-A15**

| Evaluation Indicator | Weight | Ranking | λmax | CI | CR |
|---|---|---|---|---|---|
| A11 White Walls and Black Tiles | 0.342 | 1 | 5.0426 | 0.0107 | 0.0095<0.1 Consistency check passed |
| A13Glass | 0.2187 | 2 | | | |
| A14 Steel structure | 0.1943 | 3 | | | |
| A15 Leak Windows | 0.128 | 4 | | | |
| A12 Entrance door | 0.117 | 5 | | | |

For the secondary indicators within the Spatial and Landscape Design group (A2), the matrix was assembled for the elements: A21 (Layout), A22 (Courtyard), A23 (Rock Formation), A24 (Water Feature Design), A25 (Bridge), A26 (Plants), and A27 (Corridor). After verifying that each matrix meets the consistency requirements, the geometric mean of the nine judgment matrices was calculated and combined according to Formula 2. The resulting integrated matrix is shown in the following table:

**Table 8: Integrated Judgment Matrix for A21-A27 under Spatial and Landscape Design**

| A2 | A21 | A22 | A23 | A24 | A25 | A26 | A27 |
|---|---|---|---|---|---|---|---|
| A21 | 1 | 1.4422 | 2.0801 | 1.8932 | 1.9449 | 1.4998 | 1.8949 |
| A22 | 0.6934 | 1 | 2.2497 | 1.8016 | 2.0602 | 1.0536 | 2.0119 |
| A23 | 0.4807 | 0.4445 | 1 | 0.6959 | 0.6022 | 0.5024 | 0.7159 |
| A24 | 0.5282 | 0.555 | 1.437 | 1 | 1.5507 | 0.3917 | 1.2875 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A25 | 0.5142 | 0.4854 | 1.6606 | 0.6449 | 1 | 0.52 | 0.9073 |
| A26 | 0.6668 | 0.9491 | 1.9903 | 2.553 | 1.9232 | 1 | 2.4341 |
| A27 | 0.5277 | 0.4971 | 1.3969 | 0.7767 | 1.1022 | 0.4108 | 1 |

According to the formulas, the weight and consistency calculations for the integrated matrix of A21-A27 yield the following ranking: Layout > Plants > Courtyard > Water Feature Design > Corridor > Bridge > Rock Formation. Specifically, Layout (A21) has a weight of 0.2183, ranking first, indicating that layout plays the most critical role in museum design, determining the overall spatial zoning and visitor flow planning. Plants (A26) rank second with a weight of 0.1965, reflecting the decorative and ecological importance of plant elements in Suzhou Museum. Courtyard (A22), with a weight of 0.1909, ranks third, highlighting the importance of courtyards as core design elements in traditional architecture, linking indoor and outdoor spaces and creating a tranquil atmosphere. Water Feature Design (A24) has a weight of 0.1138, ranking fourth, representing the aesthetic and cultural functions of water in museum design. Corridor (A27) and Bridge (A25) rank fifth and sixth, with weights of 0.0996 and 0.0992, respectively, indicating their roles in connecting different spaces and enhancing the walking experience. Rock Formation (A23), with a weight of 0.0817, ranks seventh. Although rock formations are classic elements in Suzhou gardens and contribute to spatial shaping, their relative importance in Suzhou Museum's design is lower. Therefore, in the expert evaluation of spatial and landscape design at Suzhou Museum, Layout, Plants, and Courtyard are considered the most important design elements, while Rock Formation plays a comparatively minor role. The results of the weight calculations are shown in the following table:

**Table 9: Weight Calculation Results for A21-A27**

| Evaluation Indicator | Weight | Ranking | λmax | CI | CR |
|---|---|---|---|---|---|
| A21 Layout | 0.2183 | 1 | 7.1048 | 0.0175 | 0.0128<0.1 Consistency check passed |
| A26 Plants | 0.1965 | 2 | | | |
| A22 Courtyard | 0.1909 | 3 | | | |
| A24 Water Feature Design | 0.1138 | 4 | | | |
| A27 Corridor | 0.0996 | 5 | | | |
| A25 Bridge | 0.0992 | 6 | | | |
| A23 Rocks | 0.0817 | 7 | | | |

For the secondary indicator elements in the A3 light and shadow effect group—A31 natural lighting, A32 light-shadow interaction, and A33 light guidance—matrix assembly is performed. After verifying that each matrix meets the consistency requirements, according to Formula 2, the geometric mean of the 9 judgment matrices is calculated and combined. The resulting integrated matrix is shown in the table below:

**Table 10: A31–A33 under A3 Light and Shadow Effects**

| A3 | A31 | A32 | A33 |
|---|---|---|---|
| A31 | 1 | 2.0596 | 2.9569 |
| A32 | 0.4855 | 1 | 0.8721 |
| A33 | 0.3382 | 1.1467 | 1 |

According to the formula, the integrated matrix for A31–A33 was used to calculate weights and consistency, resulting in the ranking: natural lighting > light-shadow interaction > light guidance. Specifically, natural lighting (A31) has a weight of 0.5523, ranking first, indicating that natural lighting dominates the light and shadow design of the Suzhou Museum. The application of natural lighting not only contributes to energy conservation and environmental protection but also maximizes light penetration into the building through transparent walls and roof design, enhancing spatial brightness and visual effects. Light-shadow interaction (A32) has a weight of 0.2271, ranking second, reflecting the significant role of light-shadow interaction in enhancing the architectural sense of visual depth. The interplay of light and architectural details adds a dynamic feel and depth to the space. Light guidance (A33), with a weight of 0.2206, ranks third; though its weight is relatively lower, it still plays a critical role in spatial flow and guiding viewing paths, directing the gaze and movement of visitors.

Thus, in expert evaluations of the Suzhou Museum's light and shadow design, natural lighting is regarded as the most essential design element, playing a key role in optimizing spatial brightness and enhancing overall visual effects. Although light-shadow interaction and light guidance have relatively lower weights, they still positively impact spatial layering and guide visitor movement. This evaluation provides a scientific basis for assessing the design of the Suzhou Museum and further clarifies the importance of each element in light and shadow design. The weight calculation results are shown in the table below:

**Table 11: Weight Calculation Results for A31-A33**

| Evaluation Indicator | Weight | Ranking | λmax | CI | CR |
|---|---|---|---|---|---|
| A31 Natural lighting | 0.5523 | 1 | 3.0277 | 0.0138 | 0.0266<0.1 Consistency check passed |
| A32 Light-shadow interaction | 0.2271 | 2 | | | |
| A33 Light guidance | 0.2206 | 3 | | | |

For the secondary indicator elements in the A4 Symbols and Cultural Elements group—A41 screen, A42 Chinese landscape painting, A43 carving and decoration, and A44 borrowed scenery technique—matrix assembly is performed. After verifying that each matrix meets the consistency requirements, according to Formula 2, the geometric mean of the 9 judgment matrices is calculated and combined. The resulting integrated matrix is shown in the table below:

**Table 12: Integrated Judgment Matrix for A41–A44 under A4**

| A4 | A41 | A42 | A43 | A44 |
|---|---|---|---|---|
| A41 | 1 | 0.292 | 0.3419 | 0.4481 |
| A42 | 3.4247 | 1 | 1.1022 | 0.7378 |
| A43 | 2.9252 | 0.9073 | 1 | 0.6325 |
| A44 | 2.2315 | 1.3553 | 1.581 | 1 |

According to the formula, the integrated matrix for A41–A44 was used to calculate weights and consistency, resulting in the following ranking: borrowed scenery technique > Chinese landscape painting > carving and decoration > screen. Specifically, the borrowed scenery technique (A44) has a weight of 0.3385, ranking first, highlighting its significance in museum design. This technique not only creates a profound spatial layering through the interaction of landscape and space but also embodies the Chinese garden aesthetic of "seeing the large in the small." Chinese landscape painting (A42) has a weight of 0.2957, ranking second, which underscores its essential role in cultural expression and aesthetic reproduction within the museum design, especially in interior decoration and landscape layout. Carving and decoration (A43), with a weight of 0.2605, ranks third, demonstrating its aesthetic value in detailed decoration. Although slightly less significant than other elements, it still enriches the building's cultural meaning. The screen (A41), with a weight of 0.1053, ranks fourth. Although screens are common in traditional Chinese interior design, their use in the Suzhou Museum is relatively limited, making them less significant in this evaluation.Thus, in the expert assessment of the Suzhou Museum's symbols and cultural elements, the borrowed scenery technique and Chinese landscape painting are regarded as the most crucial design elements, while carving and decoration and the screen, though culturally valuable, hold relatively lower importance. The weight calculation results are shown in the table below:

**Table 13: Weight Calculation Results for A41-A44**

| Evaluation Indicator | Weight | Ranking | λmax | CI | CR |
|---|---|---|---|---|---|
| A44 Borrowed scenery technique | 0.3385 | 1 | 4.0676 | 0.0225 | 0.0253<0.1 Consistency check passed |
| A42 Chinese landscape painting | 0.2957 | 2 | | | |
| A43 Carving and decoration | 0.2605 | 3 | | | |
| A41Screen | 0.1053 | 4 | | | |

The above calculation results are summarized to obtain the relative weights of each indicator. By progressively multiplying these relative weights, the comprehensive weights are determined. The comprehensive weights represent the hierarchical ranking of the lowest-level indicators in relation to the overall objective. The specific results are shown in the table below:

**Table 14: Summary of indicator weights**

| Target Level | Primary Indicator | Relative Weight | Secondary Indicator | Relative Weight | Comprehensive Weight |
|---|---|---|---|---|---|
| A Evaluation Indicator System for National Cultural Identity in Suzhou Museum | A1 Building Materials | 0.1429 | A11 White walls and black tiles | 0.342 | 0.0489 |
| | | | A12 Entrance door | 0.117 | 0.0167 |
| | | | A13Glass | 0.2187 | 0.0313 |
| | | | A14 Steel structure | 0.1943 | 0.0278 |
| | | | A15 Leak window | 0.128 | 0.0183 |
| | A2 | 0.2432 | A21Layout | 0.2183 | 0.0531 |

| | | | | | |
|---|---|---|---|---|---|
| | Spatial and Landscape Design | | A22 Courtyard | 0.1909 | 0.0464 |
| | | | A23 Rocks | 0.0817 | 0.0199 |
| | | | A24 Water Feature Design | 0.1138 | 0.0277 |
| | | | A25 Bridge | 0.0992 | 0.0241 |
| | | | A26 Plants | 0.1965 | 0.0478 |
| | | | A27 Corridor | 0.0996 | 0.0242 |
| | A3 Light and Shadow Effects | 0.2012 | A31 Natural lighting | 0.5523 | 0.1111 |
| | | | A32 Light-shadow interaction | 0.2271 | 0.0457 |
| | | | A33 Light guidance | 0.2206 | 0.0444 |
| | A4 Symbols and Cultural Elements | 0.4127 | A41Screen | 0.1053 | 0.0435 |
| | | | A42 Chinese landscape painting | 0.2957 | 0.122 |
| | | | A43 Carving and decoration | 0.2605 | 0.1075 |
| | | | A44 Borrowed scenery technique | 0.3385 | 0.1397 |

## SUMMARY

This study summarizes the evaluation process of the Suzhou Museum's design, primarily from the perspective of national cultural identification. This evaluation uses the Analytic Hierarchy Process (AHP) to assess architectural design across multiple dimensions. First, based on the cultural identification model , four primary evaluation indicators are identified: architectural materials, spatial and landscape design, light and shadow effects, and symbolic and cultural elements. These indicators represent the core characteristics of the museum's design.

Following this, several experts provided scores using the 1-9 scale method, and the weights of each indicator were calculated using yaahp12.5 software to ensure scientific and objective evaluation. In terms of specific design elements, materials such as whitewashed walls, dark roof tiles, glass, and steel structure illustrate the blend of tradition and modernity. The layout, courtyards, rockeries, and water features in spatial and landscape design reflect the fusion of traditional Chinese gardens with modern architecture. Light and shadow effects, achieved through natural lighting, light-shadow interaction, and light guidance, enhance spatial layering. Symbolic and cultural elements, such as the borrowed scenery technique, Chinese landscape paintings, and carvings, reinforce cultural heritage.

Through weight calculation and consistency testing, symbolic and cultural elements were identified as the most significant design factor, followed sequentially by spatial and landscape design, light and shadow effects, and architectural materials. Ultimately, this chapter provides a scientific basis for evaluating the design of the Suzhou Museum, clarifying how design language conveys national culture and offering in-depth insights into the integration of cultural heritage with modern architecture.

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