Optimization of Exhibition Space Design for Intangible Cultural Heritage: A Case Study of Li Ethnic Weaving and Embroidery Using AHP-TOPSIS

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Abstract. Intangible Cultural Heritage (ICH) faces significant threats from rapid modernization. Effective exhibition design plays a crucial role in heritage preservation by enhancing visitor engagement and cultural transmission. This study presents a systematic, quantifiable framework using Analytic Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methods to evaluate and optimize exhibition design, using Radiant Threads of Li People：Exhibition of Achievements in the Safeguarding of Tiraditional Li Textile Techniques of Spinning,Dyeing,Weaving and Embroidering as an empirical case study. Through expert consultation and visitor surveys, we evaluated three exhibition strategies (interactive experience-oriented, cultural immersion and symbolic narrative, and interactive experience-oriented and inheritor participation-oriented hybrid). The results showed that the interactive experience-inheritance hybrid strategy that emphasizes visitor interaction and on-site demonstrations by heritage practitioners is the best strategy for promoting the inheritance of intangible cultural heritage. This study provides measurable insights and suggestions for exhibition planners, which will help heritage protection practices.

Keywords: Intangible Cultural Heritage, Exhibition Design, AHP-TOPSIS, Visitor Interaction, Li Ethnic Textile Techniques.

1. Introduction

Intangible Cultural Heritage (ICH) encompasses traditional skills, practices, and knowledge that communities recognize as integral to their cultural identity, and its preservation is vital for cultural diversity and continuity. A prominent example is the traditional textile craftsmanship of the Li ethnic group in Hainan, China － spanning spinning, dyeing, weaving, and embroidery － recently inscribed by UNESCO on the Representative List of the Intangible Cultural Heritage of Humanity. Despite growing recognition of such heritage, current exhibition designs often lack interactivity and narrative depth, limiting audience engagement and understanding[17].

Recent advancements seek to address these issues: museums are increasingly leveraging immersive digital technologies to create interactive, narrative-rich experiences that actively engage visitors[17]. However, there remains a lack of structured evaluation methods to assess the effectiveness of these ICH exhibition strategies[9]. To fill this gap, this paper proposes a systematic evaluation framework based on a multi-criteria decision-making approach that combines Analytic Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) to rank exhibition design alternatives. The remainder of the paper is organized as follows: first the context and related work are reviewed, then the proposed methodology is detailed, followed by results and discussion, and finally conclusions are presented.

2. Literature Review

Intangible Cultural Heritage protection and inheritance has increasingly become a global concern due to rapid cultural globalization and modernization[1]. Many studies have emphasized the importance of using effective exhibition design as a key tool for cultural protection and dissemination[3]. The exhibition space that focuses on intangible cultural heritage is very different from the traditional museum exhibition space. The dynamic characteristics of intangible cultural heritage require interactive, immersive and culturally responsive space design to promote visitor participation and cultural understanding[2].

Scholar Qi Qingfu proposed that the continuation of "living inheritance" is the basic criterion for measuring the rationality of intangible cultural heritage protection methods[6]. International institutions like the V&A Museum and the Smithsonian have introduced immersive technologies such as VR and AR to enhance interaction[8]. In China, the Intangible Cultural Heritage Museum[12] and Suzhou Museum have adopted live demonstrations[7], weaving experiences, and local scene reconstructions to enrich engagement.

Effective exhibition design for ICH requires a balance between cultural representation and audience engagement. Core elements include authenticity, narrative coherence, multisensory interaction, and participatory experience[14]. Recent approaches emphasize interactive media, spatial storytelling, and inheritor performance to enhance "living" transmission. Technologies such as AR/VR and motion sensors are increasingly applied in ICH exhibitions to support dynamic display and audience co-creation[15].However, many current ICH exhibition designs remain overly static or fragmented, lacking systematic logic and audience-oriented feedback mechanisms. There is a growing demand for quantitative evaluation models to guide design optimization and cultural effectiveness[4],[13].

2.1 Principle and applicability of AHP-TOPSIS combined method

OrgThe analytic hierarchy process (AHP) and the technique for ranking ideal solutions by similarity (TOPSIS) methods are widely used in various fields such as urban planning, architectural design, and product design due to their ability to systematically handle multi-criteria decision-making problems[5].

2.1.1 Analytic Hierarchy Process (AHP)

The analytic hierarchy process (AHP) is a structured technique for organizing and analyzing complex decisions based on mathematics and psychology. It was developed by Thomas L. Saaty in the 1970s. It is a systematic quantification and analysis of expert opinions to effectively determine the importance of each evaluation indicator and ensure the logical rigor and scientific nature of the decision-making process.

2.1.2 Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)

The TOPSIS method determines the optimal solution based on the distance between the solution and the ideal or negative ideal solution. The TOPSIS method, first proposed by C.L. Hwang and K. Yoon in 1981, ranks a finite number of evaluation objects based on their proximity to an idealized target. It evaluates the relative superiority and inferiority of existing objects.

2.1.3 Technical roadmap framework

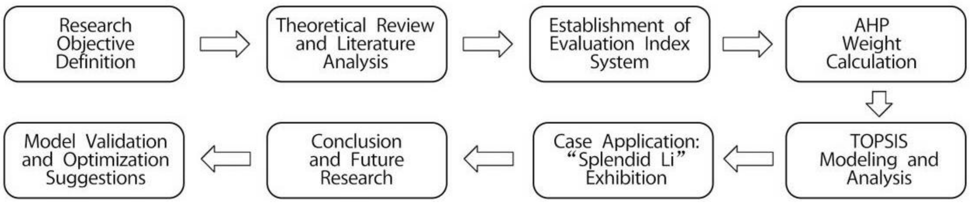

Fig. 1 Technical Framework Flowchart

3. Case Study Data Collection

3.1 Case Background: The "Splendid Li" Exhibition

This study selects the "Radiant Threads of Li People: Exhibition of Achievements in the Safeguarding of Tiraditional Li Textile Techniques of Spinning,Dyeing,Weaving and Embroidering" as its empirical case. The exhibition was held from December 6, 2024 to January 5, 2025 at the China National Intangible Cultural Heritage Museum. Centered on the traditional Li textile crafts and totemic symbols, the exhibition integrated live demonstrations by heritage bearers, interactive experience zones, process displays, and digital multimedia technologies. It systematically presented the historical development, technical characteristics, protection practices, and innovative achievements of Li textile dyeing, weaving, and embroidery.

3.2 Index system construction

To ensure a systematic and objective evaluation of exhibition design, this study constructs a multi-level index system based on literature review, expert consultation, and characteristics of intangible cultural heritage. The index system comprises three hierarchical levels: the overall goal layer, the criterion layer, and the sub-criterion layer.Each dimension is further refined into specific sub-criteria, as detailed in Table 1.

Table 1. ICH Exhibition Space Design Evaluation Index System

Target layer	Criterion layer	Sub criteria layer
AHP Hierarchical Structure for ICH Exhibition DesignEvaluation: Optimize lCH Exhibition DesignX	C_1:Cultural Expressiveness	$C_{1.1}$:Cultural symbolism
		$C_{1.2}$:Aesthetic presentation
	C_2:Completeness of Craft Demonstration	$C_{2.1}$:Full-process reproduction
		$C_{2.2}$:Process transparency
	C_3:Visitor Interaction	$C_{3.1}$:Interactive installations
		$C_{3.2}$:Personal engagement
	C_4:Immersive Experience	$C_{4.1}$:Environmental simulation
		$C_{4.2}$:Emotional storytelling
	C_5:Practitioner Involvement	$C_{5.1}$:Frequency of live performance
		$C_{5.2}$:Depth of interaction
	C_6:Educational Value	$C_{6.1}$: Knowledge clarity
		$C_{6.2}$: Learning effectiveness

A structured questionnaire was developed based on the multi-level evaluation index system, covering five key dimensions and twelve sub-criteria. Respondents were asked to rate each sub-criterion for different exhibition design schemes using a nine-point Likert scale, where higher scores indicate better performance. The questionnaire was reviewed by domain experts to ensure validity and clarity.The survey was conducted on-site during the exhibition period. A panel of nine experts—three museum curators, three ICH scholars, and three exhibition-design professionals—were invited to complete the pairwise comparison matrix for the five first-level criteria.

4. Evaluation and Results

4.1 AHP weight calculation steps and results

Calculate the weight vector of the indicator

Firstly, normalize the matrix using the following formula:

$$b_{ij} = \frac{a_{ij}}{\sum_{i=1}^{n} a_{ij}} \quad (i, j = 1, 2, \cdots n) \tag{1}$$

Where a_{ij} is the data in the i-th row and j-th column of the judgment matrix A, and b_{ij} is the data in the i-th row and j-th column of the normalization matrix.

Secondly, add up the elements in the matrix.

$$\overline{w_i} = \sum_{j=1}^{n} b_{ij} \quad (i, j = 1, 2, \cdots n) \tag{2}$$

Thirdly, normalize $\overline{w_i}$ in the above equation:

$$w_i = \frac{\overline{w_i}}{\sum_{i=1}^{n} \overline{w_i}} \quad (i = 1, 2, \cdots n) \tag{3}$$

Where w_i is the weight of the i-th indicator.

Fourth: Calculate the maximum eigenvalue of judgment matrix A

$$\lambda_{\max} = \frac{1}{n} \sum_{i=1}^{n} \frac{(Aw)_i}{w_i} \tag{4}$$

Where n is the order of the matrix, A is the judgment matrix, and w_i is the weight of the i-th indicator. $\lambda_{\max}$ is the maximum eigenvalue of matrix A.

The corresponding judgment matrices and weight vectors were calculated as shown in Tables 2–8. The weight vector for each matrix was derived by averaging the normalized column vectors.

The results show that, among the five primary evaluation dimensions, Visitor Interaction scored highest and Educational Value lowest; Cultural symbolism tops Cultural Expressiveness; live performance frequency leads Practitioner Involvement; emotional storytelling outweighs environmental simulation; interactive installations valued over personal engagement.

Table 2. Judgment matrix and weight of objective level A

	C_1	C_2	C_3	C_4	C_5	C_6	Weights
C_1	1	2	0.5	3	0.5	3	0.1831
C_2	0.5	1	0.33	2	0.5	2	0.1190
C_3	2	3	1	3	1	4	0.2868
C_4	0.33	0.5	0.33	1	0.33	2	0.0838
C_5	2	2	1	3	1	4	0.2682
C_6	0.33	0.5	0.25	0.5	0.25	1	0.0591

Table 3. Judgement Cultural Expressiveness C1 in eriteria level

	$C_{1.1}$	$C_{1.2}$	Weights
$C_{1.1}$	1	2	1.3333
$C_{1.2}$	0.5	1	0.6667

Table 4. Completeness of Craft Demonstration C2 in eriteria level

	$C_{2.1}$	$C_{2.2}$	Weights
$C_{2.1}$	1	1	0.5000
$C_{2.2}$	1	1	0.5000

Table 5. Visitor Interaction C3 in eriteria level

	$C_{3.1}$	$C_{3.2}$	Weights
$C_{3.1}$	1	0.5	1.3333
$C_{3.2}$	2	1	0.6667

Table 6. Immersive Experience C4 in eriteria level

	$C_{4.1}$	$C_{4.2}$	Weights
$C_{4.1}$	1	0.33	0.2555
$C_{4.2}$	3	1	0.7500

Table 7. Practitioner Involvement C5 in eriteria level

	$C_{5.1}$	$C_{5.2}$	Weights
$C_{5.1}$	1	0.5	1.3333
$C_{5.2}$	2	1	0.6667

Table 8. Educational Value C6 in eriteria level

	$C_{6.1}$	$C_{6.2}$	Weights
$C_{6.1}$	1	0.5	1.333
$C_{6.2}$	2	1	0.6667

4.1.1 Consistency verification

Consistency check is performed on the vectors and eigenvalues obtained earlier. If they pass the check, it means that the judgment matrix is reasonable and has explanatory value.

Assuming CI represents the consistency indicator, the following is the calculation method,

$$CI = \frac{\lambda_{\max} - n}{n-1} \quad (5)$$

By using the N value, the RI value can be obtained, the Random Consistency Index RI are shown in Table 9. thus obtaining the consistency ratio, that is

$$\mathrm{CR} = \frac{\mathrm{CI}}{\mathrm{RI}} \quad (6)$$

The consistency test of the target layer and the data of the six criterion layers (C1, C2, C3, C4, C5, C6) was carried out in turn, and it can be found that the CR values are all less than 0.1, which meets the consistency test. In order to analyze the degree of the 12 evaluation indicators more carefully, the comprehensive weights of each secondary indicator are calculated and ranked. The weight values of the comprehensive judgment matrix of design demand factors are shown in Table 10.

Table 9. Random Consistency Index RI

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
RI	0	0	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49	1.52	1.54	1.56	1.58	1.59	1.61

Table 10. Weight value of comprehensive judgment matrix of design demand

First level indicator	Weight 1	Secondary indicators	Weight 2	Comprehensive weight	Sort
C_1:Cultural Expressiveness	0.1831	C1.1:Cultural symbolism	1.3333	0.2441	3
		C1.2:Aesthetic presentation	0.6667	0.1221	6
C_2:Completeness of Craft Demonstration	0.119	C2.1:Full-process reproduction	0.5000	0.0595	9
		C2.2:Process transparency	0.5000	0.0595	10
C_3:Visitor Interaction	0.2868	C3.1:Interactive installations	1.3333	0.3824	1
		C3.2:Personal engagement	0.6667	0.1912	4
C_4:Immersiv	0.0838	C4.1:Environmental simulation	0.2500	0.0210	12

e Experience		C4.2 :Emotional storytelling	0.7500	0.0629	8
C_5:Practitioner Involvement	0.2682	C5.1:Frequency of live performance	1.3333	0.3576	2
		C5.2:Depth of interaction	0.6667	0.1788	5
C_6:Educational Value	0.0591	C6.1: Knowledge clarity	1.3333	0.0788	7
		C6.2: Learning effectiveness	0.6667	0.0394	11

4.1.2 Design evaluation object

Based on the AHP results, the comprehensive weights and rankings of the six primary dimensions and their twelve sub-criteria offer valuable insights for optimizing intangible cultural heritage (ICH) exhibition space design (see Table 10). he design prioritized six key elements: visitor interactivity, practitioner participation, cultural expression, completeness of craft demonstration, immersive experience, and educational value.

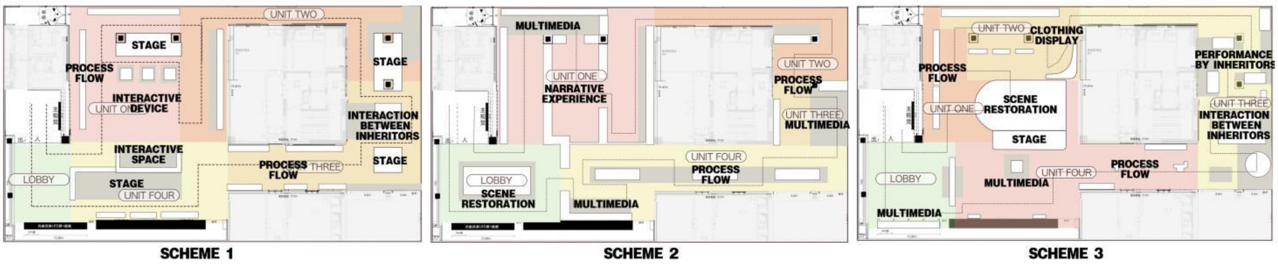

Fig. 2 Three schemes

1) Scheme 1: Interaction-Oriented Exhibition Space

This scheme divides the exhibition into spinning, weaving, dyeing, and embroidery zones, each with digital interactives, workshops, and costume experiences. Frequent live demonstrations and immersive media engage visitors, while Li motifs and clear guides enrich cultural understanding and multisensory participation.

2) Scheme 2: Cultural Immersion and Symbolic Narrative

The exhibition features four narrative zones—Origins and Myth, Craft Transmission, Daily Life and Ritual, and Innovation—guiding visitors through symbolic environments with authentic materials and large-scale reconstructions. Heritage demonstrations, interactive storytelling, and guided tours enrich cultural depth and emotional engagement.

3) Scheme 3: Practitioner-Led Hybrid Exhibition

This schemeThe program is centered around areas led by craftsmen such as weaving, dyeing, weaving and embroidery, and offers activities such as live demonstrations, visitor participation, and intangible cultural heritage workshops. Multimedia aids enhance the visit without compromising authenticity, expand audience participation, and support the dynamic transmission of intangible cultural heritage.All three schemes adhere to the traditional spatial logic of ICH exhibition halls, using craft-based zoning as the foundation while building differentiated experiences around interaction, immersion, and practitioner-led engagement. Each approach offers a distinct visitor journey and optimizes the balance between cultural integrity, educational value, and participatory innovation.

4.2 Design evaluation based on TOPSIS

The original data of three design schemes were collected, The initial evaluation matrix is shown in Table 11.The three design schemes were combined into a scheme set, and 12 evaluation indicators were defined according to the 12 design elements of the sub-criteria layer in the AHP model (Table 1). It can be seen that all 12 evaluation indicators are positive indicators. In order to ensure the objectivity and effectiveness of the evaluation results, 30 visitors (16 females and 14 males; aged 18-55 years old) were randomly selected during the exhibition. A 1-9 Likert scale was used. The arithmetic mean of the scoring results was used as the initial scoring result.

Table 11. Initial evaluation matrix

Design Scheme	Evaluation Index											
	$C_{1.1}$	$C_{1.2}$	$C_{2.1}$	$C_{2.2}$	$C_{3.1}$	$C_{3.2}$	$C_{4.1}$	$C_{4.2}$	$C_{5.1}$	$C_{5.2}$	$C_{6.1}$	$C_{6.2}$
Scheme 1	7.340	7.698	8.526	8.814	5.147	5.051	4.376	3.677	3.069	2.822	6.226	5.881
Scheme 2	8.132	8.386	7.999	7.249	6.374	6.068	7.838	8.228	7.022	6.596	5.842	5.418
Scheme 3	8.773	8.870	8.342	8.648	8.595	8.821	7.246	7.375	8.962	8.916	7.443	7.872

The data collected from the three design schemes were weighted and standardized, and the weighted standardized evaluation matrix is shown in Table 12.

Table 12. Weighted standardized evaluation

Design Scheme	Evaluation Index											
	$C_{1.1}$	$C_{1.2}$	$C_{2.1}$	$C_{2.2}$	$C_{3.1}$	$C_{3.2}$	$C_{4.1}$	$C_{4.2}$	$C_{5.1}$	$C_{5.2}$	$C_{6.1}$	$C_{6.2}$
Scheme 1	0.112	0.052	0,048	0.056	0.104	0.051	0.003	0.014	0.065	0.029	0.036	0.013
Scheme 2	0.173	0.088	0.038	0.031	0.190	0.085	0.016	0.055	0.259	0.120	0.031	0.009
Scheme 3	0.225	0.115	0.044	0.053	0.352	0.184	0.014	0.048	0.355	0.176	0.057	0.029

Calculate the weighted norm matrix

The main purpose of this step is to reduce the influence of subjective factors. The weight calculated in the previous step is multiplied by the standardized data, as shown below:

$$Z_{ij} = y_{ij} * w_j \tag{1}$$

Determine positive and negative ideal solutions and Euclidean distances

The purpose of this calculation step is to define different indicators. The closer the indicator vector value is to the positive ideal solution, the better the performance, and vice versa, as shown below:

Positive ideal solution:

$$Z_j^+ = \max \quad (Z_{1j,} Z_{2j,} ..., Z_{nj,}) \tag{2}$$

Negative ideal solution:

$$Z_j^- = \min \quad (Z_{1j,} Z_{2j,} ..., Z_{nj,}) \tag{3}$$

From this, the positive ideal solution Z_j^+ of the evaluation object can be obtained as (0.244124, 0.122112, 0.059506, 0.059506, 0.382438, 0.191219, 0.021002, 0.062906, 0.357636, 0.178818, 0.078808, 0.039404), and the negative ideal solution Z_j^-= (0.000024, 0.000012, 0.000006,0.000038, 0.000019, 0.000002, 0.000006, 0.000036, 0.000018, 0.000008, 0.000004)

The Euclidean distance calculation formula obtained by the positive and negative ideal solutions is:

$$d_i^+ = \sqrt{\sum_{j=1}^{n} (z_{ij} - z_j^+)^2} \tag{4}$$

$$d_i^- = \sqrt{\sum_{j=1}^{n} (z_{ij} - z_j^-)^2} \tag{5}$$

Calculate the ideal closeness

$$C_i = \frac{d_i^-}{d_i^- + d_i^+} \tag{6}$$

Table 13. Comparison of euclidean distance and relative closeness

	Forward ideal solution distance	Negative ideal solution distance	Relative closeness	sort
Scheme 1	0.4950	0.2167	0.3040	3

Scheme 2	0.2779	0.4189	0.6009	2
Scheme 3	0.0636	0.6276	0.9080	1

The TOPSIS analysis indicates that the practitioner-led hybrid exhibition scheme (Scheme 3) achieves the highest overall performance across all evaluation dimensions, including cultural expressiveness, craft demonstration completeness, visitor interaction, immersive experience, practitioner involvement, and educational value.

This result demonstrates that a design approach centered on frequent live demonstrations, deep practitioner-audience engagement, and integrated participatory activities is most effective for intangible cultural heritage exhibitions. By enabling visitors to directly participate in and co-experience traditional craft processes under the guidance of heritage bearers, this hybrid model optimally supports both cultural transmission and audience engagement.

5. Conclusion and Recommendations

This study systematically evaluated three exhibition design schemes for Li intangible cultural heritage using the AHP-TOPSIS multi-criteria decision-making framework. The findings demonstrate that a practitioner-led hybrid model—combining frequent live demonstrations with interactive and participatory activities—most effectively enhances visitor engagement, cultural expression, and heritage transmission. The results highlight the importance of integrating practitioner involvement and audience interaction as core strategies in optimizing intangible cultural heritage exhibitions.

5.1 Research Limitations

Several limitations should be acknowledged. First, the sample size for the audience survey was limited, potentially affecting the generalizability of the results. Second, the case study focused exclusively on Li textile heritage, which may limit the applicability of the findings to other types of intangible cultural heritage. Additionally, the evaluation relied primarily on subjective survey data and expert assessments, without incorporating longitudinal follow-up or objective behavioral analytics.

5.2 Recommendations for Future Research

Future research should expand the sample size and diversity of participant demographics to improve the robustness of evaluation results. Comparative studies involving different types of intangible heritage and varied exhibition contexts are recommended to validate the model's applicability. Further, recommended to explore the role of emerging digital technologies, such as AI-driven personalization and immersive media, in enhancing both the transmission and experiential dimensions of heritage exhibitions.

References

[1] LIU Kui-li. On the Protection of Chinese Intangible Cultural Heritage under Globalization [J]. Henan Social Sciences, 2007(01):25-34+171.

[2] LI Feng. Research on the Narrative of Intangible Cultural Heritage Display [D]. Beijing: China National Academy of Arts, 2021.

[3] AL KHALIFA Haifa-Ebrahim, JIWANE Anamika-Vishal. Visitors' Interactions with the Exhibits and Behaviors in Museum Spaces: Insights from the National Museum of Bahrain [J]. Buildings, 2025,15(8):1324.

[4] ZHANG Lei, FU Di, ZHAO Jin-long. An Empirical Study on the Digital Display Design of Intangible Cultural Heritages Based on Audience Satisfaction [J]. Discrete Dynamics in Nature and Society, 2022:9501415-1-16.

[5] REN Yu-jie, CHEN Rui-qi, WEI Zi-yi. Product Design Research of Youth Stress Relief Toys Based on AHP-TOPSIS Model [J]. Packaging Engineering, 2024,45(08):178-188.

[6] QI Qing-fu. Sustained "Living Transmission" as a Basic Criterion for Rational Protection of Intangible Cultural Heritage [J]. Journal of South-Central University for Nationalities (Humanities and Social Sciences), 2009,29(03):1-4.

[7] YANG Hong. Frontier of Intangible Cultural Heritage Display and Communication [M]. Beijing: Tsinghua University Press, 2017.

[8] MONETA Andrea, HODGSON N., FEARON E. Re-interpreting Intangible Cultural Heritage through Immersive Live Performances to Enhance Memory-Based Institutions and Foster Community Engagement [J]. International Journal of Heritage Studies, 2025,31(5):640-661.

[9] ZHANG Jin-xia, GAO Dong-meng. The "Living Narrative" and Relational Construction of Intangible Cultural Heritage Curation [J]. Art and Folklore, 2021(02):11-17.

[10] WANG Shan-shan, ZHANG Lei, ZHAO Jin-long. Research on the Strategy of Promoting the Revitalization of Traditional Crafts by Personalized Design in Intangible Cultural Heritage Exhibition [C]. SHS Web of Conferences, 2023,162:02001.

[11] LI Jia-qi. Research on Display Design of Intangible Cultural Heritage Based on Literary Narrative Theory: A Brief Review [J]. Journal of Education, Humanities and Social Sciences, 2022,5:370-377.

[12] SU Dan, MA Yue. Forms and Boundaries of Intangible Cultural Heritage Museums [J]. China Intangible Cultural Heritage, 2024(06):6-16.

[13] WANG Mei-shi. Definition, Classification and Value Pursuit of Intangible Cultural Heritage Exhibition [J]. Southeast Culture, 2021(05):19-24.

[14] SMITH Laurajane. Uses of Heritage [M]. London: Routledge, 2006.

[15] LIN Yu-ju, MA Jui-ping, CHEN Jun-liang. Cultural Creativity in Design Exhibition—A Case Study of Emotional Effects Experienced by the Audience [C]. In: Proceedings of the 6th International Conference on Cross-Cultural Design, 2014:225-233.

[16] Ren, Yu-jie, Rui-qi Chen, and Zi-yi Wei. 2024. "Product Design Research of Youth Stress-Relief Toys Based on the AHP‑TOPSIS Model." Packaging Engineering 45, no. 8: 178‑188.

[17] Meng, W. S., & Dolah, J. (2024). Interaction Design and Analysis of Exhibition Narrative Models in Cultural Heritage Museums.