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Research Article

Cultural Echoes in Modern Design: Assessing Young Consumers' Perceptions of Traditional Bamboo Weaving Patterns

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This study, employing convenience sampling of art specialists, investigates the emotional resonance of young consumers with Chinese bamboo patterns, underscoring their significance in the realm of contemporary design. Through the lens of Kansei engineering, we delve into the intricate world of bamboo weaving patterns, scrutinizing their perceptual evaluations and user preferences among 104 art university students aged 18–23. Our analysis not only identifies pivotal factors for innovative redesign but also underscores the pivotal role of these traditional patterns in enhancing the emotional and aesthetic appeal of products for the younger generation. The findings illuminate a notable appreciation among this demographic for the ecofriendly and culturally rich bamboo patterns, positioning them as essential elements in modern lifestyle products. The study advances the discourse on integrating cultural heritage into product innovation, advocating for designs that resonate with the aesthetic sensibilities and environmental values of today's youth. This aligns with the critical insights into the various categories of patterns and their diverse applications in contemporary design, addressing the cognitive gap between designers and consumers and highlighting the importance of cultural motifs in product development.

1. Introduction

Bamboo, a vital natural resource in China, has a long history of diverse industrial applications [1]. Serving as a material embodiment of ancient Chinese culture, it captures the essence of traditional practices and aesthetics [2]. Throughout its evolution, bamboo has fostered exchanges and influences with other regions, particularly in Asia [3]. Found across Asia, Africa, and Central and South America [4], bamboo is prized for its sustainability [5], flexibility, and ease of fabrication. It is commonly used in crafting woven products like mats, boxes, and baskets. Today, bamboo's traditional cultural and technological significance continues to inspire modern design, extending to housing structures, furniture, and lifestyle products [6].

Traditional bamboo patterns, integral to Chinese arts and crafts, feature prominently in bamboo weaving and carving [7]. These weaving products showcase distinct weaving techniques, shapes, patterns, and colors [8]. As a longstanding motif in Chinese art and culture, these patterns have adorned various art forms, including paintings, textiles, and ceramics, for centuries [9]. Their intricate and delicate designs symbolize strength, resilience, and prosperity [10]. With the growing integration of bamboo materials in modern design, the visual impact of these traditional patterns has become increasingly significant [11].

This study focuses on evaluating the visual impressions of bamboo patterns as perceived by young Chinese consumers aged 18–24. It seeks to understand these consumers' emotional perceptions of bamboo weaving patterns, aiming

to identify key influencing factors. These factors are crucial for leveraging innovative redesign strategies in contemporary applications of these traditional patterns [12, 13].

2. Materials and Methods

2.1. Bamboo Weaving Craft Sample. The art of bamboo weaving in China, notably sophisticated by the Song Dynasty era (approximately 960 to 1279 AD), has been an elegant testament to craftsmanship, deeply ingrained in the cultural and daily life of the imperial court and affluent families. Joseph Needham's seminal work, "Science and Civilisation in China," Volume 6, highlights bamboo's unparalleled significance in China's artistic and technological evolution. This rich historical backdrop underscores the deep-rooted heritage and cultural importance of bamboo weaving, a craft utilizing bamboo silk or splints across various weaving techniques [14, 15].

The traditional bamboo weaving patterns explored in this study originate from centuries of evolution within Chinese folk art. Under the guidance of Mr. Qian Lihui, a distinguished inheritor of bamboo weaving, the research team embarked on an extensive study of these patterns. Through visits to artisans and collections across China, Mr. Qian curated 120 patterns reflective of bamboo weaving's historical development, meticulously documented in his publication.

This craft, evolving into hundreds of styles through primary weaving methods, leads to a rich tapestry of pattern designs, each bearing unique cultural significance [16–18]. Selected bamboo weaving pattern samples derive from the "Wuzhen Bamboo Weaving" technique inheritors in Zhejiang, China, a family that has preserved this craft over five generations [19]. From their extensive collection, a diverse range encapsulating the majority of variants from fundamental weaving techniques was chosen, classified by pattern meanings including characters, plants, and geometric shapes.

Under Mr. Qian's mentorship, the research team utilized four weaving techniques—herringbone, cross, hexagonal, and circular—and concentrated on four main pattern types: textual, geometric, natural, and textural. This meticulous selection process, integrating the expertise of skilled artisans with the visual interpretation of designers, resulted in 48 distinct bamboo weaving patterns. These patterns, embodying 12 different meanings, showcase the versatility and cultural depth of bamboo weaving techniques, reaffirming its historical and aesthetic value.

In synthesizing and filtering our samples, we ensured each maintained its unique characteristics and relevance, thus providing a solid foundation for our experimental study. In preparation for the experiment, an orientation session was conducted for participants to acquaint them with the cultural significance and contemporary applications of bamboo weaving, underscoring its integration into daily products and furniture. This briefing included the presentation of images showcasing various items enhanced by bamboo weaving patterns, illuminating the craft's aesthetic and practical relevance in modern life. The discussion extended to bamboo's environmental advantages, practicality, and safety features, highlighting its suitability for innovative design solutions. Through this comprehensive introduction, participants were equipped with a nuanced understanding of bamboo weaving's potential, encouraging a more informed evaluation of the patterns with respect to traditional and modern design paradigms.

2.2. Four Types of Bamboo Weaving Patterns and Variations. The classification of bamboo weaving techniques is categorized based on different analysis perspectives, standards, and research methodologies. Primarily, it is bifurcated into two main categories: common weaving methods and decorative weaving methods [20, 21]. This distinction is rooted in the techniques' differing functionalities, focusing either on practical utility or on decorative purposes.

In bamboo weaving, common weaving techniques prioritize functionality and encompass methods like "herringbone weave," "cross weave," "hexagonal weave," and specialized methods for circular objects, such as "spiral weave" and "round surface weave" for vessel bottoms, along with "twist thread weave" for closures. These four types form the core of various patterns. Decorative weaving, on the other hand, includes techniques like "bamboo slip weave," "elastic flower," "inserting ribs," and "hard board flower," which are essentially creative variations and combinations of the original methods to enhance decorative appeal.

(i) "Ren Zi"weaving: The Herringbone Weaving

The herringbone weave is named for its resemblance to the Chinese character "ren." This weaving technique involves alternating patterns of "picking two and pressing two" or "picking three and pressing three." In this method, warp and weft threads interlock tightly. When the threads have equal width, it results in a uniform pattern. If the widths vary, the outcome is a diagonal pattern with differing widths. This technique's precision in thread handling creates distinct visual effects based on thread proportions.

(ii) "Shi Zi" Weaving: The Cross Weaving

The cross weave, characterized by its cross-shaped pattern, is a fundamental and widely used weaving technique prevalent in various everyday agricultural products. Many decorative weaving styles are derived from this basic method, showcasing its versatility and foundational role in bamboo weaving practices.

(iii) "Liu Jiao" Weaving: The Hexagonal Weaving

The hexagonal weave, a significant category in bamboo weaving, involves a three-way crossover pattern using bamboo strips. This technique does not distinguish between warp and weft, creating a unique interlacing effect. The weave's width and density can vary, resulting in hexagonal shapes of

different sizes. This diversity in execution allows for a wide range of aesthetic and structural variations within the hexagonal weave category.

(iv) The Circular Weaving and Others

Techniques like the "spiral weave," "round surface weave," and "twist thread weave" are specialized for different parts of circular objects. These techniques vary in density and patterns due to their distinct weaving methods. For the purposes of this experiment, they are grouped together for variation analysis, acknowledging their shared characteristics despite their individual differences in application and appearance.

The bamboo material samples in this study were categorized into eight groups based on four types of patterns, with a distinction between monochrome and colorful. This resulted in a total of 48 samples for analysis as shown in Figure 1.

2.3. Evaluation Method

2.3.1. Collecting the Impression Words. The whole samples were analysed using the Kansei engineering approach. Emotional imagery is an important research method in industrial design [22, 23]. Kansei Engineering (KE), originating in Japan in the 1970s, is a methodology used for affective engineering. It plays a crucial role in product development by translating consumer feelings and psychological needs into tangible design parameters. In today's society, the advancement of market economy has driven the need for product design to not only fulfill consumers' rational and material needs but also increasingly emphasize their emotional and aesthetic desires [24]. Kansei engineering focuses on understanding consumer emotions (Kansei), reflecting these emotions in product design, and creating systems for Kansei-oriented design. KE involves several steps, including choosing a product domain, spanning semantic and product properties spaces, and synthesizing these to link abstract feelings with technical specifications. The method's strength lies in its ability to establish and quantify connections between subjective emotional responses and concrete product features, a capability not adequately addressed by other methods in affective engineering. It has become one of the significant factors in enhancing the added value of products and promoting innovation and development [25].

In existing studies, semiotic vocabulary describing sensory imagery of patterns encompasses terms like beautiful, moving, and interesting [26].

Our survey sought demographic information, familiarity with Chinese traditional bamboo patterns, and visual impression evaluations. We observed participants' reactions to the samples and noted their associations with the samples' characteristics. This study, focusing on young Chinese consumers, used a survey method to gather data, recognizing the traditional and contemporary significance of bamboo materials in product design. We surveyed 104 individuals aged 18–24, half with an art and design background and half with other professional backgrounds.

Integrating keywords gathered from existing literature and magazines related to bamboo weaving, students employed divergent thinking methods to expansively generate a total of 320 words. The semantic expert panel then meticulously scrutinized these 320 collected words, summarizing and consolidating them into 15 pairs of adjectives, as shown in Figure 2, to be utilized in subsequent semantic scales. The initial pool of 320 impression words was methodically refined based on their semantic similarities. This process involved selecting words according to their average frequency value, leading to the final selection of 15 representative adjectives. Subsequently, a semantic differential (SD) Likert scale, ranging from −3 to 3, was developed to evaluate the visual impressions these adjectives conveyed on bamboo materials. The gathered data were rigorously analysed using both descriptive and inferential statistical methods to ensure a comprehensive understanding of the semantic implications.

2.3.2. Subject. The total participants were 104 people (52 with art and design learning background and 52 with other professional learning backgrounds), between the age of 18–23 years. The participants are primarily undergraduate students in their second to fourth years majoring in product design and cultural industry management at the Communication University of Zhejiang. Their ages range from 18 to 23. Participants come from various regions, including major cities such as Beijing, Guangzhou, Shenzhen, and Shanghai, as well as western regions like Xinjiang, Guizhou, and Shaanxi, and several provinces including Jilin, Zhejiang, Jiangxi, and Shanxi. This coverage essentially spans most parts of China. Among them, 52 participants have an artistic background in disciplines such as animation design, product design, and photography, while the remaining 52 have backgrounds in other disciplines such as management and network media communication. We believe that the diverse hometowns and educational backgrounds contribute to a more comprehensive understanding of the perceptions of young consumers from different regions in China regarding bamboo weaving patterns, thereby enhancing the validity of the data.

2.3.3. Procedure. The study's methodology involved an interactive exhibition in an arranged hall, as depicted in Figure 3, where participants engaged with 48 displayed bamboo weaving patterns. Upon entering, individuals used digital devices to scan QR codes adjacent to each sample, facilitating a unique blend of traditional craft appreciation and modern technology. This setup allowed for the collection of standardized data through semantic differential (SD) scales on electronic devices. Concurrently, the research highlighted bamboo weaving's adaptability in modern products, emphasizing its potential in contemporary design. This dual approach not only gathered structured feedback through descriptive adjectives but also showcased the craft's relevance and appeal to younger consumers, blending heritage with innovation. The analysis of participant impressions, distilled from a comprehensive dataset into key

Figure 1: Sample of bamboo weaving craft.

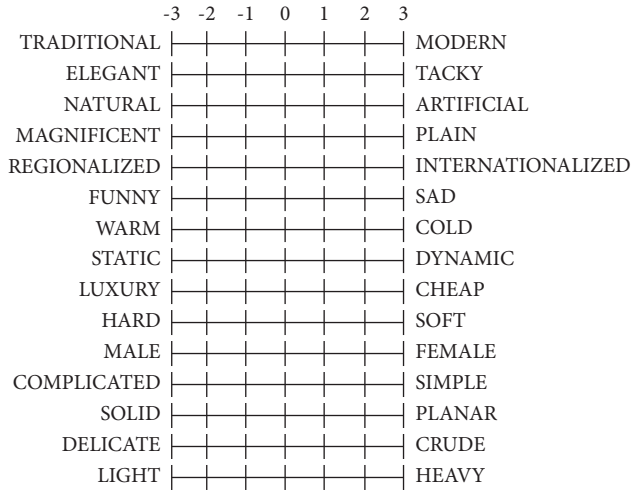

Figure 2: 7-point (-3-3) scale of semantic differential (SD) questionnaire.

Figure 3: Samples and QR codes and scenarios of the process of experimental evaluation.

adjectives and their antonyms, further refined the study's insights, laying a foundation for future product design explorations that integrate traditional crafts with modern aesthetics.

2.3.4. Visual Impression Evaluation Method. The evaluation of bamboo weaving patterns' visual impressions was conducted using factor analysis in IBM SPSS. This analysis aimed to understand the factor structure of these impressions based on people's perceptions.

To complement this, structural equation modeling (SEM) was utilized in AMOS software, enhancing the understanding and confirmation of the impressions identified through factor analysis [27]. SEM was instrumental in pinpointing influential variables and their significant interrelationships [28], clarifying which variables most significantly impact the visual appeal of the material samples.

3. Results

3.1. Evaluating Factor Structure of Visual Impressions

3.1.1. Factor Structure Reflect. The results from the factor analysis, assessing visual impression characteristics, are considered acceptable and reflective of the perceptions of young Chinese consumers.

As shown in Table 1, the Kaiser–Meyer–Olkin (KMO) measure is 0.739, surpassing the 0.7 threshold, indicating suitability for factor analysis. In addition, Bartlett's test of sphericity yields an approximate chi-square value of 830.283 with 105 degrees of freedom and a p value below 0.01. This significant result at the 1% level confirms the scale's high suitability for exploratory factor analysis.

3.1.2. Factor Structure Reflect. As shown in Table 2 and Figure 4, the factor extraction statistics for the 15 variables in the scale reveal three factors with eigenvalues greater than 1,

Table 1: KMO and Bartlett's test of sphericity.

Kaiser–Meyer–Olkin	Bartlett's test of sphericity		
0.739	Approximate Chi square	degrees of freedom	*P*
	830.283	105	<0.01

Table 2: Total variance.

Element	Initial eigenvalue			Extract square and load			Rotate sum of squares load		
	Total	Variance	Accumulation	Total	Variance	Accumulation	Total	Variance	Accumulation
1	6.072	40.482	40.482	6.072	40.482	40.482	4.358	29.055	29.055
2	4.385	29.237	69.718	4.385	29.237	69.718	4.161	27.742	56.797
3	1.564	10.427	80.145	1.564	10.427	80.145	3.502	23.348	80.145
4	0.814	5.427	85.572	—	—	—	—	—	—
5	0.719	4.794	90.366	—	—	—	—	—	—
6	0.531	3.542	93.908	—	—	—	—	—	—
7	0.243	1.617	95.525	—	—	—	—	—	—
8	0.182	1.210	96.736	—	—	—	—	—	—
9	0.153	1.019	97.754	—	—	—	—	—	—
10	0.113	0.756	98.510	—	—	—	—	—	—
11	0.083	0.551	99.061	—	—	—	—	—	—
12	0.047	0.314	99.375	—	—	—	—	—	—
13	0.042	0.278	99.653	—	—	—	—	—	—
14	0.031	0.204	99.857	—	—	—	—	—	—
15	0.021	0.143	100.000	—	—	—	—	—	—

*Extraction method: principal component analysis.

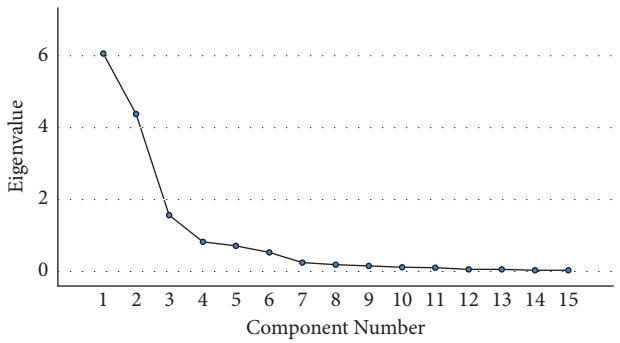

Figure 4: Scree plot.

cumulatively accounting for 80.145% of the total variance. This suggests that these three factors provide a robust explanation of the original data. Specifically, Factor 1 has an eigenvalue of 6.072 (40.482% of explained variance), Factor 2 has an eigenvalue of 4.385 (29.237%), and Factor 3 has an eigenvalue of 1.564 (10.427%).

The factor analysis results allow for the evaluation of the factor structure of visual impressions from young Chinese consumers. The results indicate that clarity and confirmatory factors related to visual appeal exert the most influence and have the strongest relationship with the overall impressions.

Table 3 outlines three factors identified in the study. Factor 1, interpreted as "cheerful," includes five impression words: hard-soft, male-female, warm-cold, funny-sad, and light-heavy. Factor 2, labeled as "style," comprises complicated-simple, luxury-cheap, delicate-crude, natural-artificial, and magnificent-plain. Last, Factor 3, denoted as "unique," encompasses traditional-modern, regionalized-internationalized, static-dynamic, elegant-tacky, and solid-planar. Each factor groups together specific impression words that collectively represent a unique aspect of the visual impressions.

4. Discussion

4.1. Visual Impressions from the Bamboo Weaving Samples. The results of the factor analysis enable us to assess the structure of visual impressions among young Chinese consumers. Importantly, the variables of clarity and confirmatory aspects in visual appeal emerge as the most influential and have the strongest relationships with these impressions. This highlights their critical role in shaping the overall visual impact perceived by this demographic.

In Figure 5, the SEM path diagram illustrates the clarity and confirmatory factors in visual impressions as perceived by young Chinese consumers. The SEM results, detailed in Table 4, show various fit indices: a goodness-of-fit index (GFI) of 0.518, an adjusted goodness-of-fit index (AGFI) of 0.335, a comparative fit index (CFI) of 0.602, and a root mean square error of approximation (RMSEA) of 0.290. The diagram displays 15 direct variables. The chi-square value is 423.617 with a significance level (p value) of less than 0.05 and a cmin/df value of 4.869.

The SEM analysis factor loadings are detailed in Table 5, showing the factor loading coefficients for the measurement variables. For a measurement variable to be considered significant, it should pass the significance test ($p < 0.05$) and have standardized loading coefficients above 0.4. The analysis reveals that all 15 variables meet these criteria. The model's path coefficient table further confirms this, with all

Table 3: Factor structure reflected.

Impression	Element		
	1. Cheerful	2. Style	3. Unique
Hard-soft	−0.952		*P*
Male-female	−0.932		<0.01
Warm-cold	0.896		
Funny-sad	0.83	0.452	
Light-heavy	0.695	−0.49	
Complicated-simple		0.867	0.323
Luxury-cheap		0.786	0.565
Delicate-crude	0.363	0.76	
Natural-artificial		−0.738	
Magnificent-plain		0.732	0.442
Traditional-modern			−0.918
Regional-international	0.415		−0.839
Static-dynamic		−0.374	−0.732
Elegant-tacky		0.524	0.643
Solid-planar	0.327	0.44	0.529
Eigenvalue	6.072	4.385	1.564
Cumulative	40.482%	29.237%	10.427%
Total of cumulative distribution			80.145%

[1]Extraction method: principal component analysis. [2]Rotation method: varimax with Kaiser normalization.

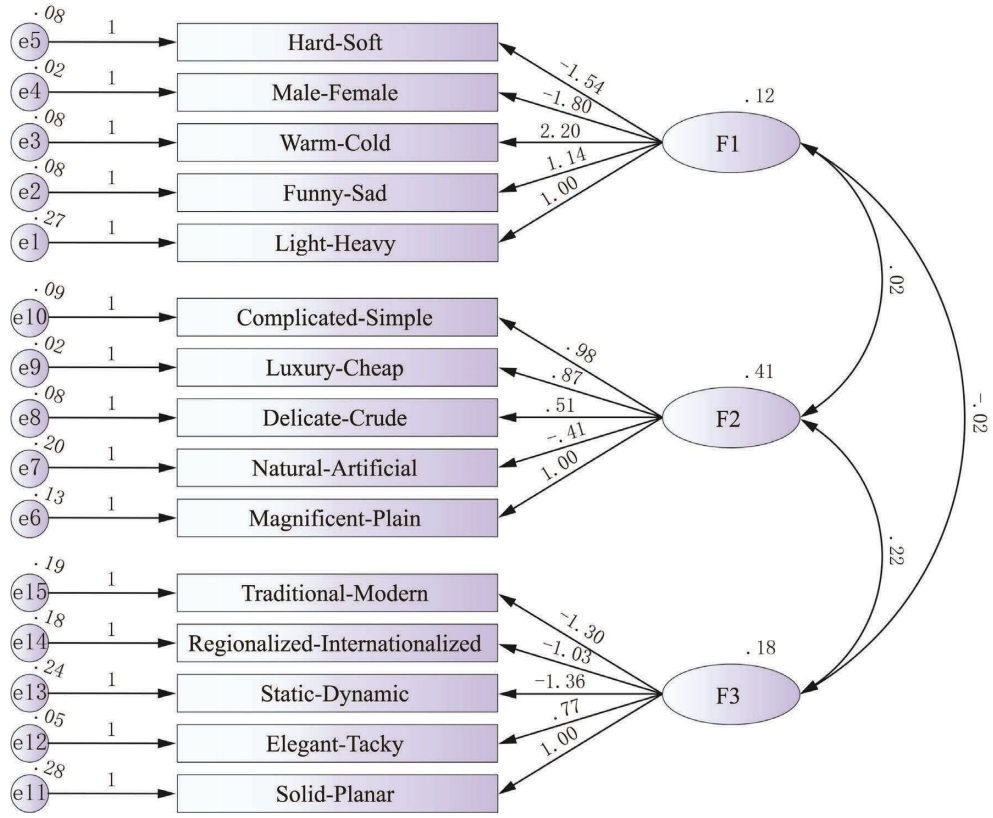

Figure 5: Path diagram.

15 variables showing significant levels ($p \leq 0.01$). Consequently, the null hypothesis is rejected, and the high standardized loading coefficients of these variables suggest they adequately explain the factors listed.

The dataset, though meticulously gathered, had inherent limitations in terms of size and diversity, which may have impacted the robustness of the model. We acknowledge these limitations and propose that future studies with larger

Table 4: The model fit summary.

Goodness-of-fit index	Value
Goodness-of-fit index (GFI)	0.518
Adjusted goodness-of-fit index (AGFI)	0.335
Comparative fit index (CFI)	0.602
Value of root mean square error of approximation (RMSEA)	0.290

Table 5: Regression weight.

Goodness-of-fit index		Estimate	*P*
Light-heavy	Cheerful	0.555	
Funny-sad		0.809	***
Warm-cold		0.939	***
Male-female		−0.981	***
Hard-soft	Style	−0.881	***
Magnificent-plain		0.874	
Natural-artificial		−0.506	***
Delicate-crude		0.751	***
Luxury-cheap		0.968	***
Complicated-simple		0.905	***
Solid-planar	Unique	0.623	
Elegant-tacky		0.816	***
Static-dynamic		−0.764	***
Regionalized-internationalized		−0.721	***
Traditional-modern		−0.788	***

[1]*** $P < 0.001$.

and more varied samples could provide a clearer understanding of the relationships we explored. This refinement could potentially lead to stronger and more interpretable factor structures and improved fit indices.

Factor 1 encapsulates contrasts in physical and emotional attributes, like "hard-soft" and "funny-sad," suggesting a focus on tactile and mood-related characteristics of bamboo weaving. Factor 2 delves into the complexity, perceived value, and craftsmanship aspects, with contrasts like "complicated-simple" and "luxury-cheap," indicating a focus on the intricacy and perceived quality. Factor 3 explores cultural and stylistic dimensions, with contrasts like "traditional-modern" and "static-dynamic," pointing towards an assessment of the cultural relevance and dynamism in the designs. Each factor group collectively represents distinct perceptual dimensions related to bamboo weaving.

4.2. Perception of Tradition and Modernity among Young Consumers. Contrary to our initial hypotheses regarding the perception of "modern" versus "traditional" aesthetics—wherein monochromatic and historically rich patterns were expected to be viewed as traditional—the findings revealed that young Chinese participants' perceptions were not predominantly influenced by color. Instead, aesthetic features like the density of internal lines and directional contrast played a more significant role in attributing modernity. Interestingly, the use of vibrant colors and dynamic lines in symbolic patterns was associated with modernity, reflecting a preference for the "national trend" culture among the youth.

Interviews with participants further illuminated that dynamic color schemes in traditional patterns were perceived as modern and appealing, suggesting a blend of traditional craftsmanship with contemporary appeal. The difficulty in pinpointing exact elements that shift a design's perception from traditional to modern suggests a holistic approach to pattern evaluation by the participants. This holistic perception may stem from a growing appreciation for traditional culture, influenced by educational emphasis on local heritage, familiarity with bamboo weaving techniques, and exposure to international brands incorporating intangible cultural heritage.

4.3. Visual Impressions of Modern and Interesting by Young Consumers. Figure 6 illustrates the sample types that evoke impressions of "internationalized" and "modern," as perceived by young Chinese consumers. The results effectively showcase the modern and international attributes associated with four different coding patterns in bamboo weaving. The manifestation of modernity within these bamboo weaving patterns is further elaborated in the subsequent section.

(i) The presence of strong geometric elements in bamboo weaving patterns, such as circles, squares, and hexagons, tends to signify modernity. In contrast, the use of traditional Chinese characters (as in A01) and traditional motifs (like in A02), as well as patterns inspired by natural plants (seen in C02), is often viewed as embodying ethnic and traditional characteristics.

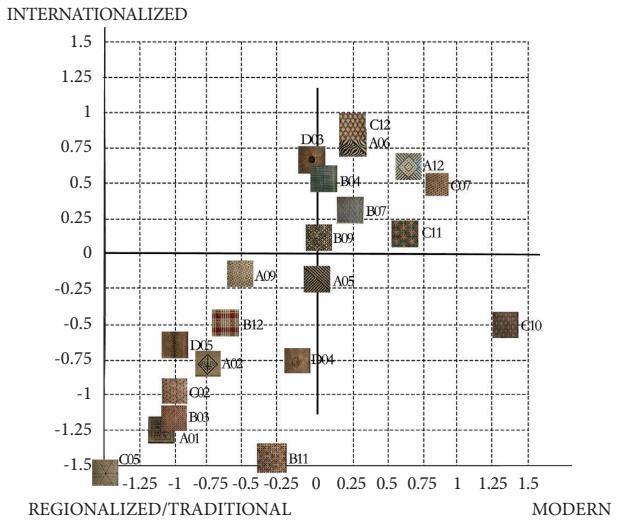

Figure 6: Scatterplot in regionalized-internationalized and traditional-modern.

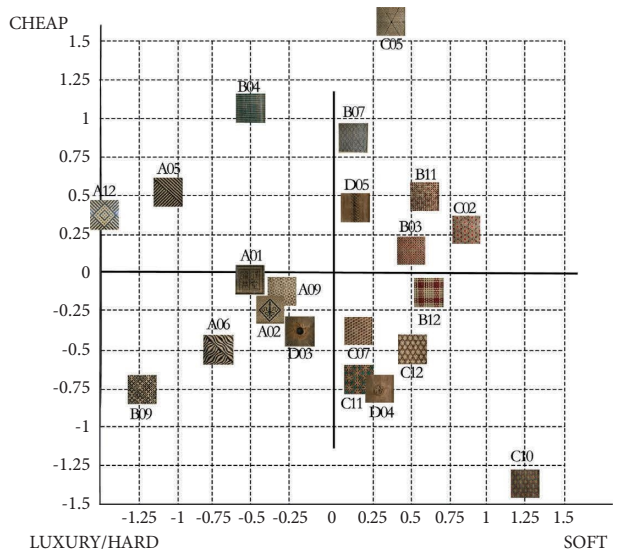

Figure 7: Scatterplot in cheap-luxury and hard-soft.

(ii) The impact of color in bamboo weaving patterns significantly influences viewers' perceptions. Statistical analysis reveals that traditional Chinese colors, such as Chinese red (seen in B3, B11, B12, etc.), tend to evoke a strong sense of tradition. In contrast, the use of nontraditional colors like black, white, rose red, orange red, or varied red tones is associated with modernity and internationalization. This distinction is exemplified in pattern B12, which, while similar in pattern composition to B09, differs markedly in color combinations, as evidenced in the survey results.

(iii) Patterns with central symmetry are typically linked to ethnic and traditional styles, whereas those with less central symmetry are seen as more modern. An exception is pattern D3, where its central hollow spaces may contribute to this deviation. Modern patterns often exhibit dynamic elements, such as overlapping arrangements and varying sizes, which contribute to their contemporary appeal.

4.4. Visual Impressions of Luxury and Soft by Young Consumers. Figure 7 illustrates the distribution of sample types across two dimensions: softness-hardness and luxury-affordability, as perceived by young Chinese consumers.

In our analysis of bamboo weaving patterns, it is evident that monochromatic and geometric patterns with straight lines (categories A and B) convey a sense of seriousness. In contrast, colorful patterns, especially those involving warm colors, curves, and natural motifs (categories C and D) evoke a friendlier, softer impression. In addition, square geometric patterns primarily created through cross-weaving are perceived as luxurious. Conversely, herringbone patterns, though also forming abstract geometric lines, are seen as more affordable and approachable due to their triangular shapes and tight arrangement. There are also specific cases, like Sample B12, which, despite being based on cross-weaving and straight geometric lines, leans towards a softer impression due to the varying density of the upper layer of weaving and the use of warm red hues. This contrasts sharply with the evaluation of Sample B09.

5. Conclusions

This study sheds light on the cognitive differences and limitations between designers and consumers, offering insights for leveraging traditional cultural patterns in modern product design. By analyzing young consumers' visual impressions of Chinese traditional bamboo weaving patterns, it highlights perceptions of "modernity" and "interest." These insights are valuable for integrating such patterns into various products, aiming to elicit similar positive responses from consumers.

In user research, findings often show that designers and consumers may not share the same emotional responses to design elements, with their reactions sometimes being markedly inconsistent [29]. Research into consumer preferences can significantly impact the market [30]. Among young Chinese consumers, perceptions such as "cheerful" and "unique" are noted, greatly influencing their impressions of "modern" and "interesting."

This study's insights into young consumers' perceptions of bamboo weaving patterns provide a valuable guide for design innovation. The findings, particularly regarding preferences for modernity, style, and uniqueness, offer concrete directions for integrating traditional bamboo patterns into contemporary product design. By understanding these preferences, designers can create products that not only preserve cultural heritage but also resonate with the aesthetic and emotional desires of the younger generation. This approach bridges the gap between empirical research and practical application, ensuring that traditional craftsmanship adapts to modern demands, thereby contributing to the revitalization and global appreciation of Chinese cultural elements in design.

This study opens avenues for comparative research on traditional bamboo weaving patterns and innovative designs from other Asian countries, such as Japan and Indonesia. Future research could also optimize the analysis of pattern and color combinations in bamboo weaving. It might explore perceptions and visual impressions arising from incorporating contemporary materials like acrylic and nylon into traditional weaving techniques and designs. Due to the scope and resources of this study, our focus was limited to visual impressions. In future research, we plan to explore user experiences with physical products to gain a more comprehensive understanding of how these impressions translate into real-world interactions and usage.

Data Availability

The data presented in this study are available on request from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

X.C. and M.G. were responsible for conceptualization. X.C. was responsible for methodology. M.G. was responsible for software. X.C. and M.G. were responsible for validation. X.C. was responsible for formal analysis. M.G. was responsible for investigation. L.Q. was responsible for resources. X.X. was responsible for data curation. M.G. was responsible for writing of the original draft. X.C. was responsible for writing, reviewing, and editing. M.G. was responsible for visualization. X.C. was responsible for supervision. M.G. was responsible for project administration. X.C. and M.G. were responsible for funding acquisition. All the authors have read and agreed to the published version of the manuscript.

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