

## IDEA DEVELOPMENT IN INNOVATIVE DESIGNS FOR TRADITIONAL HAKKA BAMBOO CURTAIN CRAFTS IN TAIWAN

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### ABSTRACT

*The objective of this study is to explore the feasible directions for the transitional designs of the Hakka traditional bamboo curtain crafts in Taiwan and the main research emphasis is on the innovation of craft products. This study is based on the concept of deconstruction and reconstruction by means of the morphological analysis, attribute listing, and the method of SCAMPER checklist were further integrated for examining the creative thinking of relevant elements. These methods are often used for product upgrades or the replacement of traditional products with new ones. The application of attribute listing is to avoid the limitation of thinking and it can generate a comprehensive list of changeable characteristics for a product. The method of SCAMPER checklist is helpful for a designer to think outside the box and generate new concept. These two methods are integrated in this study in order to generate a creative thinking checklist so that systematized conceptions can be realized by consulting professionals. At the final stage, we carried out the investigation of the degree of professional consensus in order to list the directions for modification in the future and the results can serve as a good reference for future product reconstructions. As one of the bamboo curtain elements, bamboo strips were selected as a case study in this research and similarly any other element can follow this model for the development of creativity conceptions. The research results indicated that, a designer can develop various creative directions for the modification of bamboo strips by the SCAMPER creative thinking checklist. The design considerations are based on different attributes or characteristics such as materials, patterns, colors, dimensions, functions, techniques, etc. The results further indicated that, color is the major visual feature for a bamboo curtain. Therefore, if bamboo strips of diversified colors can be integrated into a design, it can overcome the existing color constraints and will allow a product to generate refreshing visual perceptions. In addition, the integration of emotional factors of the local culture into the product designs is also an important key to the emotional triggers for a consumer. Moreover, it is also critical to the enhancement of a product's spiritual level and the upgrade of a product into a cultural and creative product.*

**Keywords:** Bamboo curtain, Hakka, Traditional craft, Innovative design, SCAMPER

### INTRODUCTION

One of the distinguishing features of Hakka traditional houses in Liu-tui of Taiwan is the bamboo curtains at the front doors. These bamboo curtains serve mainly as door curtains and therefore they are also called bamboo door curtains (Fig. 1). In early days, almost every Hakka house had a bamboo-woven door curtain at the entrance of each room of their houses.

They are one of the must-have craft necessities in the daily life of Hakka people in Liu-tui since then. Even in modern days, we can still spot bamboo curtains in the traditional houses in Liu-tui.



Figure 1. Traditional houses and bamboo curtains

Bamboo curtains are commonly used in Taiwan as window curtains or partitions. For the specific demand of architectural spaces in Liu-tui area, Hakka ancestors designed bamboo curtains for use as door curtains, which are not only mosquito-repellent and dust-proof, but also useful for inside-outside segmentation and ventilation. It is also excellent as being perspective but can still keep privacy. Meanwhile, they have the advantageous characteristics of being easy to scroll up and down while it is also easy to remove. Meanwhile, bamboo curtains are integrated with piping, cotton strip techniques and art painting which makes it different from a plain bamboo curtain (Fig. 2). People in different areas also developed different features independently so that bamboo curtains are not only practical and artistic, but also became daily craft necessities of distinguishing features specific to the Liu-tui area. However, such traditional arts and crafts have gradually declined in the last few decades. In recent years, consumers began setting a higher standard for their quality of living. Due to the enhancement of environmental awareness, numerous benefits of bamboo materials have been valued again. Just recently, various types of bamboo craft designs also received international recognition and therefore the traditional bamboo crafts are getting popular again. Bamboo curtains incorporate both practical and decorative values and are also remembrance of very long historical traditions. It is worthy of developing this type of products into something with local features.



Figure 2. Liu-tui Hakka bamboo curtains

Based on this consideration, the purpose of this study is to carry out conception developments for innovative designs of traditional bamboo curtain crafts in order to explore the possibility of innovative designs for these traditional crafts. The research was carried out mainly by a qualitative study and the first step was to conduct field research in order to gather bamboo curtain samples. After that, the morphological analysis proposed by Zwicky (1967) was used to deconstruct and reconstruct the concepts and extract the design elements of a bamboo curtain. The methods of attribute listing that was proposed by Robert Crawford (1979), the

SCAMPER creative thinking checklist approach proposed by Robert F. Eberle (1971), and the interviews of professionals were carried out in combination in order to develop the concept of innovative designs for bamboo curtain crafts.

The application of attribute listing is especially suitable for the upgrade and replacement of traditional products. The purpose of this method is to list the changeable attributes and features one by one for a traditional bamboo curtain so as to carry out the transformation of relevant characteristics. For the concept of modifications on various types of attributes, the usual approach is to find the possibility of various types of transformation by associations in thinking, brainstorming, etc. However, to reduce the confinement on the subjective thinking of an individual, the approach of SCAMPER creative thinking checklist was integrated into this study for the development of creative concepts. The SCAMPER approach allows a designer to propose the conception of modifications from seven modifiable aspects of a product. It is an approach that allows thinking outside the box and let the creativity run quickly and therefore it is often used during product improvements and the development of various types of products. This study aims to integrate the above-mentioned methods with the assisting interviews with professionals to carry out the development of creativity concepts for bamboo curtain crafts. It is expected to carry out a more comprehensive conception about the possibility of modifications for relevant elements.

## **LITERATURE REVIEW**

### **Attribute listing**

Attribute listing is a well-known creative thinking strategy, which was first proposed in 1954 by US Professor Robert Crawford (1979). This method emphasizes the importance for a user to observe and analyze characteristics or attributes of objects or problems during the process of creation. After that, the user can propose conceptions of improvements or changes by aiming at each of the characteristics. The purpose of this approach is to list a product's changeable characteristics in a more comprehensive way so as to avoid the limitations of thinking. The practical way is to list various attributes of an object that is typically accomplished in a way of listing various types of modifiable attributes and features of a product. According to its noun attributes, verb attributes, and adjective attributes followed by proposing the concepts of modification. Afterwards the relevant modification will be recombined in order to propose the conception of new products. As of now, the attribute listing approach has been extensively used in various types of fields including creativity enlightening (Studer et al., 2016), creative designs (Kim et al., 2005), styling or product design like the air conditioner design (Wu and Wang, 2011), styling analysis of medical treatment products (Shen et al., 2015), design of medical treatment equipment (Melgozaa et al., 2012), etc.

### **SCAMPER creative thinking checklist**

SCAMPER is an abbreviated name for the thinking of developing creativity and it is one of the important methods of modern innovative thinking. In 1971, US Psychologist Robert F. Eberle referred to Osborn's checklist (Osborn, 1963) and proposed another type of creative thinking checklist method which is later called SCAMPER (Eberle, 1971). It is an approach that allows thinking outside the box and allows the creativity to run quickly and therefore is often used for product improvements. This type of checklist can trigger a designer's creativity and its name is an abbreviation of seven English characters each of which represents one of the seven modification directions which are respectively S-(Substitute), C-(Combine), A-(Adapt), M-(Modify/Magnify), P-(Put to other uses), E-(Eliminate), and R-(Rearrange/Reverse) (Fig. 3). By means of the above-mentioned approaches, a designer can

determine a direction to follow during the innovation process so as to avoid aimless and impractical conception processes. This way the time spent on innovations can be saved and the innovative thinking process can be systemized.

The SCAMPER approach is often used for the improvement on existing products. During the development and innovative thinking process in various design fields, the SCAMPER approach is often utilized on turbomachinery industrial designs (Childs and Tsai, 2010), design of creative cuisines (Kudrowitz et al., 2014), character designs (Yuen et al., 2015), development of universal products (Liu, 2012), design of lighting fixtures (Shohdy Ahmed, 2016), paper cutting with creative patterns (ÇEĞİNDİR and ÖZ, 2016), etc. With the fast development in economy, the SCAMPER approach is further used extensively in many other fields such as the solutions to service design problems (Moreno et al., 2014), engineering concept generalization (Shanna et al., 2012), innovative design education method (Seo and Kim, 2014), design heuristics (Yilmaz et al., 2011), and the application of creative thinking education (Chen, 2010), etc. Though the attribute listing approach and the SCAMPER approach are often used for product improvements, there are few studies which applied these approaches to the modification of traditional craft products. This study aims to combine both the attribute listing and SCAMPER checklist approaches in order to carry out imaginative design thinking on traditional bamboo curtains. The eventual attempt is to overcome the limitation of traditional design thinking.



Figure 3. SCAMPER

## RESEARCH PROCEDURES

### Collecting samples and extracting design elements

In this study, we carried out field research in 96 Hakka villages which are located in Liu-tui area in southern Taiwan. We collected a total of 100 samples. It was known from the collected samples that, though traditional bamboo curtains have its fixed norm, they still present regional distinguishing features. The difference in these features is presented on the bamboo curtain piping color, cotton stripe woven approach, and the theme of painting. We consulted professionals to extract the design elements of a bamboo curtain and they are respectively bamboo strip, piping, cotton strip, and painting. These four relevant elements are designated as Elements A, B, C, and D and they are named the key elements for new conceptions and modifications when carrying out bamboo curtain innovative designs. In this study, we selected bamboo strips as a case study for carrying out the development of creative concept for Element A (Fig. 4).

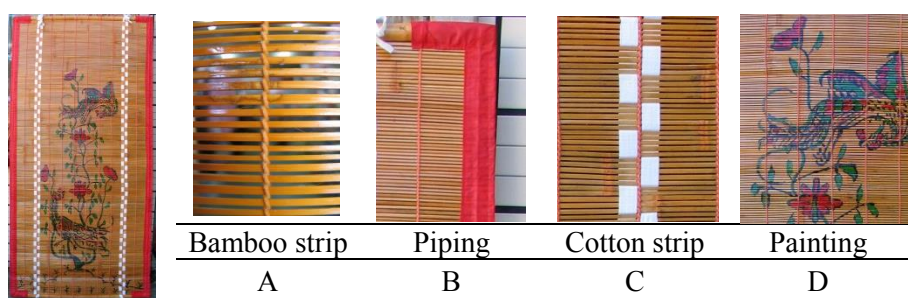


Figure 4. Key elements

## Design of the creative thinking checklist






### (1) List of attributes and features of a bamboo strip:

With the application of the attribute listing concept, changeable characteristics of a bamboo strip were listed in this study based on the noun attributes, verb attributes, and adjective attributes. Since the attributes listed for different products are not exactly the same, a person’s interpretation of an attribute might possibly be different from the others. From the aspect of noun attributes, we listed (a) Material and (b) Pattern; from the aspect of adjective attributes, we listed (c) Color and (d) Dimensions; from the aspect of verb attributes, we listed (e) function and (f) Process/technique of a bamboo strip.

### (2) SCAMPER creative thinking checklist:

In this study, a bamboo strip’s six attributes and features were integrated with seven components of the SCAMPER creative thinking for the assessment by the checklist. The design of the checklist is to have those six attributes of a bamboo curtain as the horizontal axis and those seven verification directions of SCAMPER as the vertical axis. After that, a matrix was constructed as shown in Table 1.

**Table 1. Checklist of attributes and features for a bamboo strip (Element A)**

		<i>Overall image</i>		<i>Partial image</i>			
<i>Product image</i>							
		<i>Element A-bamboo strip</i>					
		<i>Attribute listing of bamboo strips</i>					
<i>Attribute Listing</i>	<i>Noun attributes</i>		<i>Adjective attributes</i>		<i>Verb attributes</i>		
	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	
		<i>Material</i>	<i>Pattern</i>	<i>Color</i>	<i>Dimensions</i>	<i>Function</i>	<i>Technique</i>
<b>SCAMPER</b>	S	A-a-S	A-b-S	A-c-S	A-d-S	A-e-S	A-f-S
	C	A-a-C	A-b-C	A-c-C	A-d-C	A-e-C	A-f-C
	A	A-a-A	A-b-A	A-c-A	A-d-A	A-e-A	A-f-A
	M	A-a-M	A-b-M	A-c-M	A-d-M	A-e-M	A-f-M
	P	A-a-P	A-b-P	A-c-P	A-d-P	A-e-P	A-f-P
	E	A-a-E	A-b-E	A-c-E	A-d-E	A-e-E	A-f-E
	R	A-a-R	A-b-R	A-c-R	A-d-R	A-e-R	A-f-R

\*SCAMPER : S-Substitute, C-Combine, A-Adapt, M-Modify, P-Put to another use, E-Eliminate, R-Rearrange

\*Ex. A-a-S : Bamboo strip(A)- Material(a)- Substitute(S)  
→the possibility of having a bamboo strip’s material to be substituted.

\*EX. A-c-S/M-Bamboo strip(A)- Color(c)- Substitute(S) or Modify(M)  
→the possibility of having a bamboo strip’s color to be substituted or modified.

Those six attributes and features of the horizontal axis are respectively a-Material, b-Pattern, c-Color, d-Dimension, e-Function and f-Technique. The seven verification directions of SCAMPER on the vertical axis are respectively S-Substitute, C-Combine, A-Adapt, M-

Modify, P-Put to another use, E-Eliminate, R-Rearrange. For the convenience of recording the conception directions for the attributes of each element, the items to be investigated are designated by three English characters which serve as the codes. Among these three codes, the first English character represents a bamboo curtain's design element; the second English character represents the curtain's attributes; the third English character represents the thinking direction of SCAMPER. For example, A-a-S means the possibility of having a bamboo strip's (A) Material(a) to be substituted (S); A-b-R means the possibility having a bamboo strip's (A) Woven pattern (b) to be rearranged (R). The modification conceptions of similar concepts can be integrated together such as A-c-S/M-means the possibility of having a bamboo strip's (A) Color (c) to be substituted (S) or modified (M).

### **Consulting professionals for their opinions and integrating the results**

In this study, we invited 12 professionals from different fields for in-depth interviews. We asked each of these professionals and scholars to carry out creative thinking verification on the attributes and features of each design element. Those six attributes of each design element for a bamboo curtain need to be verified against the seven creative thinking directions of SCAMPER. Each element needs to be verified against 42 assessment items. Therefore, those four elements of a bamboo curtain need to be verified against 168 conception assessment items. Each of the interviewees was asked to propose his/her conceptions of modification against the items in the table. Any inadequate modification direction was directly eliminated and the interviewee was asked to move forward to the next assessment item. The bamboo strip of Element A was selected as the case study and the professionals were interviewed according to those 42 assessment items of a bamboo strip.

The first round of interviews on the modification conceptions was carried out by open-ended questions. Each of the 12 interviewees was asked to propose his/her possible modification conceptions based on a bamboo strip's variable factors. After that, the related conceptions were further integrated and the modification advises of reference values were filtered out for the investigation on the consensus of related opinions.

### **Investigation on the degree of consensus**

We further summarized the relevant conceptions that are mentioned above and picked those modification conceptions which might serve as a good reference. Generally, we picked one to three modification conceptions with reference values for the investigation on the degree of professional consensus. The purpose of the investigation on the degree of consensus is to understand the professionals' value and recommend each of the relevant conceptions. The principles of recommendations are based on a combination of consideration of creativity and feasibility of a relevant conception. Any recommendation item which has a consensus degree over 70% was included as one of the references for the direction of bamboo curtain modification.

## **RESEARCH RESULTS**

The results of this study include the recommendations on the 42 modification directions for a bamboo strip from 12 professionals. A total of 504 item questionnaires, that is, 42 item questionnaire per professional, were reviewed and evaluated by those 12 professionals. The results were filtered out then summarized to come up with some relevant conceptions. The final results went through the deliberation of the professionals' degrees consensus as shown in Table 2. Any relevant recommendation that has a degree of consensus over 70% was listed as one of the references for the modification directions (Table 3). The results of this study were obtained from filtering those 510 interview recommendations, each having a degree

consensus of over 70%.The resulting relevant recommendations are briefly described as follows:

**Table 2. Investigation on the degree of consensus for the modification conceptions of a bamboo strip**

bamboo strip(A)	Attribute Listing						
	A	b	c	d	e	f	
SCAMPER	S	A-a-S 25%	A-b-S 58%	A-c-S 91%	A-d-S 50%	A-e-S 66%	A-f-S 66%
	C	A-a-C 83%	A-b-C 75%	A-c-C 8%	A-d-C 0%	A-e-C 75%	A-f-C 66%
	A	A-a-A 33%	A-b-A 83%	A-c-A 75%-83%	A-d-A 83%	A-e-A 75%	A-f-A 91%
	M	A-a-M 75%	A-b-M 83%	A-c-M 91%	A-d-M 83%	A-e-M 83%	A-f-M 91%
	P	A-a-P 75%	A-b-P 33%	A-c-P 50%	A-d-P 41%	A-e-P 75%-83%	A-f-P 16%
	E	A-a-E 0%	A-b-E 16%	A-c-E 41%	A-d-E 0%	A-e-E 0%	A-f-E 0%
	R	A-a-R 16%	A-b -R 83%	A-c-R 75%	A-d-R 0%	A-e-R 33%	A-f-R 75%

Note: To keep this paper brief, we listed only the top level of recommended approaches here in this table with no recommendation details. However, detailed descriptions of each modification conception were given to the interviewees during the interviews.

**Table 3. Degrees of consensus on the modification conceptions of bamboo strips and filtered results**

Attributes	SCAMPER	Filtered modification conceptions	Degree of consensus
Material (a)	C	A-a-C - The combination of bamboo strip materials	83%
	M	A-a-M - The improvement on bamboo strip materials	75%
	P	A-a-P - The change in the application of bamboo strip materials	75%
Pattern (b)	C	A-b-C- The combination of bamboo strips' woven pattern	75%
	A	A-b-A- The adjustment of bamboo strips' woven pattern	83%
	M	A-b-M- The modification of bamboo strips' woven pattern	83%
Color (c)	R	A-b-R- The rearrangement of bamboo strips' woven pattern	83%
	A	A-c-A- The adjustment of bamboo strips' color tones	75%
	A	A-c-A- The adjustment of bamboo strips' color depth	83%
Dimensions (d)	S/M	A-c-S/M- The replacement or modification of bamboo strips' color scheme	91%
	R	A-c-R- The rearrangement of bamboo strip colors	75%
Function (e)	A/M	A-d-A/M- The adjustment or modification of bamboo strip dimensions	83%
	A	A-e-A- The adjustment of bamboo strips' practical function	75%
	M	A-e-M- The change of bamboo strips' practical function	83%
Technique (f)	C	A-e-C -The integration with bamboo strips' other functions	75%
	P	A-e-P- The change of bamboo strips' function or application	75-83%
	A/M	A-f-A/M- The enhancement of bamboo chipping technique	91%
	A/M	A-f-A/M- The enhancement of bamboo strips' weaving technique	91%
	R	A-f-R - The rearrangement of bamboo strips' production technique	75%
	M	A-f-M- The application of bamboo strips' dyeing technique	91%

### **The change of bamboo strip material (a)**

The research results indicated that, for the combination of materials, 83% of the professionals agreed that a bamboo strip (A) can be combined with the variations in the bamboo strip's abundant types of compound medium. For example, different types of medium can be beaded on a bamboo strip, such as mini colored beads or colored glazes, etc. Alternatively, a bamboo strip might be partially wrapped with various types of colored fabrics so as to enrich the variation of the bamboo strip's colors (A-a-C). For the improvement on the bamboo strip materials, 75% of the professionals agreed that the improvement on materials can enhance the usage functions of the bamboo strip (A). For example, bamboo charcoal techniques can enhance a bamboo strip's original usage functions and added values (A-a-M). The original function of a bamboo strip is to serve as one of the materials of bamboo curtains. When a bamboo strip is integrated with bamboo charcoal techniques, the bamboo strip can be used in more diversified applications (A-a-P).

### **The change of bamboo strip woven pattern (b)**

The research results indicated that, for the variation of patterns, 83% of the professionals agreed that the woven pattern of a bamboo strip (A) can be more diversified. Examples include the application of different weaves such as plain or twist when weaving a bamboo curtain (A-b-A/M). Another alternative is to overcome the limit of traditional bamboo strips' parallel patterns and replace it with alternative patterns such as twill weave, diamond weave, etc. (A-b-M/R). Besides, 75% of the professionals agreed that a bamboo strip's woven pattern can be used in combination with bamboo strips of different sizes and diameters, as well as with other alternative approaches during the weaving process. From the aspect of bamboo weaving patterns, various types of ornamental patterns can be integrated. The styles or figures of cultural features can be utilized for weaving so that a bamboo curtain's woven patterns can be aesthetically decorative with cultural meanings.

### **The change of bamboo strip color (c)**

The research results indicated that, for the variation of colors based on the current technical developments, the color of bamboo strips might be improved and diversified. For the adjustment of bamboo strip color tones, 75% of the professionals agreed that the green color protection technique can be used to keep bamboo materials' original green color (A-c-A). 83% of the professionals agreed that the carbonization technique can be utilized to adjust the depth of bamboo strip color tones so that a bamboo strip's color tone can present abundant gradational variations (A-c-A). For the variation of color schemes, 91% of the professionals agreed that the application of advanced bamboo strip dyeing techniques and color fixation techniques can overcome the limit of a bamboo strip's original color (A-c-M) and allows the color variations of a bamboo curtain to be more diversified.

### **The change of bamboo strip dimensions (d)**

The research results indicated that, for the variation of dimensions, 83% of the professionals agreed that the dimensions of a bamboo strip can be changed based on different design requirements (A-d-A/M), such as the bamboo strip's length, diameter, width, thickness, etc. The variation of a bamboo strip's dimensions not only can respond accordingly to actual demands and the variations of visual effects, but also can present the dimensions with cultural meanings. For example, the concept of the carpenter's ruler in traditional Chinese feng shui can be integrated so that the dimension itself possesses the auspicious implications, such as welcoming fortune, attracting money, becoming auspicious, becoming wealthy, etc. These figurative implications can enhance the design of bamboo curtains to a higher spiritual and cultural level.



### **The change of bamboo strip function (e)**

The research results indicated that, for the functional variations, 75% of the professionals agreed that the practical functions of a bamboo strip can be enhanced. For example, the aforementioned integration of bamboo charcoal techniques into bamboo materials not only can change the bamboo strip materials but also enhance the practical function of bamboo strip (A-e-M/P). The bamboo charcoal can remove peculiar smells along with the functions of dehumidification and electromagnetic wave shielding. The integration of bamboo charcoal techniques can further enhance a bamboo curtain's practical functions and also include added values beyond its original functions. For the change of practical functions, we can further consider the diversification of bamboo curtain applications. Aside from making a bamboo curtain as a door curtain or a window curtain, 83% of the professionals interviewed agreed that a bamboo curtain can go through diversified designs (A-e-M/P), such as bamboo folding screens, bamboo divider curtains, bamboo wall pictures, bamboo floor mats, bamboo table mats, etc. The combination of designs does not only integrate practicability but also keeping it ornamental. Therefore, it is required to strengthen the product designs and make them delicate and artistic. Moreover, 75% of the professionals agreed that the design of a bamboo strip may include special cultural implications (A-e-C/P). The product does not only possess practical and decorative functions but can also enhance further as a demonstration platform for special cultures.

### **The enhancement of bamboo strip technique (f)**

The research results indicated that, for the variations of technique, 91% of the professionals agreed that productions by machines can be utilized so as to enhance the production technique for bamboo curtains. For example, bamboo chipping machines and bamboo weaving machines can be used to replace manual labors so that products can be manufactured in a larger scale (A-f-A/M). In addition, 75% of the professionals agreed that new woven techniques can be developed for bamboo curtains. For example, dual-layer dimmable bamboo curtains could be a good direction of development in the future along with innovative and diversified woven techniques for bamboo strips (A-f-M/R). For the enhancement of the color processing technology for bamboo materials, 75% to 91% of the professionals agreed that the techniques of bamboo curtains' color applications can be enhanced. For example, the green color protection technique, carbonization technique, and dyeing technique can all be utilized in order to enhance the overall visual effects of bamboo curtains and attract younger groups of people (A-f-C/M).

## **CONCLUSIONS**

By combining various types of modification conceptions for the design elements of a bamboo strip, the possible changes or improvements are summarized as follows. The bamboo strip material can be improved and used in combination with other types of medium. The bamboo strip woven pattern can be changed by developing diversified weave patterns so as to overcome the limitation of traditional linear and parallel weave patterns. The bamboo strip color can be improved by using the green color protection technique so as to keep the original green color or use the carbonization technique to adjust the depth of color tones. Furthermore, these techniques can be integrated with advanced dyeing and color fixation techniques so as to get the bamboo strips dyed. The dimensions of a bamboo strip can be adjusted or modified depending on demands and it can be further integrated with specific cultural meanings. The practical functions of a bamboo strip can also be enhanced or altered so that special cultural implications can be adequately integrated as an addition to the practicability and ornamental functions. For production technologies, modern bamboo chipping and weaving machines can

be used to enhance the production of bamboo strips so that relevant products can be produced in a larger scale. The development of various types of weaving techniques can also enhance the variety of a bamboo curtain so that the aesthetic perception of the bamboo curtain can be enhanced.

The results of this study indicated that most of the professionals agreed that color is the most important visual feature for a bamboo curtain. If a bamboo curtain can be designed with diversified colors, the resulting product can overcome the limitation of existing colors and can also generate refreshing visual perceptions. Moreover, the integration of cultural and emotional factors into the design of a bamboo curtain is also an important key to enhance the level of product values so that consumers can be emotionally triggered. Therefore, researchers are advised to carry out follow-up studies on the influence of the overall planning of colors on a bamboo curtain. The study should also contain topics related to the integration of cultural and emotional factors into a design.

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