A Study of Color, Material and Finish Designs using a Culture-oriented Approach and its Impact on Product Recognition

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Abstract: This research study focuses on a culture-oriented approach to Color, Material, and Finish (CMF) design for products and its impact on product recognition. The study identifies the CMF elements of a traditional Maharashtrian craft and translates them onto a household product (a bowl). The research investigates the recognition value, viewer's perceptions, and preferences for the new proposed CMF designs of bowls that are inspired by Maharashtrian Khana sarees. A mixed-methods approach is taken combining qualitative and quantitative methods. Study results indicate that a cultural approach to CMF design allows designers to present more recognizable products in the market. CMF designers need to target a specific user group and cultural context to fulfill the user's aesthetic needs and desires.

Keywords: Color, Material, Surface pattern, Finish, Culture-inspired, Product design

Introduction

Some products are losing their identity because of their similar form and function (Lin et al. 2007). One effective way to differentiate products from their competition is by applying visual aesthetics (Mumcu and Kimzan 2015). Visual aesthetics can upraise the product's value, and this added value goes beyond functionality and fulfills the user's aspirations and emotional desires (Becerra 2016; Isoaho 2016). Qu, Mao, and Li (2018) stated that aesthetics is one of the most important factors and can uplift the recognition value of the product. The visual aesthetic concepts can be defined as beauty, attractiveness, and sensorial experience (Khalighy et al. 2014; Becerra 2016; Tapaswi 2019). The theory of beauty and attractiveness was examined by Khalighy et al. (2014) in their study. A study conducted by Mumcu and Kimzan (2015) revealed that aesthetically appealing products would decrease the price sensitivity factor. Study discussions also show that visual product aesthetics create a significant impact on product identity and consumer behavior.

According to Becerra (2016), aesthetic values and experiences are often influenced by socio-cultural trends and the context where it is widely used. Muthumani and Bhattacharya (2011) suggest that consumers are constantly looking for aspirational products, and along with the product they also buy values and experiences. They argue that to design aspirational products, designers must understand the aesthetic perceptions of the target consumers as well as their cultural backgrounds and the context where the product will be placed. Becerra (2016) highlights that aesthetic perceptions of users vary according to their cultures with aesthetic preferences being directly related to Color, Material, and Finish (CMF) elements. Depending on the cultural context, the same color, material, or finish can be perceived differently. Cultural CMF elements are the unique features that can be implemented onto a product to enhance product identity in the global market and fulfill the individual consumer's experiences.

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COMMON
GROUND

In product design, CMF design is still a relatively new and emerging discipline, particularly in India. There are only a few published studies for culture-oriented CMF design concerning the Indian cultural context (Becerra 2016; Isoaho 2016).

This research presents the findings from a review of the literature concerning a culture-oriented approach to CMF design. The research work proposes and evaluates CMF aspects of a new product that takes inspiration from Maharashtrian traditional cultural elements. In particular, the study evaluates the impact of culture-inspired designs on product recognition value and so on viewers' perception and their buying interest. The paper concludes by discussing the results and future research scope.

Literature Review

A culture-oriented approach in CMF design is relatively new and unexplored. As CMF design is a new and emerging discipline there are very few research studies available before 2000 and therefore the maximum studies included in this study were between 2000 to 2020 (Figure 1).
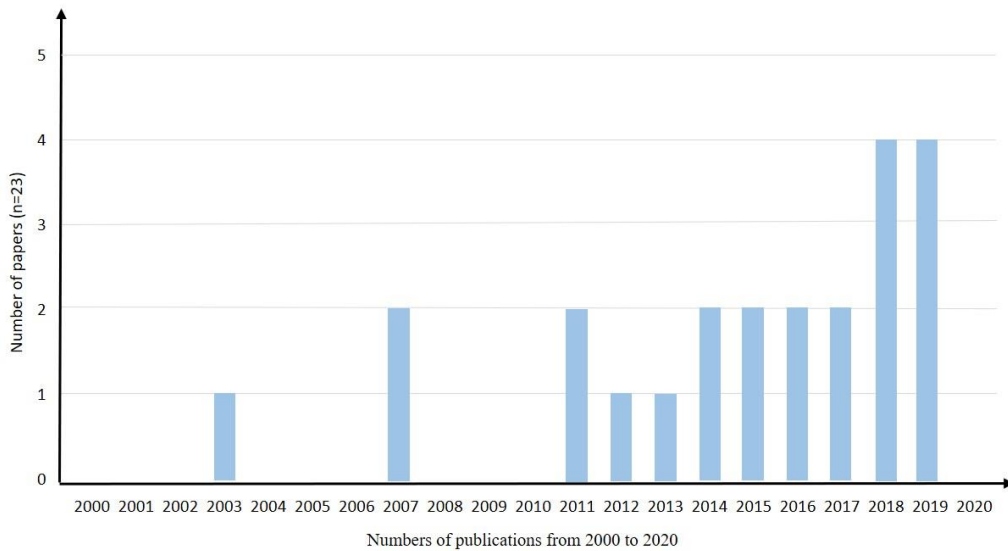

Figure 1: Numbers of publications from 2000 to 2020
Source: Ugale, Bisoyi and Loudon

From an initial analysis of the literature, based on Clarke and Braun's (2014) thematic analysis approach, seven common categories were found: culture-oriented design; aesthetics in design; CMF design; color; texture-pattern-surface, and finish design; material; and trends. All the studies were then assigned to one or more of these categories for further in-depth analysis.

The studies included in the first category, i.e., Culture-oriented design, show that designing culture into modern products is a trend worldwide (Lin 2007; Ser 2010, Becerra 2016). The idea is that applying cultural features to modern products will help to enhance the recognition value of products in the global market. Each country has its own unique culture and is an excellent source of inspiration for designers. A framework suggested by Lin (2007) for studying cultural objects classifies culture into three layers: physical (material) culture, social (behavioral), and spiritual (ideal). These three cultural layers are based on Leong and Clark's (2003) three cultural levels: the outer (tangible) level, the mid (behavioral) level, and the inner (intangible) level. Further in the research study, design features, cultural layers, and levels are combined in a framework and demonstrated how to transform the cultural features of an aboriginal garment into new cultural products (Lin 2007). It became a valuable reference to help

designers to create a successful cultural product. Similarly, Ser (2018) conducted a study on transforming cultural features to design elements to generate a culture-oriented design. Based on a framework suggested by Leong and Clark (2003) and Lin (2007) for studying cultural objects, cultural features were identified and translated into design resources and lastly transformed into design elements. Three scarfs were designed under the cultural product design model suggested by Lin (2007). This practice-based research is limited to graphic design therefore, in-depth investigation of similar research interests from different design disciplines provides an enormous opportunity for future research work (Ser 2018). The importance of including a cultural study in the design process is highlighted by Becerra (2016). According to her, to design any successful product, the designer needs to understand the context where the product will be placed along with the cultural background of the consumer. The product aesthetic needs to follow the ongoing socio-cultural trends to be more relevant for the consumer.

Studies included in the second category, i.e., Aesthetics in design, show that aesthetics is an essential factor and is influenced by socio-cultural trends (Muthumani and Bhattacharya 2011; Tapaswi 2019). Muthumani and Bhattacharya (2011) argue that the cultural approach in product design will enhance the product's aesthetic and cultural values. Beauty and purpose are defined as two qualities of aesthetics for everyday objects (Tapaswi 2019). Mumcu and Kimzan (2015) found that when the aesthetic value is high, consumers are less sensitive towards the price. According to Becerra (2016), aesthetic preferences are directly related to the CMF elements, and depending on the cultural background the same color, material, and finish can be perceived differently.

Studies included in the third category, i.e., color, material, and finish design show that aesthetic and functional value need to ideally be in balance to give a successful experience to the consumer, and consequently it will reduce the risk of market failure (Becerra 2016; Isoaho 2016). The trends are continuously changing with time, and therefore there is nothing constant in CMF design that means there is always a scope for new CMF designs (Becerra 2016). Becerra (2016) in her study introduced 6 steps for CMF design creation which are as follows, step 1- Information gathering, step 2- Establishing a Narrative, step 3- Creating a CMF strategy, step 4- Understanding Part Break up, step 5- Creating CMF Palettes and step 6- CMF development. Different approaches are there to practice the CMF design and the cultural approach is one of them which is not yet explored in detail (Becerra 2016).

The importance of studying color is described in the studies included in the fourth category, i.e., colors. Color meaning and color perception change according to cultural context (Viková, Vik and Kania 2015; Casas and Chinoperekweyi 2019). Viková, Vik, and Kania (2015) studied the relationship between color and words under different cultural contexts. Results show significant cultural differences between Czech, Russian and Japanese cultures. According to Viková, Vik, and Kania (2015), color perceptions are dependent upon the context in which it is seen and they have a symbiotic relationship with the user's experiences. Similarly, a study conducted by Casas and Chinoperekweyi (2019) shows that the cultural perception of color and color psychology are the core elements in CMF design that influence consumers' buying interest and have a significant impact on people's buying behavior. Lucassen, Gevers, and Gijsenij (2011) found that along with color when textured samples are used in studies, the emotional responses of users get strongly affected by textures.

Surface texture, finish, and pattern-related studies were included in the fifth category, showing that all these three elements play an essential role in product aesthetics. According to Iosifyan and Korolkova (2019) textures are significantly associated with six basic emotions. When people touch a particular texture, they perceive distinct emotions associated with that texture. Similarly, one paper from the sixth category, i.e., the material, shows that an appropriate selection of material can raise the emotional value (Crippa, Rognoli, and Levi

2012). Along with a material design, finish design also has a sensorial aspect that helps to elevate the product's emotional value. The finish of the product very much depends upon the material type and manufacturing process (Becerra 2016).

Studies included in the seventh category, i.e., trends, show that trends are continuously shifting, merging, and changing with time (Becerra 2017; Rana 2019). Becerra (2017) suggests that to make designs more relevant, designers need to follow the current trends. A study conducted by Rana (2019) found that the handwoven fabric 'Khana' from Maharashtra is one of the popular trends in Maharashtrian fashion. According to her, there is enormous scope to use Khana handlooms in household products like home furnishing and home decor.

The findings from the literature review suggest that cultural studies are extremely crucial while designing any culture-oriented product, and its importance is discussed in several studies. Culture-oriented color, material, and finish design is a specialized area in product design that is emerging and provides an excellent opportunity for designers to study the culture and create aspirational and desirable products for target users. The literature review highlighted that, trends continuously change with time and the product designers need to follow the current trends. Trend research suggests that Maharashtra's handwoven fabric produced from the Khana handloom is one of the latest trends that is very popular among Maharashtrian users (Rana 2019).

Based on the insights from the literature review, the primary research of this research study focuses on the CMF elements of the Maharashtrian Khana sarees and translates them onto a household product intending to investigate the recognition value, the viewer's perceptions, and their preferences for the new proposed CMF designs.

Objectives

There were three objectives for the primary research:
1. To evaluate which Maharashtrian handloom and its CMF design elements are the most preferred by a Maharashtrian target audience.
2. To examine the effect of texture, pattern, and color, inspired from the selected Maharashtrian handloom, on the recognition value of a proposed product.
3. To investigate the viewers' perceptions and preferences of a proposed product, based on texture, pattern, and color inspired from the selected Maharashtrian handloom.

To address the three objectives the primary research was carried out in two stages. In stage I, the research work identified the most popular Maharashtrian traditional handloom and evaluated its CMF design elements. In stage II, the research work evaluated the impact of the new proposed culture-inspired CMF designs on product recognition value and so on viewers' perception and their buying interest.

Stage I: Research Work

In stage I, the study was narrowed down to focus only on the Maharashtrian culture because of the diverse nature of Indian culture. Maharashtra's unique art and craft were identified and further narrowed down to the Maharashtrian handloom. Stage I research work aimed to identify the most popular Maharashtrian traditional handloom and evaluate its CMF design elements. This section describes the method, results, and discussion for stage I research work.

Stage I: Method

The stage I study was conducted with 100 female participants who were young learners, working professionals, and homemakers having an age range between 20-50 years from Maharashtra's state as they are potential buyers for the selected product and they are well aware

of the selected Maharashtrian handloom. A simple random sampling technique was used to select all 100 participants with their consent to participate. An online interview was scheduled using a video conferencing software tool to make the interview process more convenient for all the participants who are from different parts of Maharashtra. After an initial briefing, a questionnaire link was shared with all participants and they were asked to complete the questionnaire during the online interview session. In total, five multiple-choice questions were included in the questionnaire. Questions asked related to 1. Demographic 2. Maharashtrian handlooms 3. The design elements of selected Maharashtrian handloom and 4. User interest to buy a Khana saree-inspired product. Assistance was provided to participants during the online interview session to resolve the participants' queries regarding the questions. Participants were not allowed to discuss answers during the online session to avoid participants influencing each other while completing the questionnaire. Each participant individually filled in the online questionnaire.

Five historically and culturally significant handwoven fabrics were shown to participants in the questionnaire that were all made from the Maharashtrian traditional handloom: Paithani, Himroo, Khana sarees, Solapur Chadar, and Ghongadi (Potdar 2018). Figure 2 shows colored images for all five fabrics.

| Paithani | Himroo | Khana Saree | Solapur Chadar | Ghongadi |

Figure 2: Maharashtrian Handlooms
Source: Potdar 2018

To find out the most popular culture-oriented design among the Maharashtrian participants, the question asked was 'which Maharashtrian handloom do you think is becoming more popular in today's time? Select from the given image options a. Paithani; b. Himroo; c. Khana; d. Solapur Chadar; e. Ghongadi.' In addition, participants were shown five different (and common) color and pattern options. Figures 3 and 4 show, colored images of the five Khana saree color and pattern options shown to participants.

Color option 1 Color option 2 Color option 3 Color option 4 Color option 5

Figure 3: Most Common Khana Saree Colour options
Source: Ugale, Bisoyi and Loudon

Khana Pattern 1   Khana Pattern 2   Khana Pattern 3   Khana Pattern 4   Khana Pattern 5
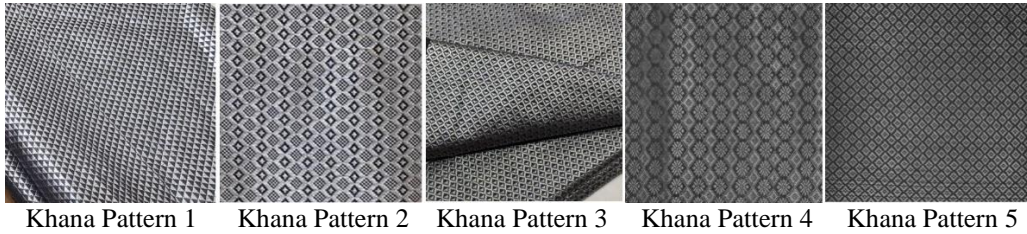
Figure 4: Most Common Khana Saree Pattern options
Source: Ugale, Bisoyi and Loudon

To find out the most preferred Khana Saree color combination among the Maharashtrian participants, the question asked was 'which color combination of Khana handloom do you prefer if you want to purchase a Khana Saree? Select from the given image options a. Red and Black; b. Green and Black; c. Silver and Black; d. Orange and Black; e. Blue and Black.' To find out the most preferred Khana pattern among the Maharashtrian participants, the question asked was 'which pattern of Khana Handloom would you prefer if you want to purchase a product (crockery) inspired from the Khana design? Select from the given image options a. Khana Pattern 1; b. Khana Pattern 2; c. Khana Pattern 3; d. Khana Pattern 4; d. Khana Pattern 5.'

To help evaluate the responses from the participants, the following three hypotheses were formulated:

Hypotheses

H1: The Khana Handloom fabric is the preferred choice amongst Maharashtrian participants.
H2: The Khana Handloom fabric design with red and silver color combined with black is the preferred color combination among the Maharashtrian participants.
H3: The Khana Handloom fabric design with a basic geometric shape in the pattern is the preferred pattern among the Maharashtrian participants.

The collected data was critically analyzed using the SPSS Statistics 21.0 tool. Chi-square goodness of fit test was adopted to test the hypotheses H1, H2, and H3 as there is only one categorical variable.

Stage I: Results

To analyze the answers to the question 'which Maharashtrian handloom do you think is becoming more popular in today's time?' (And Hypotheses H1), a Chi-square goodness of fit test was used. The result value obtained of $P<0.001$ shows a significant difference between the observed and the expected value among all the cultural handlooms. A score of 56 in the frequency table shows that the Khana handloom was the most popular fabric. Consequently, hypothesis H1 is accepted.

To analyze the answers to the question 'which color combination of Khana handloom do you prefer if you want to purchase a Khana Saree?' (And Hypothesis H2) a Chi-square goodness of fit test was again used. The result value obtained of $P<0.001$ shows a significant difference between the observed and the expected value among all five Khana saree color options. A score of 38 in the frequency table shows that the primary color red in combination with black was the most preferred Khana saree color combination. The second-highest score of 24 highlights the popularity of the silver and black color combination. Therefore, hypothesis H2 is accepted.

To analyze the answers to the question 'which pattern of Khana Handloom would you prefer if you want to purchase a product (crockery) inspired by the Khana design?' (And Hypotheses H3) a Chi-square goodness of fit test was again used. The result value obtained of $P<0.001$ shows a significant difference between the observed and the expected value among all five Khana patterns. A score of 55 in the frequency table shows that Khana pattern 1 i.e., a basic geometric triangular Khana pattern, was observed as one of the most preferred patterns. Therefore, hypotheses H3 is accepted.

Stage I: Discussion

The findings from stage I of the research showed that Khana sarees with the primary color red and silver in combination with black were the most popular among the Maharashtrian female participants. The stage I research also showed that Khana sarees with a geometric triangular pattern are the most preferred among the participants. Therefore, Khana sarees with the red-black and the silver-black color combination having simple geometric triangular patterns were taken as the design inspiration in the next stage of the research. Figures 5 and 6 show the color palettes and pattern palettes selected. These CMF palettes were used to develop two new CMF designs for a bowl product as part of the stage II research.

PANTONE 4259 C	PANTONE 427 C	PANTONE 3517 C
Color Values RGB 50 41 35 Hex/HTML 322923 CMYK 54 67 72 83	Color Values RGB 208 211 212 Hex/HTML D0D3D4 CMYK 14 8 4 0	Color Values RGB 193 0 22 Hex/HTML C10016 CMYK 0 100 96 6

Figure 5: Most Preferred Khana Saree Colour Palette
Source: *https://www.pantone.com*

Figure 6: Most Preferred Khana Saree Pattern Palette
Source: Ugale, Bisoyi and Loudon

Stage II: Research Work

The Stage II research work evaluated the impact of two new proposed culture-inspired CMF designs on product recognition value and so on the viewers' perception and their buying interest. Cultural CMF elements inspired by the Khana saree were applied to a bowl product. A bowl product was selected for the Cultural CMF application because it is a well-known and widely used product, with a simple form having concave and convex surfaces. Even if the color, material, texture, and finish are changed, the bowl still performs the same function and was successfully used in a previous study (Crippa, Rognoli, and Levi 2012). This section includes the method, results, and discussion for stage II of the research work.

Stage II: Method

The stage II study was conducted with the same 100 female participants as in stage I. 100 participants were divided into two sample groups each group consisting of 50 participants each to help reduce bias as they were asked to respond to two different CMF designs of a bowl.

In bowl design 1, a basic geometric triangular pattern having red and black color combination was used to give a bold and more traditional look. In bowl design 2, a basic geometric triangular pattern having silver and black color combination was used to give a bold and more modern look. A 3D CAD model was created for each bowl using Rhinoceros 4.0 software. A tileable pattern was created using Adobe Photoshop CC software and then applied to each bowl using KeyShot 6 software. Material and finish were applied to each bowl using KeyShot 6 software. A matt and gloss finish was used in both the bowl designs to enhance the pattern details. The material proposed for both bowls is ceramic as it is the most common material found in bowls as well as giving a more premium look. Figure 7 shows both the bowl designs and Table 1 shows design details for both the bowl designs.
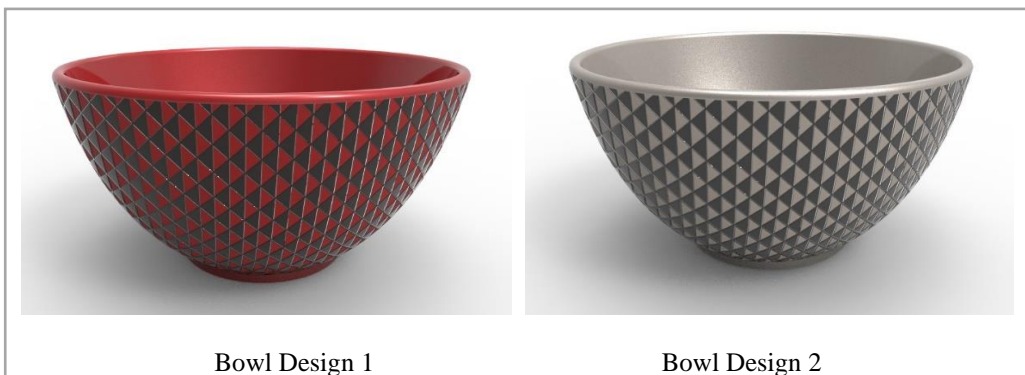

| Bowl Design 1 | Bowl Design 2 |

Figure 7: Culture-inspired Bowl Designs
Source: Ugale, Bisoyi and Loudon

Table 1: Culture-inspired Proposed Design Details

Bowl Design 1 Details	
	Color: Red & Black Bowl
	Material: Ceramic
	Pattern: Triangular
	Finish: Matt and Gloss
Bowl Design 2 Details	
	Color: Silver & Black Bowl
	Material: Ceramic
	Pattern: Triangular
	Finish: Matt and Gloss

Source: Ugale, Bisoyi and Loudon

The two culture-inspired bowl CMF designs were evaluated with Maharashtrian female users to understand its effects on product recognition value, viewer's perceptions, and preferences. 3D rendered colored images for both the culture-inspired bowl CMF designs were shared with participants and they were asked to share their views and preferences. The two different CMF bowl designs were presented to the two different sample groups separately to investigate if there was a significant difference between the two designs. Since, both the sample groups consisted of participants having age range between 20-50 (which is a relatively wide range) t-tests were conducted to investigate if there was a significant difference in product recognition value, aesthetic design preference, and buying preferences between the two age groups of 20 to 35 and 36 to 50.

Online evaluation sessions were undertaken for two different sample groups and each group was asked to assess one bowl design. After an initial briefing, which took around 5 minutes, a questionnaire link was shared with all participants and they were asked to fill out the questionnaire during the online session. Closed, open-ended, and multiple-choice questions were asked (14 in total) in the questionnaire. Questions asked were related to 1. The recognition value of the designs; and 2. The perception and preferences of the users for the proposed design. Assistance was provided to participants during the online evaluation sessions to resolve the participants' queries regarding the questions. Participants were not allowed to discuss answers during the online session to avoid participants influencing each other while completing the questionnaire. Each participant individually filled in the online questionnaire. There were no restrictions given for the time limit. Each participant took approximately 20-30 minutes to complete this task. Responses received from both the sample groups were recorded. All collected data were analyzed using the SPSS Statistics 21.0 tool.

The following four hypotheses were formulated:

Hypotheses

H4: The proposed two CMF designs inspired by the Khana handlooms do have significant differences. This hypothesis was tested based on answers to the question: 'Please rate the proposed design based on visual appeal on scale 1 (not at all appealing) to 5 (very appealing)?'

H5: The proposed CMF design inspired by the Khana handlooms has a significant difference in product recognition value between two age groups of 20 to 35 and 36 to 50. This hypothesis was tested based on answers to the question 'How would you rate this product in terms of being new and different from other products currently available concerning Maharashtrian Cultural Context?'

H6: The proposed CMF design inspired by the Khana handlooms has a significant difference in aesthetic design preference between two age groups of 20 to 35 and 36 to 50. This hypothesis was tested based on answers to the question 'Please rate the proposed design based on visual appeal on the scale of 1 (Not at all appealing) to 5 (Very appealing).'

H7: The proposed CMF design inspired by the Khana handlooms has a significant difference for buying preferences between two age groups of 20 to 35 and 36 to 50. This hypothesis was tested based on answers to the question 'How likely are you to buy this product if it were available in the stores where you normally shop? Select from given option a. Definitely would buy; b. Probably would buy; c. Might or might not buy; d. Probably would not buy; e. Definitely would not buy.'

     A t-test was adopted to test the hypotheses H4, H5, H6, and H7 to compare the means of the two groups. Here, the groups were from two different populations, hence the independent t-test was performed. Before conducting t-tests, tests of normality were conducted to check whether the data was normal or not.

Stage II: Results

The results from the normality tests show that the data is normal.

Analysis of the results to the question 'Please rate the proposed design based on visual appeal on scale 1 (not at all appealing) to 5 (very appealing)?' (And Hypothesis H4) found that the obtained value of $P=0.532>0.05$ does not show statistical significance (see Table 2), therefore hypothesis H4 was rejected. This means that both popular color combinations of red in combination with black and silver in combination with black have a similar impact on users' perceptions.

Table 2: Independent Sample T-test for Aesthetic Preferences

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Aesthetic Preference	Equal variances assumed	.162	.688	.627	105	.532	.105	.168	-.228	.439
	Equal variances not assumed			.623	99.845	.534	.105	.169	-.230	.441

Source: Ugale, Bisoyi and Loudon

Analysis of the results to the question 'How would you rate this product in terms of being new and different from other products currently available concerning Maharashtrian Cultural Context?' (And Hypothesis H5) compared the differences in response between two age groups of 20 to 35 and 36 to 50. Table 3 shows that the obtained value of P=0.406>0.05 does not show statistical significance. Thus, hypothesis H5 was rejected.

Table 3: Independent Sample T-test for Recognition value

		Levene's Test for Equality of Variances		t-test for Equality of Means							
									Std.	95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. 2-tailed)	Mean Differ-ence	Error Differ-ence		Lower	Upper
Proposed design how new and different from other products	Equal variances assumed	.045	.834	-.838	54	.406	-.208	.248		-.705	.289
	Equal variances not assumed			-.843	553.781	.403	-.208	.246		-.702	.287

Source: Ugale, Bisoyi and Loudon

Analysis of the results to the question 'Please rate the proposed design based on visual appeal on the scale of 1 (Not at all appealing) to 5 (Very appealing)' (and Hypothesis H6) compared the differences in response between two age groups of 20 to 35 and 36 to 50. Table 4 shows that the obtained value of P=0.015<0.05, which shows statistical significance, consequently hypothesis H6 was accepted.

Table 4: Independent Sample T-test for Aesthetic Value

		Levene's Test for Equality of Variances		t-test for Equality of Means							
										95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. 2-tailed)	Mean Differ-ence	Std. Error Differ-ence			
										Lower	Upper
Aesthetic value of	Equal variances										

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
proposed design	assumed	.369	.546	-2.510	54	.015	-.521	.207	-.936	-.105
	Equal variances not assumed			-2.483	49.757	.016	-.521	.210	-.942	-.099

Source: Ugale, Bisoyi and Loudon

Analysis of the results to the question 'How likely are you to buy this product if it were available in the stores where you normally shop? Select from given option a. Definitely would buy; b. Probably would buy; c. Might or might not buy; d. Probably would not buy; e. Definitely would not buy (and Hypothesis H7) compared the differences in response between two age groups of 20 to 35 and 36 to 50. Table 5 shows that the obtained value of $P=0.351>0.05$, which does not show statistical significance hence hypothesis H7 was rejected.

Table 5: Independent Sample T-test for Buying Preferences

		Levene's Test for Equality of Variances		t-test for Equality of Means						
						Sig.	Mean Differ-ence	Std. Error Differ-ence	95% Confidence Interval of the Difference	
		F	Sig.	t	df	(2-tailed)			Lower	Upper
Buying Interest for proposed design	Equal variances assumed	1.057	.308	-.941	54	.351	-.185	.196	-.578	.209
	Equal variances not assumed			-.945	53.532	.349	-.185	.195	-.577	.207

Source: Ugale, Bisoyi and Loudon

Therefore overall, there were no significant differences between the two age groups of 20 to 35 and 36 to 50 with regards to the recognition value of the product and buying preferences for the culture-inspired bowl designs. However, there were significant differences in aesthetic preferences for the designs.

Limitations

This study was limited to the Maharashtra region. It was a pilot study conducted with 100 participants; the accuracy of the results can be increased by including more participants. 3D render images of proposed designs were shared with participants. The accuracy of the results here can be increased by showing them the actual products.

Discussion

This research study focused on the color, material, and finish design elements of the Maharashtrian Khana handloom and how the proposed culture-inspired CMF designs create an impact on a product's recognition value. The literature review findings highlight the importance of transforming cultural features into a modern product in the local and global market to create unique and desirable product solutions for target consumers. Through the literature review, it was also observed that the Khana handloom, from the Maharashtra region in India, is one of the latest trends which is very popular among the Maharashtrian users.

The results from this study show that when cultural CMF elements, inspired from a Khana saree, were applied to a bowl product, the Maharashtrian participants found the product more relevant. Therefore, it suggests that it is very important in CMF design to follow current socio-cultural trends to make the product more relevant and desirable for users. It is also suggested that it is very important for CMF designers to study the context where products will be placed. The study results show that the proposed two CMF designs of a bowl, inspired by the Khana handlooms, have a significant difference in aesthetic design preference between two age groups of 20 to 35 and 36 to 50. The research study also suggests that Maharashtrian female target users, having an age group between 20 to 50, want to buy culture-inspired products. However, their aesthetic preferences vary between age groups (20 to 35 and 36 to 50) which means that in CMF design it is very important for the CMF designer to target very specific user groups and the context to meet the user's aesthetic needs and desires. Some products exist, for example, a wallet, handbag, face mask, and pillow cover, which are designed by taking inspiration from the Khana handloom and which are made by using Khana fabric. The novelty of this research work is that cultural CMF elements of the Khana handloom have been applied for the first time on hard products, i.e., a bowl which was made out of ceramic material. All these insights obtained through research study are very advantageous for design learners and for CMF designers who wish to create CMF designs by taking a cultural approach. Guidelines for how to create CMF for products by taking a cultural approach has a huge scope for future research work. Integration of culture and CMF design is still evolving which provides great opportunities for researchers. The cultural design approach in CMF design is an effective way to develop the regional culture and creative industry and to uplift the CMF design level of the products. The industries are slowly started giving more emphasis on CMF design as they started understanding how CMF design can bring extra value to the product at a low cost while maintaining the same product form. Thus, this research study will be beneficial for both academia and industry.

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