



WARNABALI: BALINESE COLOR INTENSITY DIVERSIFICATION FOR DEVELOPMENT OF BALI MODERN INTERIOR AND ARCHITECTURE COATING IN ADDITIVE COLOR ONLINE BASED EXPERIMENT

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Abstract

Purpose: This study aims to conduct experiments on enriching the intensity of traditional Balinese colors that are relevant to the application of color in modern interiors and architecture.

Research methods: The research method uses online-based experiments by mixing Balinese colors with light and dark characters in a ratio of 66.7%: 33.3%. Mixing is done by crossing process and the results of the cross process are arranged into a Balinese color palette based on Additive Colors.

Findings: The color cross method with a ratio of 66.7% light to 33.3% dark produces Bali color variants with various tint intensities. The scan results on the Balinese print-based color composition arranged in the *nawa sangha* cosmology, which is processed online through the *dopely.top* website, produces relevant colors developed in modern interiors and architecture. The process of diversifying the color intensity will provide recommendations for its application to residential and non-residential interiors.

Implications: Provide insight into the use of traditional Balinese colors to designers and architects, in an effort to preserve and strengthen tradition-based knowledge for the development of modern design science.

Keywords: Warnabali, Balinese Color, Coating, Bali Modern, Interior Architecture, Additive Color

INTRODUCTION

This research is a continuation and development of the Warnabali research (written without spaces with a lowercase 'b' in the word 'Bali') chaired by Anak Agung Gede Rai Remawa in 2009 who already has a Creation Registration Letter Number C00201002320 dated 29 June 2010, issued by the Director General of Intellectual Property Rights of the Ministry of Law and Human Rights of the Republic of Indonesia. The name is the output of the Competitive Grant Research entitled "Development of Warnabali with Modern Techniques as an Effort to Increase the Selling Value of Local Products, which consists of I Nyoman Wiwana, I Wayan Sukarya (ISI Denpasar) and Anak Agung Bawa Putra (UNUD). [1].

Color is one of the most important components in design and marketing, and is linked to culture and religion [2]. Color in culture also correlates with its function as a natural dye [3]. Color is generally often used as an aesthetic addition and a medium of communication. Color is a visual sign and a sign of natural language. Color is unique because of its capacity to be a cultural unit in terms of Eco. Without realizing it, color gives a lot of special identification to certain things that describe its own time, place, and situation. Different cultures have different terms for colors, and may also assign several color names to slightly different parts of the spectrum [4]. The idea that colors can transmit meaning, emotional or cognitive messages, has ground in two areas. One is the convection that some reactions to color are innate, intuitive, and universal to everyone. The other lies in a learned set of associations that depend, in part, on a reality known to all and, in part, on a learned meaning in a given time and place [5]. So color can apply universally that is general in nature, as well as culturally specific in its meaning and color hue.

Research on local Indonesian colors and their development is currently still limited, so that local Indonesian colors are lagging behind when compared to the development of color intensity in other parts of the world. Indonesian colors spread from Sabang to Merauke such as Minang, Sundanese, Javanese, Dayak, Bugis, Sasak colors and so on. Including Bali, it has a distinctive color concept, with special values based on Balinese *cet* derived from natural materials.

Cet Bali (Balinese Coating) is used as a natural dye for wood-based media. Traditionally, *Cet* Bali is used for coloring activities, both *mulasin* (coloring process) and *ngodakin* (coloring sacred objects made of wood which are restorative). *Ngodakin* comes from the word '*odak*' which means *boreh* (traditional coating) [5, p. 2]. The colors in *cet* Bali are generally sacred colors. The availability of traditional color materials in the current era is increasingly scarce. Therefore, the color material for *ngodakin* uses modern paint whose color hue is different from the traditional color hue.

Cet Bali Materials are divided into solid ingredients are *deluga*, *pere*, *atal*, *tulang* (Bone), soft ingredients: *kencu*, *taum*, *mangsi* and Mixing/Adhesive ingredients: *ancur*.



Figure 1. Balinese *Cet* Bali Material
[Source: Reference [1]]

The process of making Balinese *cet* Bali begins with preparing a kind of pottery or ceramic tin, complete with a grinding stone. Natural materials are prepared in relation to the color to be made. The natural ingredients are ground until smooth, then crushed as an adhesive. If needed, water can be added so that the material can be crushed easily. The grinding motion is carried out gently and consistently, so that the natural ingredients can be perfectly smoothed, as well as crushed in a perfect mix.



Figure 2. Processing The Natural Coating Into Medium
[Source: Reference [1]]

The results of the Balinese *Cet* are collected according to the *Pengider Bhuana* Color Concept as part of the *Dewata Nawa Sanggha* Concept (9 Gods of Nine Cardinal Direction). The Concept of *Dewata Nawa Sanggha* is one ApplicationThe concept of *Warnabali* comes from the *Lontar Kereb Bhuana*, *Dewa Tatwa* or other *lontars*. Another concept is *Tri Kona*, namely the concept of the three colors; red symbolizes *Brahma*, black symbolizes *Vishnu* and white symbolizes *Iswara/Shiva* [6]. Therefore, the results of mixing the colors of Balinese prints are arranged based on the *Nawa Sanggha* concept, with a different darkening application (Key), namely between applications with *Mangsi* or *Taum*.



Figure 3. *Cet* Bali in *Nawa Sanggha* Arrangement
[Source: Reference [1]]

Cet Bali as part of Balinese visual culture must be preserved and developed. This effort related with the discourse on searching for 'Indonesian design' as the character of national design and branding of Indonesian designs as an added value of Indonesian products in international design competitions continues to emerge. The postmodernism wave in the field of design increasingly provides opportunities for Indonesian designers to develop aspects of locality in each of their design works [8]. One of them is by diversifying the color intensity into modern architectural interior design. This can be developed by conducting experiments on the color of Bali which has been studied previously. The results of the development can be used to create a strong identity for the character and appearance of the colors used for wall paint/interior walls and building architecture. This ideal development from cultural resources will need cultural content translation capability to become design aesthetics idioms that is relevant to accommodate modern life, without damaging its original culture [9].

The color of Balinese paint which tends to have a sacred character is trying to be enriched, to match the modern space. This requires a process of profanization of sacred colors without harming the cultural philosophy in it. Bali has a variety of religious rituals and cultural traditions that are sacred (*wali*), semi-profane (*bebali*), and profane (*balih-balihan*). *Wali* and *bebali* arts include types of art that have religious values and sacred. The performance is related to the time and place as well as the ceremony. Meanwhile, *balih-balihan* art includes art that emphasizes entertainment and aesthetic values where the performing arts are more secular in nature. *Balih-balihan* is staged anytime and anywhere without any binding time, place and event restrictions [10, p. 41]. The classification framework for performing arts is used as the basis for understanding that the character of Balinese culture is open to development. The color of *cet* Bali for ritual activities is matched with '*wali* color' as a sacred color and '*bebali* color' as a semi-profane color which is still related to customs and traditions. Meanwhile, what will be developed in this research is the color '*balih-balihan*' or '*bebalihan*' which is profane and relevant in the context of modern applications.

This study seeks to experiment with the diversification of Balinese color intensity, especially on online-based additive colors. Additive color is the process of mixing colored light. The most common application of this can be found in theater lighting [11, p. 11]. Starting from the primary group of red, green, and blue, an additive color model occurs when colored lights overlap and mix to produce a visible spectrum. The mixing of the primaries results in the color white [12, p. 137]. Additive color in the study refers to layer-based color processing through online sites. Additive color mixing is used as a simulation of the next Bali color intensity diversification experiment.

The perception of color in a space always carries a symbolic, emotional, and physiological effect associated with it [13, p. 65]. The application of color in the interior will affect the quantity of human interaction in space. This refers to the research of The National Human Activity Pattern Survey (NHAPS) in 2001 which states that modern humans spend 90% of their life indoors [14] [15]. So by applying traditional colors into interiors and architecture, it will indirectly bring people closer to recognizing their culture through their residential space. Although designers have many design tools to create spaces with high

atmospheric quality, color can prove to be one of the most effective tools due to its immediate and immediate effect on the user's senses. Color was initially approached as a materialistic component, but became more of an atmospheric element following the effects of the artistic movement [13, p. 64].

The hope is that Bali has a strong character in color display, and has a variety of Balinese color intensities for the benefit of the local color industry that can be developed into the global arena. Modern Balinese style in the form of buildings requires support in the field of interior and architectural coatings.

RESEARCH METHODS

This study uses an online-based experimental method by carrying out various color mixture variants by comparing 33.3% Bali color with dark intensity to 66.7% Bali color with light intensity. This percentage is carried out to maintain the original character of the Balinese colors which tend to be darker when compared to interior colors and modern architecture which tend to be soft and light.

The research stage begins with determining the Balinese hue in Figure 3 with the color picker tool in Microsoft Word, then the hue is scanned through the online color mixer application via the website. <https://colors.dopely.top/>. The dopely.top site is a popular color laboratory site led by Mehdi Khodamoradi and consists of 16 people. The color scan on the site will generate a color code that will be used in the online-based color mixer experiment process. In this study, we will only discuss four color mixtures as the total research sample.

FINDINGS

The results of the study obtained variations in the intensity of relevant colors used in interiors and architecture. From the color of Bali according to the position of *nawa sanggha*, a code is given with the key difference between *mangsi* and *taum*.



					
KEY=MANGSI			KEY=TAUM		
Blue Bayux #6A7E80	Tangaroa #1B2637	Wedgewood #506585	Chinook #95CAA2	Catalina Blue #283E5D	Sail #A2CCEC
Primrose #E6D38C	Mule Pawn #8A5540	Blue Polo #8BA9CB	Straw #DAC584	Old Copper #754D3C	Heather #BBBFC2
Sante fe #B66356	Red Berry #772920	Rum #77637B	Paarl #904D37	Brown #A73628	Brandy Rose #B58087

Figure 4. Warnabali Color Code Scanned on dopely.top
[Source: <https://colors.dopely.top/image-color-picker/>]

From the color code search on the dopely.top site, the code set by the research team was given.

KEY=MANGSI		
MS1	NF2	MN3
MP4	TC5	MS6
NR7	MR8	NL9

KEY=TAUM		
TS1	TK2	TM3
TP4	TC5	TS6
TR7	TR8	TL9

From the color results in previous studies, it can be determined to classify darken colors and brighten colors. The ratio of darken and brighten colors, which in the previous study was set at 30% versus 70%, was changed to 33.3% and 66.7%, because the color palette for the color mixer on the dopely.top site only provides 6 color palettes. Therefore, it is determined that the darken color is 2/6 (33.3%) and the brighten color is 4/6 (66.7%). By researchers the position of darken color and brighten color has been determined as follows:

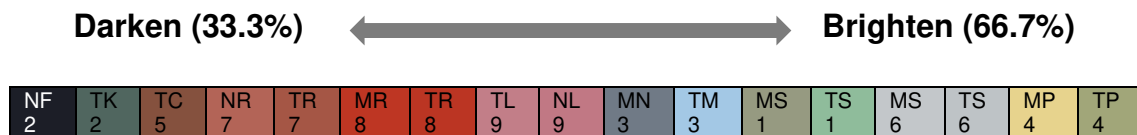


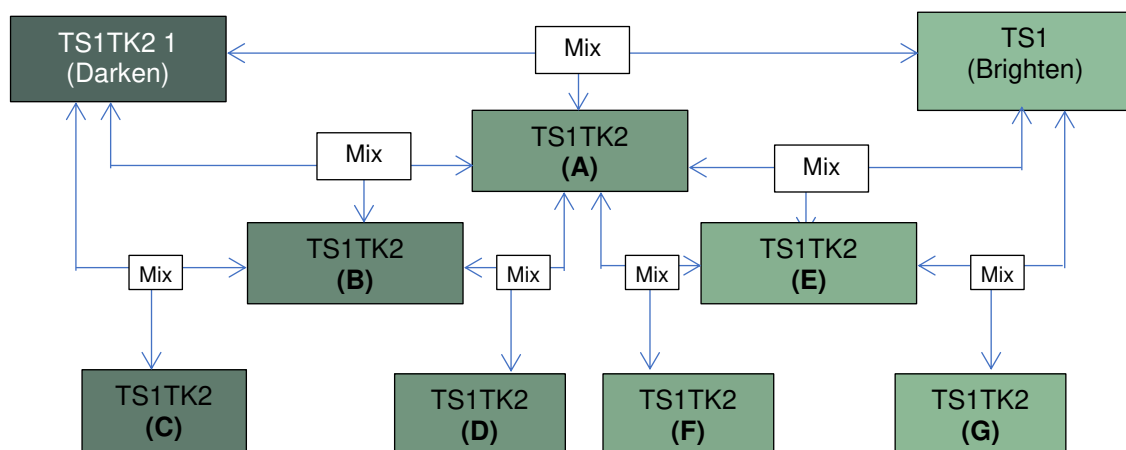
Figure 5. Assigning Darken and Brighten Colors
[Source: Research Team, 2021]

From this determination, the process of mixing colors with the cross color method between Balinese colors begins, which has been compiled based on the concept of *nawa sanggha*.

a. Mixing TS1 - TK2

TINT	BRIGHTEN (66.7%)	DARKEN (33.3%)	RESULT
COLOR CODE	TS1	TK2	TS1TK2 1

From the mixing of the 2 Balinese colors, they were crossed so that they got variations in color intensity with the crossing method, as follows:

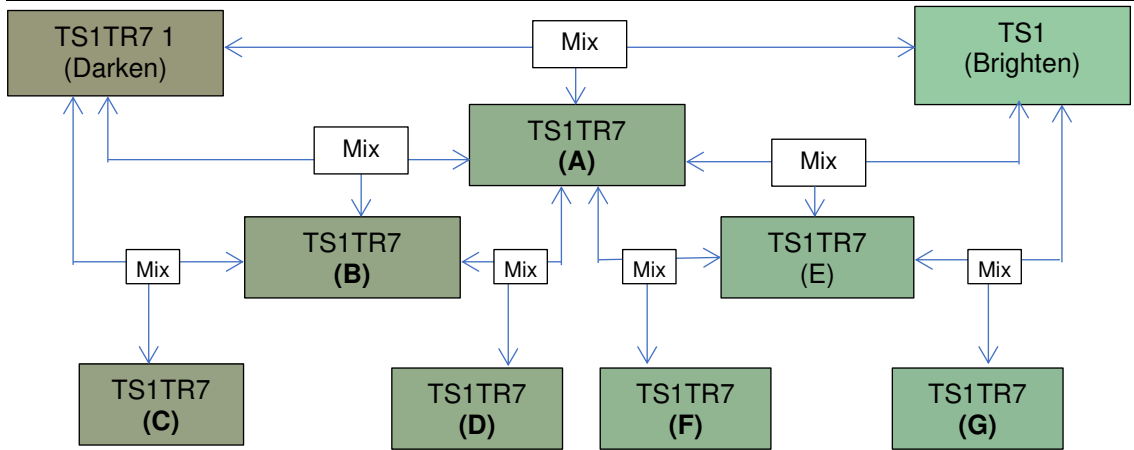


The blending results are arranged into a color palette according to the above blending method. The results of the mixing are arranged based on more suitable color gradations from dark to light colors, so as to get a more harmonious color mixing gradation.

Mixing Result	TS1 TK2 1 (Darken)	TS1 TK2 (A)	TS1 TK2 (B)	TS1 TK2 (C)	TS1 TK2 (D)	TS1 TK2 (E)	TS1 TK2 (F)	TS1 TK2 (G)	TS 1 (Brighten)
Harmony- zation	TS1 TK2 1 (Darken)	TS1 TK2 (C)	TS1 TK2 (B)	TS1 TK2 (D)	TS1 TK2 (A)	TS1 TK2 (F)	TS1 TK2 (E)	TS1 TK2 (G)	TS 1 (Brighten)

b. TS1-TR7

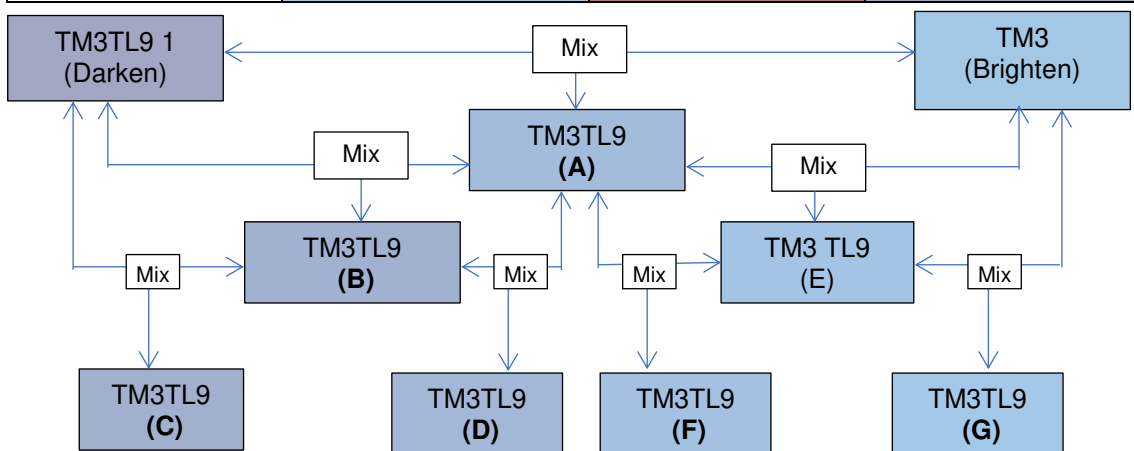
TINT	BRIGHTEN (66.7%)	DARKEN (33.3%)	RESULT
COLOR CODE	TS1	TR7	TS1TR7 1



Mixing Result	TS1 TR7 1 (Darken)	TS1 TR7 (A)	TS1 TR7 (B)	TS1 TR7 (C)	TS1 TR7 (D)	TS1 TR7 (E)	TS1 TR7 (F)	TS1 TR7 (G)	TS 1 (Brighten)
Harmony- zation	TS1 TR7 1 (Darken)	TS1 TR7 (C)	TS1 TR7 (B)	TS1 TR7 (D)	TS1 TR7 (A)	TS1 TR7 (F)	TS1 TR7 (E)	TS1 TR7 (G)	TS 1 (Brighten)

c. TM3 - TL9

TINT	BRIGHTEN (66.7%)	DARKEN (33.3%)	RESULT
COLOR CODE	TM3	TL9	TM3TL9 1

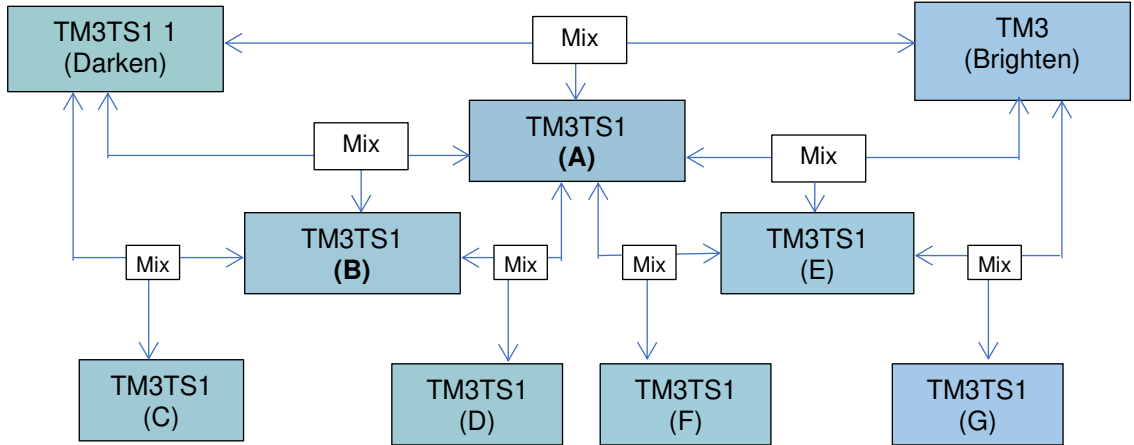


Mixing Result	TM3 TL9 1 (Darken)	TM3 TL9 (A)	TM3 TL9 (B)	TM3 TL9 (C)	TM3 TL9 (D)	TM3 TL9 (E)	TM3 TL9 (F)	TM3 TL9 (G)	TM 3 (Brighten)
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Harmony- zation	TM3 TL9 1 (Darken)	TM3 TL9 (C)	TM3 TL9 (B)	TM3 TL9 (D)	TM3 TL9 (A)	TM3 TL9 (F)	TM3 TL9 (E)	TM3 TL9 (G)	TM 3 (Brighten)
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d. TM3 – TS1

TINT	BRIGHTEN (66.7%)	DARKEN (33.3%)	RESULT
COLOR CODE	TM3	TS1	TM3TS1 1



Mixing Result	TM3 TS1 1 (Darken)	TM3 TS1 (A)	TM3 TS1 (B)	TM3 TS1 (C)	TM3 TS1 (D)	TM3 TS1 (E)	TM3 TS1 (F)	TM3 TS1 (G)	TM 3 (Brighten)
Harmony- zation	TM3 TS1 1 (Darken)	TM3 TS1 (C)	TM3 TS1 (B)	TM3 TS1 (D)	TM3 TS1 (A)	TM3 TS1 (F)	TM3 TS1 (E)	TM3 TS1 (G)	TM 3 (Brighten)

From the 4 color palettes, the results of cross-mixing get an overview of the Balinese color intensity as follows.

Table 1. Color Intensity Diversification based on Additive Color Experiment
[Source: Research Team, 2021]

TS1-TK2	TS1 TK2 1 (Darken)	TS1 TK2 (C)	TS1 TK2 (B)	TS1 TK2 (D)	TS1 TK2 (A)	TS1 TK2 (F)	TS1 TK2 (E)	TS1 TK2 (G)	TS 1 (Brighten)
TS1-TR7	TS1 TR7 1 (Darken)	TS1 TR7 (C)	TS1 TR7 (B)	TS1 TR7 (D)	TS1 TR7 (A)	TS1 TR7 (F)	TS1 TR7 (E)	TS1 TR7 (G)	TS 1 (Brighten)
TM3-TL9	TM3 TL9 1 (Darken)	TM3 TL9 (C)	TM3 TL9 (B)	TM3 TL9 (D)	TM3 TL9 (A)	TM3 TL9 (F)	TM3 TL9 (E)	TM3 TL9 (G)	TM 3 (Brighten)
TM3-TS1	TM3 TS1 1 (Darken)	TM3 TS1 (C)	TM3 TS1 (B)	TM3 TS1 (D)	TM3 TS1 (A)	TM3 TS1 (F)	TM3 TS1 (E)	TM3 TS1 (G)	TM 3 (Brighten)

Of the 4 variations of color mixing with the cross method, several color intensities are produced, which in the dopely.top site have been detected and have specific names (Table 2). This shows that the color produced by the cross has been specifically recognized ontologically by the dopely.top site. How can you claim that the colors produced by this research are Bali colors? The next process is to analyze how the technical and procedure for claiming specific color hues represent certain entities geographically, especially traditional colors.

Table 2. Warnabali Cross Results and Naming on the Dopoly.top Site
 [Source: Research Team, 2021]

TS1-TK2	Viridian Green #50665E	Sirocco #617A6D	Laurel #678674	Oxley #72947E	Bayleaf #81A98B	Bay Leaf #80AA8A	Bay Leaf #86AF8E	Summer Green #87B291	Chinook #95CAA2
TS1-TR7	Gurkhas #99957A	Sage #94A182	Sage #92A584	Mantle #8FA888	Envy #1AE90	Dark Sea Green #91B490	Dark Sea Green #91B493	Summer Green #8FB996	Chinook #95CAA2
TM3-TL9	Echo Blue #A1AFCD	Light Steel Blue #A1A6C2	Echo Blue #A0B2CF	Light Steel Blue #A2BCDE	Light Steel Blue #A4B9D9	Perano #A4C1E4	Tropical Blue #A3C4E6	Tropical Blue #A1A6C2	Sail #A2CCEC
TM3-TS1	Morning Glory #9DCBCC	Morning Glory #A0CAD4	Regent St Blue #A0CBD9	Regent St Blue #9EC4DA	Regent St Blue #A1C9DC	Regent St Blue #A1CDDC	French Pass #A2CBEA	Tropical Blue #A3C8E8	Sail #A2CCEC

The process of claiming certain colors to be the property of individuals, companies and or regions places color as a product of intellectual property rights protected by law. To what extent can a color be claimed to be proprietary? In America, Under the Lanham Act, “any word, name, symbol, or device, or any combination thereof” can serve as a trademark. If a color indicates the source of goods or services, it functions as a trademark. In *Qualityex Co. v. Jacobson Prods. Co.*, 514 US 159 (1995), the US Supreme Court confirmed that even an individual color can be legally protected as a mark in certain circumstances. In order to be registered as a mark, a color (1) must indicate to consumers the source of the mark owner's goods or services, and (2) cannot serve a functional purpose. A color mark must acquire distinctiveness before it can be protected. Color, on the other hand, is more subtle and needs time to develop as a sign of origin. As with all trademarks, color can only serve as a brand in connection with particular goods or services. An application seeking to register a color mark must include a color claim, description of the color and drawing. It must also include a specimen that consists of a color photograph that shows the manner in which the color is actually being used in connection with the applied-for goods and services [16].

Colors resulting from cross-colored have the potential to be declared as Bali colors for various reasons. First, the sign of origin has been described in this study, which was developed from the concept of *cet* Bali as part of Balinese visual culture. *Cet* Bali, which is produced from organic products, has been scanned with additive colors to produce a digital color code. The two processes of crossing by applying differences in the intensity of dark and light colors have resulted in relevant color variants being developed into interior design. The four color samples produced show the relevant colors developed into the interior design. Interior design objects are divided into residential and non-residential [17]. In residential spaces, the use of color in the interior is related to the specific emotions that will be built, individual preferences and also the background of the occupants. There are numerous factors affecting the choice of colors in the housing space interior. The used color patterns may depend on the climate. For instance, usage of patterns dominated by the warm, cool or neutral hues can depend on the climate, orientation and degree of activities [18, p. 871].

The four samples of Bali color from the experiment resulted in cold colors consisting of dominant blue and green colors. Blue as one of cool color has many connotations and meanings, but it primarily stimulates the feeling of clarity, order

and calmness. This color is particularly useful for a study, but it is a good choice for the bedroom because it stimulates the sensation of peace and quiet. The hues of blue must be carefully used, since the lighter tones have a calming effect, while the darker tones may cause a depressing feeling. Green color has similar effects, but it is also strongly related to nature, so its calming effect is stronger [18, p. 871]. The green, blue, indigo, and violet hues from our visible range of color are considered to be the cool colours. They have the opposite effect of warm colors and decrease the heart rate, respiration, and blood pressure because they affect the nervous system [19]. Therefore, the application of Balinese color samples in non-residential interiors is more suitable to be applied to hospitality, healthcare and public spaces that imply serenity or closeness to nature.

CONCLUSION

The color cross method with a ratio of 66.7% light to 33.3% dark produces Bali color variants with various tint intensities. The scan results on the Balinese traditional coating color composition arranged in the *nawa sanggha* cosmology, which is processed online through the *dopely.top* website, produces relevant colors developed in modern interiors and architecture. The process of diversifying the color intensity will provide recommendations for its application to residential and non-residential interiors. Further research is needed to further develop the intensity of Balinese colors into modern interiors and architecture.

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