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The Study of Soga Brown Colour Visual Digitization from Classical Batik of Yogyakarta

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Abstract. Indonesian traditional textile has distinct signature textile culture on its natural dye, for example Classical Batik of Yogyakarta which is well known for its brown *soga* colour, a brownish colour obtained from the colourants combination of *jambal* bark (*Pelthophorum ferrugineum*), *tingi* bark (*Ceriops candolleana*), and *tegeran* wood (*Cudrania javanensis*). Along with those ingredients, Classical Batik of Yogyakarta also uses indigo plant (*Indigofera tinctoria*) as its blue colourant to help create darker brown colour, and *kapur tohor* (Calcium Oxide) for pre and post mordant treatment. The colour study output would be a recommendation as it would be a non-analog inventory documentation of Classical Batik of Yogyakarta natural dye. In order to make the colour visual data suitable for digital device, the research requires fabrics dyed with Classical Batik of Yogyakarta natural dye ingredients and technique as samples for colour identification study by spectrophotometry and by digitalization method to obtain RGB colour value. The natural dye colour digital format data is designed to facilitate data preservation and its acquisition by individuals whom have interest on textile natural dye.

Keywords : Natural Dye, Colour Identification, RGB Colour Value, *Soga* Brown, Classical Batik of Yogyakarta

1. Introduction

Colouration textiles using natural dye is unique within colour results and the creative process of making the colour, including the traditional Indonesian textiles products which have uniqueness in its textile culture. One of the traditional Indonesian textiles which has unique feature is the Classic Batik of Yogyakarta. In addition to a distinctive feature of the decoration, classical batik also has a unique colour system, which is a dark blue colour (*wulung*), *sepia* (*dragemsogan*), and the white colour that is easily obtained by naturally using the plant materials [1]. *Soga* dark brown colour is obtained from a combination of natural dyes *jambal* bark (*Pelthophorum ferrugineum*), the *tingi* bark (*Ceriops candolleana*) and *tegeran* wood (*Cudrania javanensis*). The dark blue colour is obtained from indigo natural dyes (*Indigofera tinctoria*). *Kapur tohor*, or the oxidize calcium, as a mordant early additive and fixation in the dyeing process.

The knowledge of the traditional textile dyeing tradition need to be preserved as it is part of the cultural richness of Indonesian textiles. Textiles genuine artefact storage as natural colours resources is not reliable for the textile object has a period of obsolescence that cannot be avoided, the physical fabric may be damaged due to the effects of weather and disruption of moths, especially within Indonesian natural conditions which gives unfavourable fabric preservation which as the result the archaeological



remains of ancient Indonesia textile is difficult to be obtained [2]. The accuracy of the artefacts data identification can be questioned, because the artefacts colour object will gradually fade because of the results of time, hygiene, weather, and sunlight [3]. The means of information of traditional creativity needs to take advantage of current media and technology, such as mobile application, so that the distribution of information is accessible to the modern society. In digital technology, large amounts of information are compressed into a smaller size and then it will be restored to its original size when data information is required [4]. Information digitalization allows the information transfer that can be done through a variety of media with a clear program, both from traditional media such as print newspapers and magazines to contemporary electronic media like computers. Data compression of colour and colouration into a digital format which to be applied to mobile applications is expected to be an alternative media inventory, as well as facilitating access to information for individuals who have an interest in natural textile dyeing.

2. Experimental method

2.1. Materials

Natural dyes commonly extracted from plants and animals, and the colour of Classical Batik of Yogyakarta is obtained from plants products. The plant tissue contained colour pigment, which produced the colour. Javanese ancestor since hundred years ago use natural dyes due to the natural colour, which looks elegant and durable [5].

The sample object for the colour test identification research will be made from colour dyes and colouration techniques of Classical Batik of Yogyakarta. Method of colouring fabrics in the making of the sample is divided into two kinds, namely colour dyeing with batik technique and colour dyeing without batik technique, with dyeing variations for three, six, and nine times. The raw material used for the sample material colouring are indigo colour dye from *Indigofera tinctoria* plant to produce a blue colour, the combination of colour dye from the *jambal* bark, *tingi* bark, and *tegeran* wood to produce *soga* brown colour, and front-end *mordant* in a form of *tohor* calcium. Total of the samples are 30 pieces natural dyed fabric.

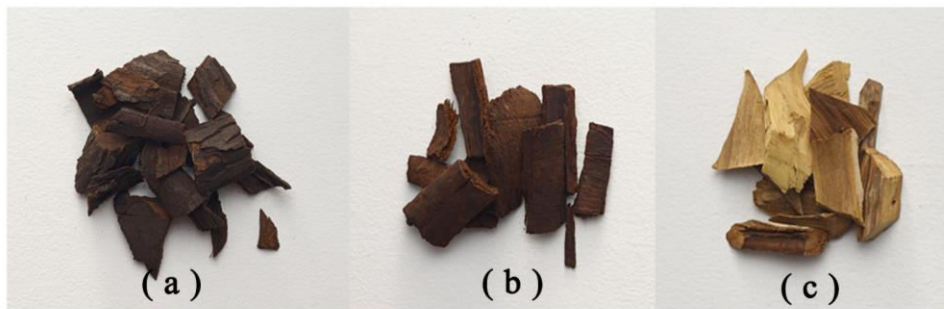








Figure 1. An examples of *jambal* bark (a), *tingi* bark (b) and *tegeran* wood (c).

2.2. Methods

Colour identification is done by using a spectrophotometer to obtain the value of the length of the colour wave, and the process of digitizing the samples to obtain discrete values at each pixel colour digital image with a sample size of 64 pixels x 64 pixels. The results of the identification test is to be standardized by converting it into RGB (Red, Green, Blue) notation, adapted to the needs of digital media designing that uses the RGB colour system [6].

Table 1. Sample A1-A2, D1-D2 and J1-J2 for colour test identification using Classical Batik of Yogyakarta colouration technique.

No.	Sample Code	Fabric Sample	Technique	Colouring Process		Mordant	
				Indigo	Soga	Pre	Post
1	A1		Batik	3 times	0	<i>Kapur tohor</i>	<i>Kapur tohor</i>
	A2		Without batik	3 times	0	<i>Kapur tohor</i>	<i>Kapur tohor</i>
2	D1		Batik	0	3 times	<i>Kapur tohor</i>	<i>Kapur tohor</i>
	D2		Without batik	0	3 times	<i>Kapur tohor</i>	<i>Kapur tohor</i>
3	J1		Batik	6 times	3 times	<i>Kapur tohor</i>	<i>Kapur tohor</i>
	J2		Without batik	6 times	3 times	<i>Kapur tohor</i>	<i>Kapur tohor</i>

2.2.1. *Spectrophotometer*. Spectrophotometry is the use of instruments to determine the concentration of colored species. The instrument used for spectrophotometry is spectrophotometer, which measures the amount of light absorbed or the intensity of color at a given wavelength [7].

Table 2. Spectrophotometry Result for Sample A1-A2, D1-D2 and J1-J2.

Sample Code	WL (nm)	RFL	K/S
A1 – A2	420 nm – 460 nm	15.474 – 29.070	2.309 – 0.865
	700 nm	19.951	1.606 – 0.285
D1 – D2, J1 – J2	700 nm	7.739 – 47.881	5.499 – 0.285

Based on the results of the spectrophotometry scanning, the result of wavelength obtained is adrift in the value range of 400 nm to 700 nm. In the sample using only indigo dye, the maximum colour value with the highest reflective rate is found in the wavelength of 420 nm, 430 nm, 440 nm,



450 nm, 460 nm, and 700 nm. As within the sample, it was only using *soga* brown dye and samples with double dye obtain the maximum colour value of 700 nm.

2.2.2. Colour digitization. Every digital-capture system is capable of transforming an object into a digital image. Nonetheless the digital image has archival value as a digital representation. Digital image-archives should facilitate scientific documentation and study of works of the object, therefore the objective is to have the capability to estimate quantitative information about the object, not creates a visually equivalent representation for a defined output device [8]. Raw data of the captured image has advantage that the high bit depth allows to correct for exposure level, white balance, sharpness, etc., without significant loss in image quality where digital image supposed to be as exact match as the original captured object [9].



Figure 2. Samples of digitized natural dyed fabric sample image (64 pixel x 64 pixel): sample A1 (a), D1 (b), J1 (c), A2 (d), D2 (e) and J2 (f)

Table 3. An example of RGB colour results conclusion on sample A1 and sample A2

Sample	RGB Value (Red, Green, Blue)			
	AVG	MED	MIN	MAX
A1 	93.7, 119.13, 135.35 (93.7, 119.13, 135.35)	86, 114, 131 (86, 114, 131)	7, 51, 80 (7, 51, 80)	238, 224, 217 (238, 224, 217)
A2 	82, 127, 141 (82, 127, 141)	82, 128, 142 (82, 128, 142)	46, 78, 93 (46, 78, 93)	110, 156, 168 (110, 156, 168)

Where as based on the digitization of colour, it is obtained 120 colour results along with its RGB notation which become the recommendation for digital colour library of natural dyes Classical Batik of Yogyakarta. The colour results classified into several groups of keyword for folksonomy purpose of featured menu recommendations, which each keyword group works as electronic tag for the colour data and content. The classified keywords are based on the name of the colour group, the colourant ingredient group, the mordant material group, the name of the traditional textile group, and the region group.

3. Results identification and color standardization

RGB colour model is considered as the base colour space for various applications due to no transformations required displaying information on the screen [10]. Therefore the application of RGB colour model includes computer graphics, image processing, analysis and storage. Colour data, which will be better to be displayed on digital media as content is taken from the colour of the identification results in the process of digitizing the image, because the identification of the resulting colour display quite varied colour range and is considered to represent the original colour of the fabric sample. The conversion of RGB colour data as the result of the conversion colour wavelength value from the identification test using the spectrophotometer are considered less representative of the original colour because there are significant differences between the colours in the RGB colour sample object with wavelength conversion results.

In addition to significant differences in colour, profiling colour identification results by spectrophotometry has limitations on the resulting colour variations based on wavelength value conversion in RGB colour notation. Where as based on the digitization of color, it is obtained 120 color results along with its RGB notation which become the recommendation for digital color library of natural dyes Classical Batik of Yogyakarta.

4. Conclusion

This study is a response to the needs of non-analog inventory documentation for the result of Indonesia natural dyes, particularly the natural dyes used in colouring Classical Batik of Yogyakarta. The study of the colour identification test is done in two ways, namely by spectrophotometry and by digitizing the image. The result of colour identification is then converted into RGB notation as a standard colour notation, which can be applied as digital content. The design of the digital content can be recommended as material for interactive digital color library features.

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References

- [1] S. D. Kartika, *Archipelago culture: Study of the concept of the mandala and the concept of the triloka / buana on tree life on classical batik*, Bandung: Rekayasa Sains, 2007. (Indonesian)
- [2] Hasanudin, *Batik pesisiran: Track the influence of the santri trade ethos on batik decoration*, Bandung: PT Kiblat Buku Utama, 2001. (Indonesian)
- [3] Milner, *The ashford book of dyeing*, Wellington: Brifget Williams Book Limited, 1992.
- [4] J. Hartley, *Communication, cultural, & media studies: Konsep kunci* (Kartika Wijayanti, terj.), Yogyakarta: Jalasutra, 2010.
- [5] Widyatmono, Nugraha & Ayu, Arik 2014 *Eco-friendly of natural color technique of traditional javanese batik* 10.13140/2.1.3935.2645.
- [6] Suyoto W, Dasuki L A, and Prasetya R G 2012 The Algorithm to Detect Color Gradation on Silk *J. IJCSI Intl. Journal.Comp. Sci.* **9**

- [7] Nouraldein Mohammed Hamad, Mosab 2018 *Colorimetry & spectrophotometry* 10.13140/RG.2.2.35282.45764.
- [8] Berns, Roy 2001 The Science of Digitizing Paintings for Color-Accurate Image Archives: A Review *Journal of Imaging Science and Technology* **45**
- [9] Kurecic, Maja & Darko, Agić & Mandić, Lidija 2007 Color management implementation in digital photography *Journal of Information and Organizational Sciences* **31**
- [10] Ibraheem, Noor & Hasan, Mokhtar & Khan, Rafiqul Zaman & Mishra, Pramod 2012 Understanding Color Models: A Review *ARPN Journal of Science and Technology* **2**