

Exploration of Natural Dye from Indonesia Plants on Children's Clothing Design

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ABSTRACT

This design uses Indonesian plants to process into natural dyes for fabrics. This design is based on the concept of eco-design for children's fashion products. The use of synthetic dyes pollutes not only the environment but also living organisms. The waste produced is liquid waste from the coloring process due to the use of chemicals. This is not only in the adult fashion world but also in the children's fashion world. The fashion industry, show that children's fashion products have a large target market, and it shows that children's fashion product has opportunities in the development of the fashion industry. The use of natural dyes, which are not yet widely found in the world of children's fashion, with the development of the use of natural dyes becoming a new development in the world of children fashion. The use of natural dyes can alternatively become a means of decreasing the use of chemical dyes. Natural dye has the potential to produce a variety of new colors that are applied to children's clothing.

Keywords: Natural Dyes, Indonesia, Children.

INTRODUCTION

Textile consumption around the world is calculated to be over 100 million tons. However, the rate of recycling is relatively low: Barely 13% of the total material input is in some way recycled after usage. Of this recycled 13%, a minuscule part is used to produce new clothing—less than 1% (BurçinÜtebay, PinarÇelik, and AhmetÇay, 2020). Textile industry waste directly discharged into rivers causes pollution in the form of: discoloration, smell, and taste in water; inhibition and loss of aquatic biological activity; pollution of soil and groundwater; and physical changes in plants, animals, and humans by chemicals (Laksono, 2012).

The fashion industry uses a more significant amount of water than other sectors to emit chemical waste containing toxins, and a lot of energy, which makes the fashion industry a significant contribution to global warming (Jennifer and Fiona, 2020). Therefore, the sale of Indonesian fashion and textile products needs to be updated in production to improve and solve problems in the fashion industry. The application of the eco-fashion product label is often found in children's fashion products, but the application still uses synthetic dyes. The application of natural dyes that are less explored for children's clothing, while the nature of children's clothing color is essential. Taking the potential to

produce color variations in natural dyes, to be developed in children's fashion so that it is more attractive and by the concept of eco-design.

Batik producing regions in Indonesia; Solo, Pekalongan, Jogja, Cirebon, Bali, Madura, etc (Cekaja, 2020). MSMEs business in Indonesia is generally carried out by a community of artisans who live in one place and are carried out in groups. With COVID-19, many artisan businesses have had an impact, which has had to close their businesses and lose their jobs. Covid-19 did not just bring an impact to the health side but also brought an impact on the MSMEs communities in Indonesia. The COVID-19 outbreak has also affected the country's economy, one of which is Micro, Small, and Medium Enterprises (MSMEs) where there are 1,785 cooperatives and 163,713 MSME people in Indonesia affected by the coronavirus pandemic (Kontan.co.id, 2020).

The issue is faced in the creative industry, with the impact on the fashion industry being very toxic. In Indonesia, the traditional craft industry is based on culture and the expertise of the region. This research aims to encourage the era of sustainable fashion by improving design strategies in encouraging social innovation. There is a need for further research in exploring the possibilities of strategy in design. Develop a design innovation strategy with material exploration used in influencing artisans in their business in the global industrial market era. In the development of the strategy, it is necessary to have a new strategy related to the concept of sustainability.

LITERATURE REVIEW

Natural Dye History

The art of color application has been known to man from time immemorial, around 3500 BC, and has used natural coloring agents extracted from vegetables, fruits, flowers, and insects. The use of natural dyes in Indonesia is related to the existence of batik in Indonesia. During the Kasunanan period and the Sultanate period, the batik industry flourished. After the end of the 18th and 19th centuries, the development of batik in Java was relatively rapid, and more and more people were interested in batik (Nurainun, 2008: 124). In 1856, synthetic (chemical) dyestuffs were discovered by William Henry Perkin. These synthetic dyestuffs had advantages compared to natural dyes. Synthetic dyes were considered more practical and stable in terms of color in relatively long storage. During the colonial period, the Dutch government (1800–1922) introduced it to the Indonesian country as well as utilized it as a means of controlling the Indonesian nation. The use and development of natural dyestuffs were supervised and not given a chance by the Dutch government, becoming a way for the Dutch, as colonizers at that time, to control the trading in Indonesia (Rahmadyanti, 2017).

Batik Artisan Community in Indonesia

The batik industry is also one of the sectors that have been making a significant contribution to the national economy. The batik industry is dominated by small and medium-sized industries (MSME) and is a sector that creates many jobs, especially for women. There are more than 400 batik artisan business communities in Indonesia

that registered in the Indonesian Ministry of Industry in 2021 (Kemendag, 2021). Batik art in each region has its characteristics, such as batik artisan in Solo making batik with classic motifs like waves. Furthermore, artisans who make batik also use different colors, such as Lasem batik which is made by artisans in Central Java with light colors.

Synthetic Dye

Synthetic dyes have a negative impact in the short and long term. Because of the pollution from industrial waste, the quality of the environment decreases in the presence of harmful substances produced in the atmosphere (soil, water, air). The textile industry dumps toxic chemicals into the atmosphere, uses enormous energy, and is one of the most significant contributors to global warming. Waste from textile dyes is in the form of liquid industrial waste, whose high chemical content results in reduced oxygen content in the water, so it can result in the death of living organisms in the water and create odors in the water.

METHODOLOGY

The research was done by applying design thinking methods (Discovery, Interpretation, Ideation, Experimentation) begins by understanding problems in the fashion industry through literature review, observation, and interview. Then, the author does a questionnaire to study market attention to sustainable fashion and natural dye. The result of the analysis used for creating the design. The study is in the form of personal experiments, where the author uses the aqueous extraction method to get the dye extract. After that, the author does the exploration of aesthetics, and the author does material testing (faded, washed, and others). After the step of the exploration, the author analyzes which is best for fabric, and the result be evaluated through an online survey.

RESULT & DISCUSSION

Color Exploration

There are a few processes in natural dyeing, in the first author tested the fabric material by burning the fabric. The synthetic fabric after being burned the fabric and smell will such as melted plastic.

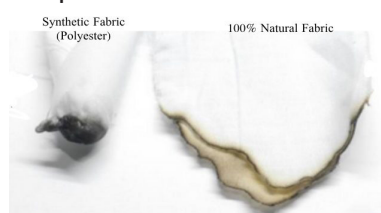


Figure 1 Testing Fabric Material (Effendy, 2021)

In this study, the author explored the method of:

- Scouring (washing) is done by soaking a cloth of 5 gr/liter and 1 liter for every 1 meter of fabric, boiled for 1 hour on low heat, then set aside for 1 hour to be able to remove dirt, oil, and chemical compounds that are in the fabric.
- Mordanting (gluing) is done with alum of 10 gr/liter, and 1 liter per 1 meter

boiled for 1 hour over low heat and let stand for 12 hours.

- Color Extraction: is done with a ratio of 1:10, 3:10, boiled with water, and fabric soaked in extraction dye.
- Fixation (locking) to lock the color using alum, limestone, and Ferro Sulfat with 5 gr/250 ml of water, in 15 minutes.



Figure 2 Fixation Process (Ferro Sulfat (Tujung), Limestone (Kapur), Alum (Tawas)) (Effendy, 2021)

The influence of the amount of dyeing extracts and the time of the dyeing process was tested in this study; the effect of fixation on fabric colors; the color resistance of fabrics in the washing process; and developed aesthetic results from natural dyes to be able to be applied as a natural dye process for textiles. The author made a dyeing color extracts experiment from eleven plants (Turmeric, Tengeran Wood, Coffee, Cloves, Jelawe Fruit, Mahogany Wood, Mengkudu Wood, Telang Flower, Tingi Wood, Secang Wood, Black Tea), and the author tested on the five different natural textile (cotton fabric, mori fabric, linen fabric, sari fabric, and paris fabric), with a ratio of 1:10 for 30 minutes, 1 hour, 4 hours, 12 hours, 1 day, and 3:1 for 4 hours.

Waktu	Konsentrasi	Fiksasi	Pewarna	Katun	Katun	Katun	Katun	Katun	Katun	Linon	Waktu	Konsentrasi	Fiksasi	Pewarna	Katun	Katun	Katun	Katun	Katun	Katun	Linon	Waktu	Konsentrasi	Fiksasi	Pewarna	Katun	Katun	Katun	Katun	Katun	Linon	
30 menit	50 gr kapur mengering 500 ml air	Tawas	Kapur								1 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur								30 menit	50 gr kapur mengering 500 ml air	Tawas	Kapur							
1 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur								4 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur								1 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur							
4 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur								12 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur								4 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur							
12 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur								24 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur								12 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur							
24 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur								4 Hari	150 gr kapur mengering 500 ml air	Tawas	Kapur								24 Jam	50 gr kapur mengering 500 ml air	Tawas	Kapur							
4 Hari	150 gr kapur mengering 500 ml air	Tawas	Kapur								1 Hari	150 gr kapur mengering 500 ml air	Tawas	Kapur								4 Hari	150 gr kapur mengering 500 ml air	Tawas	Kapur							

Figure 3 Color Exploration (Effendy, 2021)

From the research, the author found that the color tone result is variations that lead to yellow, brown, earth tones, and gray. Natural dyes cannot survive with fixed color

consistency. The color consistency will gradually decrease in the washing process. Based on the exploration, the use of cotton, linen, and mori fabrics and natural dyes from Jelawe fruit and Tinggi provide more intense color results. Furthermore, the use of Ferro Sulfat fixation to lock the color gives the strongest color results to produce the darkest color, and the color resistance also tends to be more durable.

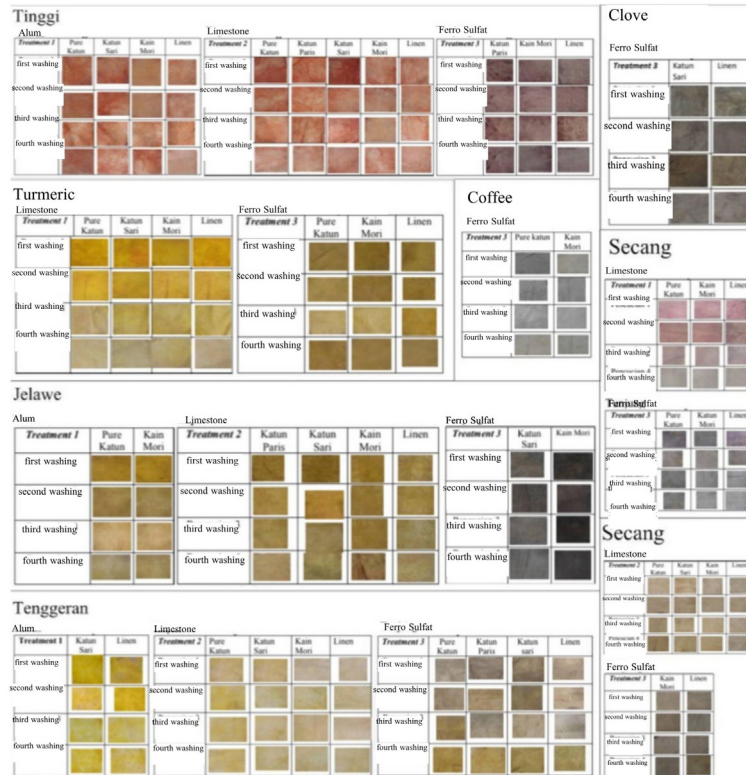


Figure 4 Color Resistance Test Results (Effendy, 2021)

In addition, researchers also conducted research on aesthetic studies of natural dyes using eco-print and tie-dye techniques. Besides that, researchers also used iron rust materials in aesthetic studies.

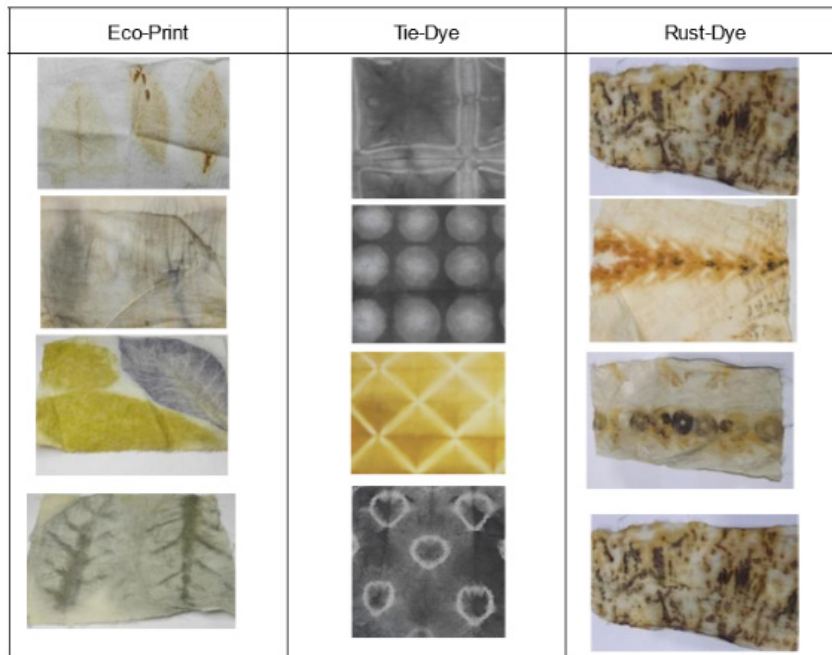


Figure 5 Aesthetic Exploration Results (Effendy, 2021)

Designing Proses

Using natural dyes from Indonesian plants is an alternative that is still rarely developed in creating and developing eco fashion, especially in the children's fashion industry. The idea of designing children's fashion products with the principle of a sustainable culture, with adaptation from Surjan clothes and Kutubaru, a traditional culture clothes from Central Java. It not only aims at product design but also has ecological value and cultural preservation in its design. In this design, the author thought of an opportunity to produce an eco-fashion product to be a part of the slow fashion movement in Indonesia. This also will be a medium for kids to learn about the culture.

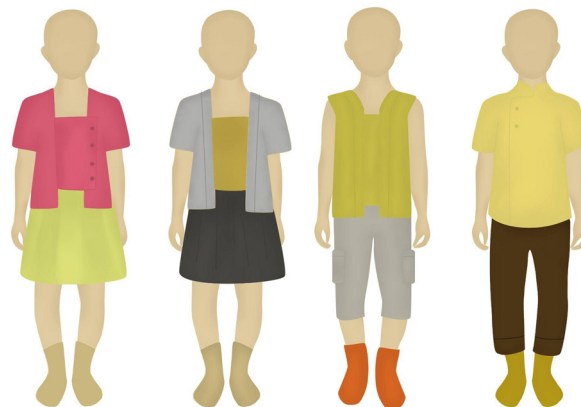


Figure 6 Surjan and Kebaya Kutubaru Design Sketches (Effendy, 2021)



Figure 7 Final Prototype (Effendy, 2021)

The author researched the responses of parents who have children to find out their answers and interest in natural dyes, sustainable fashion, and the development of traditional clothing. Reviews are conducted online, with respondents looking at photos and videos to be able to explain the product more clearly. The review was conducted by 11 people with a rating system from 1 (less) to 4 (excellent). Overall, the result of the use review was good with score in 3 and 4.

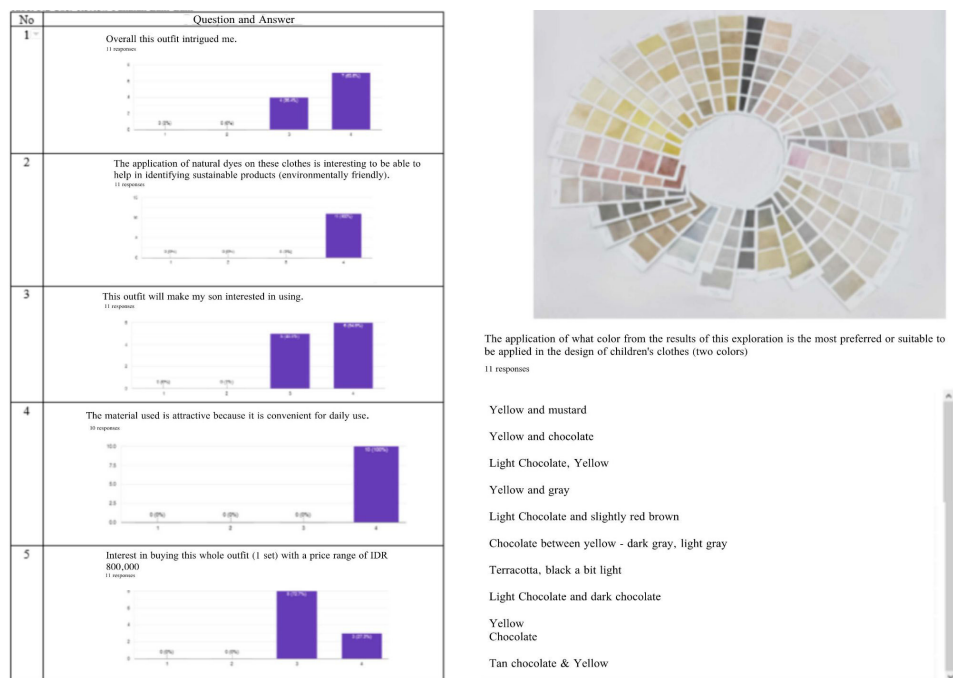


Figure 8 User Review (Effendy, 2021)

CONCLUSION

From the research carried out, several things can be further improved and can be a topic for further study.

- Explore other color extraction methods, by mixing more varied color extractions.
- Trying other natural material sources, such as kitchen waste, will be an opportunity for applying to material sustainability.

- Explore other techniques in applying natural dyes, and make developments in aesthetic studies.
- Cooperate with groups, organizations, restaurants, and other communities to collect materials.

Furthermore, this research gives a valuable approach not just for designers but also for local artisans or the local community.

- To help local artisans to give new methods, analyses, and alternative solutions in developing material exploration and natural dye.
- Become an influence to introduce sustainable fashion in advancing the innovation and business opportunities of Indonesian artisan.
- Rebuilding opportunities of the artisan business after the covid 19 pandemic in the global market with Indonesia's sustainable product.
- Give artisans opportunities in joining partnerships with Indonesian brands to produce sustainable textile products, this will increase job opportunities for artisans.
- Innovative strategies for further design in using materials from local resources.

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