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Potential of Coconut Husk Material as a Sustainable Block Batik Development Tool

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Abstract
Coconut (Cocos nucifera) is Malaysia's fourth-largest industry, and its outer husk is a sustainable, accessible, and cheap fibrous waste. The rise of copper as the primary material has affected the making of blocks 'sarang' tools and, in turn, impacted the selling price. If these issues continue, it could push the Malaysian block batik to the brink of extinction. Thus, sustainability towards the blocks 'sarang' is required. This paper discovers and explores potential solutions through sustainable materials as new materials to minimise the cost. The result will give alternative materials besides copper to facilitate the growth of the Malaysian batik industry.

Keywords: Alternative batik; Block batik; Batik block development tool; Coconut husk

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1.0 Introduction

This paper discusses the potential solutions of sustainable material as a new alternative material for block batik tools besides copper. Whereby researchers explore the potential of coconut husk as a sustainable block development tool. Coconut husk will be experimented with by discovering its characteristics in wax resistance and absorption before being explored in its novelty forming as a sustainable block batik development tool. Using sustainable materials as an alternative tool to copper block can maintain block batik production at a low cost without destroying the possibilities for the next generation's future, and it becomes the first to be documented. Besides, this approach will create a value-added product from "waste into valuable" through the 3Rs Initiative while educating society to think creatively, learn and adapt to sustain our batik heritage parallel with the Sustainable Development Goals (SDG) for a better and more sustainable future for all (United Nations). Batik has existed in Malaysia since the 1920s. Batik is a dyeing fabric process using a resist technique by covering the design area cloth with a wax-resistant to prevent it from absorbing colour (*MyBatik*, n.d). The term 'batik' derives from the Javanese word 'Amba', meaning to drip or write point, whereas the original Malay word is '*tik*' or from the combination of both words becomes '*Ambatik*', which means to draw, write, paint, or drip (Samin et al., 2018). There are two significant types of batik in Malaysia – '*Batik canting'* and Block batik, but in this paper, the researcher will focus on Block batik. Traditionally, the Block batik is produced using hot (melted) wax on a copper block or sometimes a wooden stamp with an artistically patterned bottom. The fineness and creativity of the motif carved on the block represent the beauty of the block batik pattern design.

1.1 Batik Block and its Issues

Batik block is a unique craft and has led to the establishment of Malaysian society's socio-cultural lifestyle and has become part of the daily attire that enriches the Malays' unique way of life. According to the Malaysian Standard (2019), batik block, known as *'Batik terap*', is a technique where a block '*sarang*' is dipped into molten hot wax and pressed on the fabric to make a pattern. Diverse approaches,

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methods, styles, and motifs have been developed to sustain and keep thriving to create an excellent competitive environment within industries. However, rising copper prices have affected the making of block '*sarang*' and, in turn, impacted the selling price. According to an article from Utusan Malaysia, Rosliza Mohamed, 2022. Titled "*51 Tahun Md. Ghani hasilkan blok batik cetak*" (51-year-old Md. Ghani has been involved in producing blocks '*sarang*' batik). M.d Ghani bin Mat, known as Adiguru in block '*sarang*', said he was happy to see the block batiks rising again after the movement control order (MCO). However, he had trouble getting copper as the primary material because of the high prices of copper against other metals. He has no option except to increase the selling price of the copper block. Copper blocks nowadays cost two hundred to six hundred, depending on size and complexity. If these issues continue, the price for one block will escalate into thousands of ringgits. To make it worse, one set of batik sarongs requires six stamping block tools (designed block especially for *kepala kain* (centre panel), *tepi/kaki kain* (The edge border), *kapit kain* (Flanking border), and *badan kain* (the central part of the batik cloth) (Afiqah et al., 2018) and it will become unaffordable, especially for small and medium enterprises (SMEs). It could push Malaysian batik to the blink of extinction for the next generation. Thus, sustainability towards the blocks '*sarang*' is required. This paper discovers and explores potential solutions through sustainable materials as new materials to minimise the cost besides copper.

2.0 Literature Review

2.1 Stamping Block

The stamping block or block batik tool, known as the block '*sarang*', is the primary equipment for batik block making. It is creatively engraved on the block's bottom surface with fine creativity. (Lias et al., 2020). And then, the block is dipped into molten hot wax and pressed onto the fabric to make a pattern. The pattern will be dyed and fixed before drying or double-layer. Block batik started with wooden blocks by Tuan Haji Mohamad Che Su Ishak, known as *'Batik pukul'*. With the expertise and creative hands of a talented wood craving, the block's bottom surface has been creatively engraved with fine hand craved and creative patterns. During that time, the wooden block technique used natural black dye as a colouring, known as the '*Terap hitam*' technique (Kraftangan Malaysia, 2012). However, the method is not considered batik because no wax is used in producing batik, and the wooden block was not well-kept due to termites or deterioration (Mohd Rafizi et al., 2016). Then, the wooden block was slowly replaced with copper, steel, and zinc, which are more practical and accessible to shape (Figure 1). The copper strips are made 1.5 cm wide and bent and welded together into the shape of the motif. The use of metal batik blocks has a greater impact on the batik industry in terms of the quality of design and design motifs that can be produced with an intricate and attractive design (Norlelawaty et al., 2013), according to previous research by Lias et al., 2020. In the early stages, block 'sarang' only used flora and plants such as potato and banana stems from applying or imprinting on a whole cloth surface. This process was compatible with the technology available at the time and was slowly replaced with wooden and copper blocks.

Fig. 1. Two different materials of batik – The left is made from copper, and the right is made from a wooden block.
(Source: own photo at *Museum Terengganu*)

2.2 Sustainable Material

Sustainable materials are the ability to maintain a physical process over time. It is a broad term for managing resources to keep them manageable for future generations. Practising sustainable resources takes essential steps towards creating a more positive and environmentally friendly environmental impact. This sustainable material directly reduces the process's cost using renewable earth resources (Neill Gatley, 2022). Therefore, identifying and analysing sustainable materials in developing alternative materials is necessary to maintain the block batik of materials for future generations. One of the sustainable materials that will be explored and explored in this article is coconut husk material. Coconut is Malaysia's fourth largest industry, and the coconut tree produces 50–100 fruits annually. Producing coconut products generates many coconut husks, and 85% of the 50 billion coconuts grown annually are thrown away, causing global pollution (Farmfolio, 2019). It has been reproducing with various textures and shapes to minimise waste, from whole pieces of coconut husk to pieces that have been chopped or crushed up (Janette et al., n.d). Coconut husk has a high lignin content, making them elastic, strong, and durable. The fibres from the coconut husk are thick and coarse, with outstanding properties such as hardness quality (free of fragile characteristics such as glass) and better acoustic resistance. It also has non-toxic properties and resistance to bacterial and fungal decomposition, and they have no flammability properties. Besides, the coconut husk is more moisture-resistant than other natural plant-based fibres and can withstand salty seawater and heat exposure.

3.0 Method

This study was conducted using a studio practice base to discover and explore the potential solutions of sustainable material as a new alternative material for block batik tools. The experiment started by identifying the coconut husk material in various textures, types, and shapes. Coconut husk material had been extracted, chopped, or crushed. It has been classified into three types: coco fibre, coco chip, and coco peat. Coco fibre is a natural fibre obtained from coconut husks; the fibrous material lies between the hard inner shell of the coconut and the outer layer, while coco chips are scraps from coconut husks; they appear to be small pieces of wood in various defined particle sizes. Coconut husk also comes in powder form known as coco peat (finely chopped coconut husk that has converted the fibre into a powder form). Then, it is divided into two stages. The first stage is to identify the possibilities of coconut husks in wax resistance and absorption, and the second stage is to discover its novelty-forming potential in the sustainable development tools of block batik. Furthermore, this sustainable block will then be tested and validated to verify that it meets the specifications or requirements of a block batik tool. The processes experiment is described in detail to ensure this experiment becomes the best way to describe this paper's outcome (Figure 2).

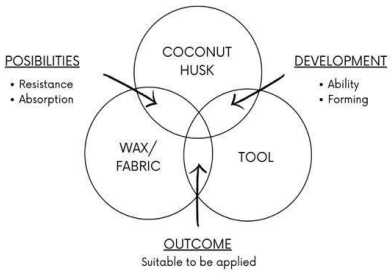


Fig. 2. Three variables were used in this experimental research.
(Source: *Own work, 2022*)

3.1 Stage 1 - Identifying the Possibilities of Coconut Husks in Wax-Resistance and Absorption

In this stage, coconut husk will be used in batik-making to figure out the potential of its characters in hot molten wax as a primary requirement parallel to the global definition of batik, whereby the wax-resist technique is the primary medium for creating patterns on fabrics (Malaysian Standard, 2019). The wax will prevent the dye from penetrating the fabric and leave "empty" areas in the dyed. In this experiment, the researcher cut/formed all types of coconut husk material into the selected size (D X H: 4cm x 4 cm) to be experimental. For coco peat material, the researcher used a compaction mould with manual pressures so it could be formed within the requirement size above to be experimental. This process involves several mixings of materials and a binder that holds the powder in dough form. After all the sample material was ready to be explored, the experiment started by heating or melting the batik wax, and the coconut husk material was consistently dipped into the hot wax (Figure 3). This process used two different temperatures, medium and overheating. The aim of this experiment is to identify and evaluate coconut husk durability in heat resistance, especially in molten hot wax, since this experiment will be the first recorded on coconut husk material in wax- resistance. The results show that it is suitable to be used in hot molten wax; it is still in shape or solid and does not show any brittle effect, even if it is consistently dipped and uses overheating temperatures (Table 1). Next, coconut husk material was explored in wax absorption; its aim is to identify the absorption of wax in coconut husk material that will be stamped in various types of fabric. The coconut husk again has been dipped into hot molten wax and stamped on the fabric surface. In this experiment, the researcher used three different thicknesses of fabrics. This is the second requirement in the batik-making process, whereby the image of the surface block is transferred to the fabric by the wax stamping technique. The absorption wax in the fabric sample will influence the batik outcome. If the resulting wax in the fabric is smooth, exploring and developing a block tool is suitable (Table 2).

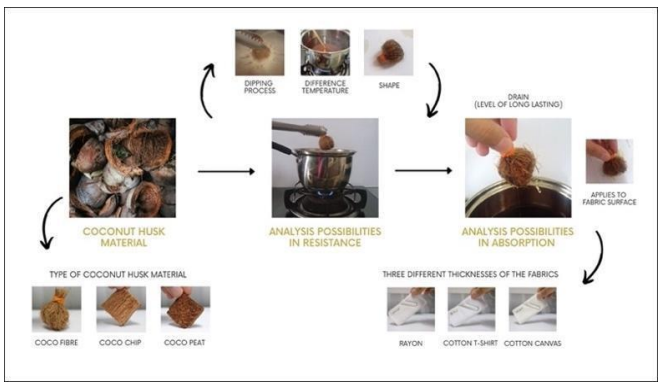


Fig. 3. Coconut husk flowchart of the possibilities analysis in wax-resistant and absorption
(Source: *Own work, 2022*)

3.2 Stage 2 - Discovering its Novelty Forming Potential in the Sustainable Block Batik Development Tools

At this stage, coco peat has been selected as the most suitable coconut material for developing block batik tools. It has shown high

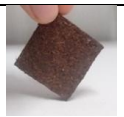
resistance and absorption possibilities on the fabric surface. Besides that, the characteristics of coco peat are simplicity, compactness, and ease of shape, which became the primary priority. It also can be done by compaction mould with manual pressures without using a high-technology machine (hot compress pressure) compared to another type of coconut husk material. This state starts by brainstorming and sketching some ideas in the block tool, preserving creatively engraved ideas on the block's bottom surface. Then, the ideation design was formed by extracting, compressing, and moulding the coco peat material into a form (Figure 4). This process uses 100% handmade production and involves several mixings of sustainable material and binder from polyvinyl acetate (PVA) and starch that holds the powder in dough form. After that, the dough was compacted into a mould with manual pressures, removed and dried in direct sunshine. Moreover, the block surface was dipped in molten wax and was smoothed with sandpaper to get a flat surface before it was suitable to be applied on the fabric surface for batik making.

Fig. 4. Process forming coconut husk block tool.
(Source: *Own work, 2022*)

4.0 Result and Discussion

Table 1 shows the results of the wax resistance of coconut husk material before and after it was dipped in molten hot wax. At the first dip in molten wax, the coconut husk material creates a bubble effect; It looks like it is burning and is slightly darker when removed from the molten wax. The longer the coconut husk dips, the darker it will be. However, the coconut husk material did not exhibit brittle properties, melting and still can maintain its shape. It shows that coconut husk material has a high heat resistance even after repeated dipping in the overheated wax. Moreover, Table 2 shows the result of these three distinct varieties of coconut husk re-dipped in hot wax to identify further its possibilities in wax absorption effect on the fabric surface. Three different thicknesses of fabric are used in this experiment, whereby the image of the surface block is transferred to the surface fabric by the wax stamping technique. The result gives different effects and outcomes. Every time, the coconut husk is stamped on the fabric. It has produced different quantities of lines and shapes even with the same form. This is because the type of coconut husk material, the type of fabric, the degree of wax release, and the temperature of the wax play a role in producing the outcome of the material. The results show that these three coconut husks, especially coco husk, can transfer their wax absorption to the fabric surface with unpredictable brush strokes. In contrast, the coco chip initially showed a bold and solid side but slightly became an unpredictable brush stroke. Furthermore, coco peat has shown solid, boldly shaped results.

Table 1. Result of possibilities of coconut husk material in resistance

Material	Before Experiment	After Experiment
Coco Fiber		
Coco Chip		
Coco Peat		

(Source: *Own work, 2022*)

Table 2. Experiment with wax absorption on the fabric surface by applying it to three different fabric thicknesses.

Fabric	Temperature	Coco Fibre	Coco Chip	Coco Peat
Rayon	Medium			
	Overheat			
Cotton T-Shirt	Medium			
	Overheat			
Cotton Drill	Medium			
	Overheat			

(Source: *Own work, 2022*)

Table 3. Exploration Tool of Sustainable Block Tool

	NAME:	Sustainable block			
	TYPE:	Traditional block technique			
	SIZE:	HEIGHT:	8.5 cm	WIDTH:	8cm
		DEPTH:	6.5 cm	WEIGHT:	135g
MATERIAL:	Coco peat				
FUNCTIONALITY:	Stamping block tool				
SHAPE/AESTHETIC:	Geometric motif				
PROCESS:					

(Source: *Own work, 2022*)

Wax resistance and absorption in Table 3 indicate the sustainability of the block. The surface block motif is absorbed nicely into the surface fabric, and the block form, especially the carved part, remains firm and solid after repeated stamping. The stamping process was more lightweight and easier to handle, which is better than copper block, which is heavier. However, the wax temperature was the crucial variable that influenced the fabric outcome during the exploration. The block requires a consistent temperature and a precise pattern for optimal results. If the block were dipped longer in molten hot wax, the block surface would be hotter, which would cause the wax to expand and close the detailing part of the block when applied to the fabric surface. Furthermore, this study proved the durability of the block throughout a two-meter-long block batik-making procedure (Figure 5). The six main steps of the batik process, designing, waxing, dying, fixing, dewaxing, and drying, are all used to verify the result. The block batik-making process started with melting wax and damar in a flat pot with a standard stove. The block will be heated and tested on the sample paper/ fabric to test and reach the

optimal wax temperature before applying the length of the material. Then, the stamping process was done repeatedly on the fabric's surface. After the wax was completely dried, the material was strung on the frame for the dyeing process and continued with the fixing, dewaxing, and drying process. The result is simple-looking and clean. It shows coconut husk is suitable for use without bristle effect, melting, or changing shape. The block form still looks firm and solid in the stamping process, and each stamping produces different qualities of lines, Making this sustainable block unique and never the same.

Fig. 5: The validation of the coconut husk block tool applies to two meters of length fabric.
(Source: *Own work, 2022*)

5.0 Conclusion

In conclusion, the outcomes of this research paper show that sustainable materials such as coconut husk as an alternative tool provide new knowledge and perspective to the batik block industry. The characters of simplicity, lightness, handiness, obtainable and ease of shape became the priorities for developing a new alternative batik tool. This new alternative tool maintains the aesthetic block outcome's originality by engraving the block's bottom surface with fine hand carving. This research limitation focuses on identifying and developing new alternative tools in the studio practice base, where these new alternative tools still need to be explored in large production to identify the usability of this alternative in the Malaysia Batik industry. It could benefit batik makers, practitioners, and university students locally and abroad. Besides, this alternative tool can be explored in new ideation of its function to be more user- and youth-friendly to attract the young generation with block batik making. Plus, it will provide a new perspective on stamping blocks in the manual printing sector. Various types of sustainable materials can also be discovered and explored to find the best material parallel with the Sustainable Development Goals (SDG) for a better and more sustainable future for all (United Nations).

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Paper Contribution to Related Field of Study

This paper contributes to the field of art and design, especially in textiles, as novel alternative block tools besides copper that can also be used in printing. Furthermore, this paper adds value to applied Science and environmental study in sustainability research by discovering and developing waste in valuable products from sustainable resources such as coconut husk.

References

Afiqah Izzati Sobri, Rafeah Legino (2018). Imitation of Batik Sarong Design and Features, Environment- Behaviour proceeding journal, International Conference on Science & Social Research (CSSR), 99-108

Janette, Jesper. (nd). Coconut coir for microgreens. Retrieved November 16, 2021, from Microgreenscorner: https://www.microgreenscorner.com/how-to-use- coconut-coir-for-microgreens/

Farmfolio (2019). Waste Not: Putting Coconut Husks to Good Use. Retrieved November 15, 2022, from Farmfolio: https://farmfolio.net/articles/waste-not-putting-coconut-husks-good-use/

K. M. Faridul Hasan, Peter Gyorgy Horvath, Miklos Bak and Tibor Alpar. (2021). A state-of-the-art review on coir fibre-reinforced biocomposites. RSC Advances (18).
Kraftangan Malaysia, 2012. Retrieved June 25, 2021, from informasi kraft negara: http://informasikraf.blogspot.com/2012/12/batik-blok.html

Lias, H., Ismail, A. R., Hamid, H. A. (2020). Malaysia textile craft industry: Innovation inspired by bamboo for batik block contemporary design. IOP Conference Series: Earth and Environmental Science, 549(1), 012087

Norlelawaty Haron, Nik Hassan Shaimi Nik Abdul Rahman, Zuliskandar Ramli. (2014). Kajian terhadap penggunaan bahan teknik pembuatan dan motif pada block batik. Providing Seminar Antarabangsa ke-4 Arkeologi, Sejarah dan Budaya di Alam Melayu, 345-358.

Neill Gatley (2022). What is sustainable resource management, and how do you achieve it? Retrieved November 15 2022, from British Assessment Bureau: https://www.british-assessment.co.uk/insights/what-is-sustainable-resource-management-and-how-do-you-achieve-it/

Norlelawaty Haron, Nik Hassan Shaimi Nik Abdul Rahman, Zuliskandar Ramli. (2013). Sejarah perkembangan industry batik di Kelantan. Providing Seminar Antarabangsa ke-2 Arkeologi, Sejarah dan Budaya di Alam Melayu., 933-947

Malaysian Standard, (2019). Handcrafted Malaysian batik – specification. (First review)

MA Samin, R Legino and R Kari. (2018). Alternative Batik - The Potential of Its Outcome and Designing Methods. International Journal of INTI 22, 54-58.

McGill University (2021). What is sustainability? Retrieved June 25, 2021, from University of Alberta Office of Sustainability https://www.mcgill.ca/sustainability/files/sustainability/what-is-sustainability.pdf

Mohd Rafizi (2016). Reinventing batik stamping tool from recycled material. Master dissertation, Universiti Teknologi Mara.

MyBatik. (n.d). Malaysia Batik. Retrieved June 25, 2020, from myBatik Kuala Lumpur: https://mybatik.org.my/batik/batikhistory/malaysia-batik/

Rosliza Mohamed. (2022). 51 Tahun Md. Ghani hasilkan blok batik cetak. Retrieved 7 Jan 2022, from Utusan Malaysia: https://www.utusan.com.my/terkini/2022/01/51-tahun-md-ghani-hasilkan- blok-batik/

T. Editor of Encylopedia. (2021). Encyclopedia Britannica. Retrieved June 25, 2021, from Britannica: https://www.britannica.com/topic/coir
United Nations (n,d) Academic Impact Retrieved June 25, 2022, from United Nations https://www.un.org/en/academic-impact/page/sustainability.