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Exploration of Batik Block on Vegetable Tanned Cow Leather for Malaysia Craft

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Abstract
Batik block is referring to the process of decorating and colouring fabrics to create the pattern. This aimed in this study is to evaluate the batik block technique on vegetable-tanned cow leather. This study was conducted in two stages, in which the first stage aimed to evaluate the adherence rate of wax by some factors such as heat temperature and wax composition on vegetable-tanned cow leather. The second stage of the study aimed to evaluate the type of dye used in the batik method of dyeing on vegetable-tanned cow leather. The experiment and observation method was applied in this study to collect the data. On the leather that has been printed using the block technique, the wax as a batik resist has a heat level at an average of 60-70 degrees celcius. Meanwhile, in batik dyeing, remazol dye was utilised. The Characteristic of remazol is easily mixed and handled with water, providing the best adhesion and colorfastness. In conclusion, vegetable-tanned cow leather with the batik dyeing method was recommended to become one of the alternative materials of batik craft.
Keywords: Batik, Batik Process, Vegetable Tanned Cow Leather

Introduction

Malaysia is a country with a wide range of local crafts. Handicrafts in Malaysia can be classified as textiles, ceramics, metals, rattan and various trades (Akhir, 2015a). During this time, among the products of textile craftsmanship in Malaysia is batik. In Malaysia, the batik industry belongs to the category of microenterprise but consider a contributor to industrial development in the country. Malaysian batik is in great demand in local and international markets because of its unique character (Masrom, 2012; Nawi et al., 2020).

However, the batik industry in Malaysia is experiencing problems in terms of high costs in the manufacturing process due to the rising cost of raw materials. Most of the raw materials are imported from abroad such as China, India, Indonesia and Germany (Akhir, 2015b). Until now, the process of producing batik still uses the old method which takes a long time but the income is still small and most of the buyers are local customers (Akhir, 2015b).

Nowadays, many batik handicrafts are produced into items such as fashion accessories and home decorations other than clothing (Hussin et al., 2020). This is intended to attract

buyers and as one of the efforts to elevate Malaysian batik to the new generation. Therefore, batik handicrafts in Malaysia have the potential to grow as one of the creative economic resources due to the diversity of cultures that can be offered to the world.

Batik produced in Malaysia should be fresher and more contemporary to ensure that batik can compete and high demand with other more modern and stylish products. Acording to previous studies (Samin et al., 2018), the innovations made focus only on the technique, colour, and process of removing the wax. However, experimentation on new materials as an alternative to producing batik is less carried out by batik practitioners (Kari et al., 2017).

In conclusion, this study is to explore batik processes on the leather such as the process of waxing, dyeing, dye fixing and removing wax. This study is important to propose other materials other than fabric as an alternative material in further developing batik handicraft products in Malaysia. The end of this study is to ensure that batik on leather can be further developed and remain relevant and well receives among young people and global level today.

Batik Block

Since the 1920s batik in Malaysia has been operating in Kelantan by Haji Che Su bin Ishak (Lias et al., 2020; Yusnita, 2015). Batik is one of the unique cultural symbols in society (Hussin, 2016). The word batik means to draw, write, draw and dot (Nordin & Bakar, 2012; Abdullah, 2018) which comes from a combination of Javanese language that is tick and ambatik (Abdullah & Abu, 1990; Akhir, 2015). Meanwhile, according to the book Malaysia Batik Reinventing a Tradition, the word batik refers to the process of decorating and colouring fabrics using wax techniques (Yunus, 2011). Therefore, batik is a technique for patterning fabrics using wax as a barrier to colour during the colouring process.

Canting and block technique is a traditional technique widely used by batik practitioners in Malaysia (Samin et al., 2018). Block batik was the earliest technique introduced in Malaysia (Hafiza et al., 2021). The batik block technique refers to the process to create the pattern using wood or metal that is craved then dipped into hot wax and stamped onto fabric (Perbadanan Kemajuan Kraftangan Malaysia, 2019). However, the issue in Malaysia's craft industry, the research focusing on innovation and ideas in terms of technique, material and batik production is still limited because of a lack of creativity in producing exclusive and attractive batik goods (Lias et al., 2020). Besides that, manufacturers and marketers of batik products do not dare to be creative and produce innovative batik products to attract consumers by using new materials and designs to enhance traditional batik products (Kari et al., 2017).

Vegetable Tanned Cow Leather

Leather is converting animal rawhide and skin into a more durable and flexible material (Maina et al., 2019). It includes the process of transformation from raw skin into leather that is stable, durable, good breathability, less permeable to water, more resistant to abrasion and has high strength characteristics (Falcao & Araujo, 2011; Maina et al., 2019). Usually, leather is used to produce products such as shoes, clothes, bags, gloves and so on (Teklay & Kechi, 2018). Referring on the declining in demand for leather products due to trends and fashion, several studies need to be conducted to study the appropriate methods to add aesthetic value to leather products. Through innovation in the techniques used are able to attract interest and change public perceptions of skin products. Therefore, this study is to see the

effectiveness of the dyeing method on vegetable-tanned cow leather as an alternative material for producing batik.

Leather Process

The leather process involves three stages which are the first stage is pre-tanning, the second stage is the tanning process and the post-tanning (Maina et al., 2019)**.** Tanning is a process of treating the animal skin or hide (Omoloso et al., 2021) by which will exchange the animal hides for leather by preserving the material and halting decomposition (Krishnamoorthy et al., 2012). The tanning process can be defined as a bond of the molecule with the protein and collagen in the skin and forcing out the water (Cooper, 2018). The tanning process will preserve the performance of the hide with various stages of pre-treatment with specific practical properties in a final product, such as stability, appearance, water resistance, temperature resistance and elasticity (Muthu, 2020). This process is to transform rawhide from animal leather material using chemicals and mechanistic to produce different products like apparel products and upholstery products (Muthu, 2020).

There are several different types of tannage available depending on the quality and needs of the consumer. The type includes mineral tanning (chromium, aluminium, iron and zinc), vegetable tanning (mimosa, acacia, quebracho), and aldehyde tanning (glutaldehyde, formaldehyde) and oil tanning (Maina et al., 2019). However, among the tanning process, chrome and vegetable tanning are most used widely because it is providing better leather characteristics than other tanning in terms of high thermal stability, lightweight and high strength properties (Ork et al., 2014). However, Vegetable-tanned is the most widely used leather in the production of products such as shoes, upholstery, wall-hanging and harness (Falcão & Araújo, 2011). Vegetable tanning is the conventional tanning process using natural material known as eco-friendly and is considered less polluting to the environment than chrome tanning but this type of tanning is high tensile, insulating properties and flexible (Maina et al., 2019). This tanning process uses natural ingredients such as barks, leaves, twigs and fruits from certain trees and plants (Falcao & Araujo, 2011). In addition also vegetable tanned leather has thermal stability for its properties to 75-85 ˚C and good shape retention (Ork et al., 2014).

However, in Indonesia, studies on leather products have been carried out such as the use of batik technique, eco-print techniques, ikat techniques and the use of natural dyes as one of the techniques in making designs on the skin in addition to maintaining the environment with the use of natural materials (Ristiani, 2019; Pancapalaga, 2016). Through the production of batik motifs on the leather can add aesthetic value and look more attractive on the leather products produced. Therefore, leather has the potential to be an alternative material to replace the fabric in the production of batik handicraft products.

Materials and Equipment

Material

This study uses vegetable-tanned cow leather to produce a batik sample. The leather was selected due to their differing leather composition. Table 1 below shows the type of material used in the experiment. The sample of leather was cut into 15cm x 15cm (Table 1). The leather was obtained from Kit-M Sdn Bhd, Kuala Lumpur. The type of vegetable tanned cow leather used a full grain with semi-aniline finishing.

bngTable 1
The type of material used.

Material	Name	Thickness	Colour
	Vegetable tanned cow leather	1.2 mm	Pale Cream

Equipment

The equipment utilised in this study was a stove, pot, scale, thermometer, ruler, cutter, brush, container, and block stamp. The ingredients include paraffin wax, resin, remazol dye, soda ash, and vegetable oil.

Methodology

Experiment Procedure

Data collection in this study is using experiment procedure to explore the batik dyeing process on vegetable-tanned cow leather as a value added on leather serface and alternative material on producing batik craft. the main purpose of data collection through this experiment was to draw conclusions to answer the objectives of the study. The data collection method used is through observation from the experimental sample performed. Observational method is an activity that focuses on an object or sample to describe an existing situation using all the senses (Kawulich, 2005). Data were collected by 20 samples from an experiment on vegetable tanned cow leather with several variables in term of wax temperature, dyestuff and dye fixing to prevent the color from light and water. The main important factor in batik making involves 3 stages; preparing leather, making process and finishing process. preparing leather is involve the process to remove dirt and paint on the leather surface. while the making process involves the waxing and dyeing process to create the pattern using the block technique. Meanwhile, the finishing process involves dyeing fixing and wax removal. The purpose of dyeing fixing is to prevent the color transfer when it is wet or during washing (Mazumder & Haque, 2011). It improves wet color fastness and leather quality.

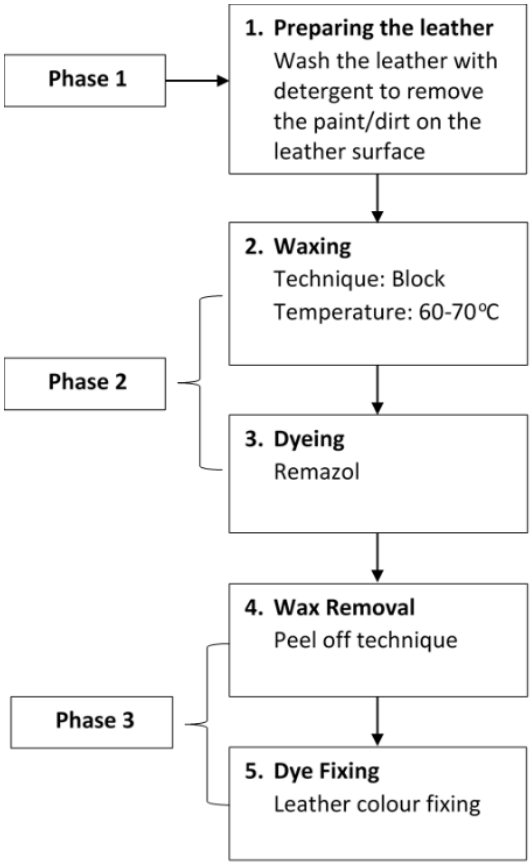


Figure 1: Experiment procedure on vegetable-tanned cow leather using batik making process.

Phase 1: Leather preparation before making batik block

The first phase before batik making is preparing leather through scouring the leather with detergent to remove the paint or topcoat on the leather surface. The paint or topcoat that was sprayed on the surface of the leather served as a protection and to cover up the defect as an aesthetic value (Boahin & Asubonteng, 2014). The topcoat on the leather surface will prevent wax and dye from absorbing into the grain. Therefore this scouring process is important in determining the degree of penetration of wax and color on the skin in terms of color brightness and color resistance (Mijer, 2018). Figure 2 shows the surface of vegetable-tanned cow leather after washing. Using a Binocular Microscope with 10x magnificent, the pore was seen and open. Then, cut the leather sample into 15cm x 15cm sizes.

Figure 2: Vegetable-tanned cow leather surface using Binocular Microscope with 10x magnificent.

Phase 2: Waxing and Dyeing Process

Wax is one of the resist techniques for producing batik to prevent colors from mixing to produce a pattern (Pancapalaga et al., 2014). The adherence rate of wax on leather is influenced by some factors such as heat temperature, wax composition and leather surface texture. Wax temperature is the main influence on leather tissue because the more wax absorbs into the corium of leather, the more difficult it is to remove (Pancapalaga et al., 2014). The mixture of paraffin wax and resin was used using the block technique to create the pattern. The heat wax temperature, wax composition and leather surface are factors is the influence adherence rate of batik wax (Pancapalaga et al., 2014). The composition of paraffin wax is 60% of wax, 40% of resin and 5ml vegetable oil. The resin was used a binds the ingredients together and to increase the adhesiveness of the wax (Haslina et al., 2015; Sharifah et al., 2017). Meanwhile, the wax is heated at 60-70^{o}C then the block is dipped into hot wax and applied to the surface of the leather and let the wax cool and harden before applying dye.

The level of leather thickness is different from the fabric; this is because the leather consists of 3 layers that determine the level of colour absorption (Pancapalaga et al., 2014). The main factor in the process of leather colouring is dependent on the physical and chemical content of the colour that suits the structure of the leather because it will affect the level of diffusion of the colour into the leather. The dye to be selected for the study was required to have the properties of good penetration, color fastness and color brightness. Remazol dye was selected in this study because the characteristic of dye is water-based and easy to handle (Hafiza et al., 2021). The dye was applied using the brush on the design area drawn by wax.

Dyeing method using Remazol dye

Dilute the mix of remazol dye and soda ash with warm water until dissolved. Remazol is a synthetic dye used for dyeing, dripping and quenching. Meanwhile, soda ash was used as a fixing agent for reactive dye. Fixing agent as a color binder to prevent color from transferring to other surfaces. Soda ash is also known as Sodium carbonate which is easily dissolved into water (Khaliq et al., 2021). Then apply the dye to the leather surface which has been waxed using a brush and dried.

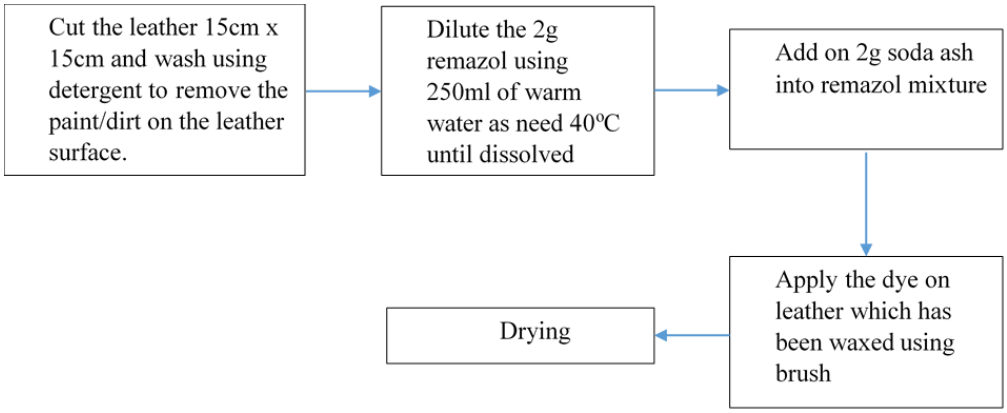


Figure 3: The process of leather dyeing using remazol dye (Khaliq et al., 2021).

Phase 3: Wax Removal and Dyeing Fixing

This method is to remove the wax on the leather through the peel-off method until the wax is released. Meanwhile, after the wax was removed, the dye need to be fixed using several mechanical to prevent the color to fade. The method used to fix the colour is

dependent on the type of dyestuff material used (Haslina et al., 2015). Traditionally, sodium silicate was used as a fixing agent to remazol dye (Khaliq et al., 2021). Sodium silicate is usually used for fixing the remazol dye by soaking or sweeping the surface of the fabric for 4 to 8 hours(*Seni Kraf Batik Motif Dan Teknik*, 2009). However, the process of removing the silicate and wax is using hot water which will be destructive to the leather structure. The temperature plays a very high role in preserving leather from damage. Besides that, this process also takes a long time because the fixing process using sodium silicate is need at least 4 to 8 hours before wash. Therefore, in this study, soda ash known as Sodium carbonate was added to a mixture of remazol as the binder and color become strong and do not fade (Khaliq et al., 2021).

Finishing Process

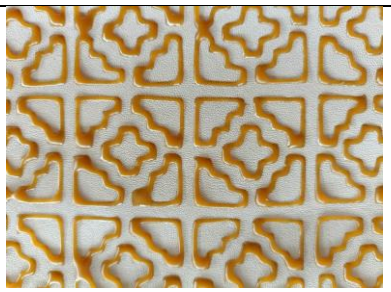
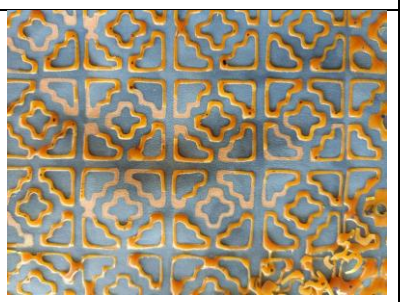
Meanwhile, This study uses acrylic solution as a color binder with leather fibres for the finishing process. The finishing process is the last step in the batik process of leather using various materials such as acrylic or depending on leather properties and the final product (Nalbat et al., 2016). The finishing process is the application of surface finishing that involved mechanical treatment to enhance the quality of leather and cover the defects on the surface (Gulbiniene et al., 2003). Besides that, the finishing of leather will be affected by color and visual appearance to be more attractive to the customer (Maina et al., 2019). This process is the most important stage of visual appearance and defines the final product performance to attract end-users. Finishing gives a tendency to increase color resistance, while the air and water vapour permeability of the leathers is decreased. The type of polymeric binder and the penetration of finishing solution into leather or the thickness of overall coating are extremely important in defining the final properties expected from the leathers.

Result and Discussion

Effect of wax temperature and wax removal on vegetable tanned cow leather

The result of wax temperature on vegetable tanned cow leather can be seen in table 1. The findings from this experiment show that the wax diffuses in the grain and corium only at a temperature of 60 - 70^{o}C. The speed of wax freezing is also fast with the content of wax-and resin. The rate of resin used in the wax affects the level of adherence of the wax where more resin is used the rate of adhesion of the wax to the skin is stronger due to the content of the resin containing the acid monomer. Therefore, when the wax has cooled, it is easy to remove by using the peel-off method after the color is dry. This is in line with previous studies where it was said that higher temperatures would damage the structure of the skin (Pancapalaga et al., 2014). It is because, the higher temperature of the wax, the wax will penetrate deeper into the grain and will be difficult to remove. Meanwhile, the depth of penetration when sticking batik wax into tanned skin depends on the ratio of the acid monomer to the mixture of other materials (W Pancapalaga et al., 2014). Besides that, according to the previous study, the process of removing wax on leather by rubbing method until the wax is released (Sutyasmi et al., 2019). From this finding, it can be said that the best wax temperature is at an average of 60-70^{o}C and wax removal is using the peel-off method to prevent the leather from damage can be used.

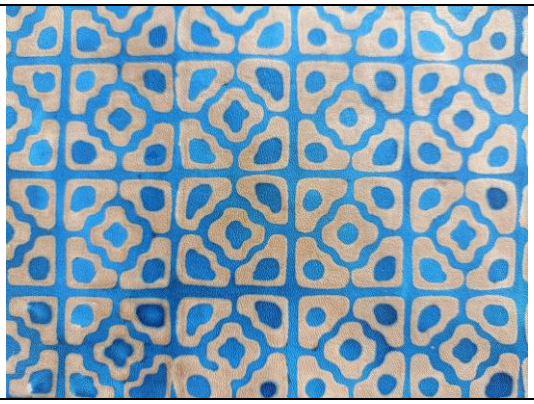
Table 2
The result of wax temperature on vegetable tanned cow leather using block technique.

Wax Composition	**Temperature**	**Block technique**	**Peel off method**
Paraffin wax	≤60 – 70°C		

Effect of remazol dye on vegetable-tanned cow leather

Table 2 showed the color brightness from dyeing exploration using remazol dye (blue) on vegetable-tanned cow leather. The penetration dye is only in the grain and corium parts of the leather. Meanwhile, remazol colour is quickly absorbed into the leather throughout the colouring process. The dye, on the other hand, did not penetrate the leather's back and it produces a subdued color tone. According to the previous study mentioned, the color produces depends on the chemical structure of the material and the color of the leather surface. Furthermore, the main factor in skin coloring is the formation of salt bonds with the amino group of collagen in the skin (Pancapalaga et al., 2014).

Table 3
The effect of remazol dye on vegetable-tanned cow leather

Dye Composition	
Remazol dye	

Effect of acrylic solution on vegetable tanned cow leather as a finishing coating

This research has been done on the effect of acrylic solution as a binder compound and leather color fixing as a topcoat to obtain a good composition on the leather surface. This is in line with the previous study where the finishing process will improve the leather properties in terms of visual appearance and leather resistance to light or water (Gulbiniene et al., 2003). From the visual appearance, the acrylic solution can prevent the leather from being damaged and give an attractive effect.

Conclusion

Vegetable-tanned cow leather has the potential in producing batik crafts as an alternative material other than natural fabric. This study needs to be studied in depth to propose to the relevant industry. The present result indicates that the appropriateness of the batik process on leather differs from the traditional batik process. The wax removal is using a peeled-off method to replace the sodium silicate as a colour fixing indication, and the wax temperature is the most critical parameter in the process. The quality of batik on leather in future could be improved by using the batik process on leather. Therefore, this technique and process can develop creativity and innovation in the batik area as an alternative material for producing batik crafts. Through this study, the inheritance of batik textiles can be sustained through the innovation of new materials in the batik craft industry.

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