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RESEARCH PAPER

COTTON FENT FABRIC AS AN ALTERNATE MATERIAL FOR BATIK MAKING

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ABSTRACT

The art of batik making is very unique and labour intensive, yet culturally philosophically embedded in every piece and style of fabric decoration, and therefore must be sustained at all costs. The motivation for this study was due to the limited availability of quality fabrics, ever increasing cost of mercerized cotton and shedda in the local market and the need to find an alternate yet durable fabric for the batik industry. The objective of the study was to ascertain whether cotton fent as a substitute is durable, for batik making with the same characteristics as mercerized cotton. The art studio-based design was used. Purposive sampling was used to segregate the collected sampled cotton fent fabrics. These were evaluated through a pre-tested questionnaire by ten batik experts from Kumasi who had sound knowledge of batik making. The location of the study was the Asfatex batik studio due to its well-equipped facilities. The results of the study indicated sharpness, clarity, evenness, overall appearance and depth of colour in fent batik. Using the plain mercerized cotton as a standard for the comparison, cotton fent batik fabric used was rated the best. The possibility of using fent cotton as an alternate less costly readily applicable fabric for batik making was confirmed irrespective of the initial characteristics of varied pigment-coloured screen prints outlook. This project, recommends that batik makers explore it further for its artistic and economic development in Ghana and additionally advocate for scientific laboratory studies on cotton fent fabrics for other possible outcomes.

Keywords: batik making, cotton fent fabrics, mercerized cotton.

INTRODUCTION

Batik is an ancient fabric wax-resist dyeing tradition of Java, Indonesia applied to the whole cloth. Batik is composed of the word "Tika", which means sacred painting and is also derived from Javanese words, "Amba" which means wide, and "Titik" which means (create) dots to form lines (Lukman, et al, 2018). The technique is made either by drawing dots and lines of the resist with a spouted tool called a canting or by printing the resist with a copper stamp called a cap or a wooden block, designed foam, brush, or broom. The wax resists applied allows the artisan to colour selectively by soaking the cloth in one colour, then removing the wax with boiling water, and the process repeated severally if multiple colours are desired. Batik is a method of patterning fabric by using the principle of wax resists (Kafka, 1973). Wherever there is wax on the fabric, water or dye cannot penetrate. Most batiks are highly developed with the best batiks still made in Java. The most common fabrics used are cotton and rayon. Other materials include beeswax, paraffin wax and plant vegetable dyes. The designed block stamp is usually a traditional motif made from formed metal or wood.

In recent times, the transition from traditional to contemporary batik designs has become more obvious with the ever-increasing emergence of batik fabrics that are usually decorated with abstract designs or tribal motifs. This transition has proved that batik-making continues to meet the needs of creative artists, designers, and craftspeople all over the world. However, in Ghana, mercerized cotton fabric is the predominant material used. This cotton fabric is the most suitable fabric for batik making because of its softness, lustre, and tension strength, a greater affinity for dyes, comfortability, gentleness to touch and easy finishing (Asmah, 2004). Mercerized cotton is formed by passing threads under tension through a cold solution of twenty per cent (20%) caustic soda to permanently impart a greater affinity for dyes and various chemical finishes. This causes swelling of the fibres and adds approximately twenty per cent (20%) tensile strength when compared to the non-mercerized equivalent (Hayes, et al, 2013).

Mercerized cotton is used widely in industrial and domestic production. Increased tensile strength, hygroscopicity, dye affinity, smoothness, lustre, wear resistance, light resistance, dimensional stability and physical compactness is a major factor for technical textile fabrics. Between twenty to thirty per cent (20-30%) of dye and chemicals are saved while dyeing after mercerizing, increasing chemical reactivity at low temperatures, and increasing apparent colour depth after dyeing (Hayes, et al, 2013). There is also improved dyeability of immature cotton (greater uniformity of appearance), and increased fibre moisture regain. The colour is brighter, and it also gives the cloth a better resistance to multiple items of washing, keeping the colours bright and unchanged over time. In addition to increasing lustre and affinity to dyestuffs, the treatment increases strength, smoothness, and resistance to mildew, and also reduces lint.

Due to an insufficient supply of mercerized cotton from Ghanaian textile industries in 2015 such as (ATL) at Akosombo, Ghana Textile Printing Company (GTP) at Tema, Ghana Textile Manufacturing Company (GTMC) at Tema and Juapong Textiles Ltd., (JTL) at Juapong, most of these fabrics sold in the local markets and are in high demand for batik and other textile products (Sutton, et al, 2012). Its preference, though very expensive yet scarce, has compelled the local batik industry to rely on other less prized fabrics such as calico or traditional bleached cotton, and grey baft, just to mention a few for batik production. These fabrics however have their flaws especially their lack of affinity for dyes which may affect

the quality of the finished batik produced as compared to the mercerized cotton fabrics. Hence the need to find an alternate fabric yet durable enough to attain the right affinity of dye for batik production.

Kuo, et al, (2003) indicate that the fent fabrics produced are sometimes sold to retailer's stores and often sold below cost price to local shoe, bag, belt etc. makers yet seldom used to serve the same purpose as the plain mercerized cotton fabric in batik production. To ascertain its possibility, as an alternative material for batik production, a study was conducted to utilize the fent cotton fabric for batik production. The word 'fent', is a local term meaning a remnant or flawed piece of fabric measured and sold by weight in other words an odd piece; specifically, imperfectly printed or imperfectly dyed ends of cotton and other cloths, which are sold for patchwork and similar purposes. They are often in short lengths, cut from a piece, end or lump of cloth often imperfect end or length of finished fabric, having been accumulated either at the mill or sometimes in the wholesaler's, (Kuo, et al, 2003).

Kuo, et al, (2003) further state that fent is a word used in the textile manufacturing industry to describe the various cut-pieces of cloth having a length of 45 centimetres or more but not exceeding 90 centimetres where the width is one meter or more, or having a length of 65 centimetres or more but not exceeding 135 centimetres where the width is less than one meter with a significant amount of defects.

These portions of the printed cloth are labelled as fents or third-quality cloth due to the significant number of defects found on them after printing. He added that fents have the same cloth structure as the 1st and 2nd quality cloth but are discarded only because of the printing defects found on them.

Fent produced by the industry for the public is sold at relatively cheaper prices in bales to a selected number of company traders and quite recently, fashion designers who use parts of the fents to design fashionable garments and accessories such as earrings, bangles, necklaces, belts just to name a few (Kuo, et al, 2003). Also, some of the fents are used to produce bedsheets, bedspreads, and pillowcases for workers of the company and the general public as such (Kuo, et al, 2003). These discarded fents often contain patches of dyes or pigment prints, colour bleeding, misfits, poor penetration of colour, stains, and wrong colour used in the dyeing or printing processes. Below are examples of these defects shown in the Figures. 1, 2, 3, 4 and 5.

Fig. 1: Colour bleeding defects

Fig. 2: Misfit defects

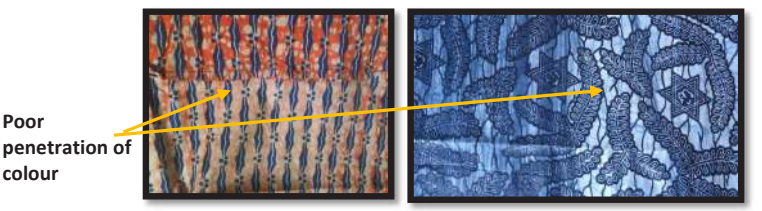

Fig. 3: Poor Penetration of Colour

Fig. 4: Stain defects

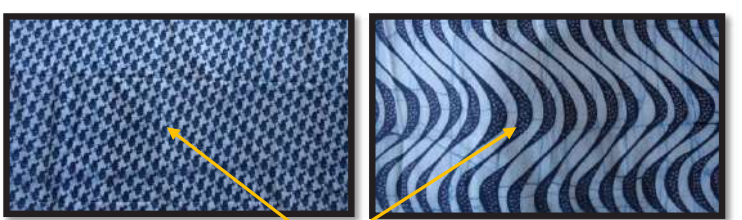

Fig. 5: Bad Colour defects

MATERIALS AND METHODS

Materials

Through studio-based practice and experimentation, the research focused on selecting the appropriate cotton fent for the project. In this project, the cotton with fewer print designs and a more plain background colour was found most suitable to offer a good ground for dyeing to reveal any batik prints applied on them. Other materials used were assorted vat dyes, paraffin wax, sodium hydroxide, sodium hydrosulphite, tracing paper, water, mild detergent, heat source (coal pots), metal bucket, aluminium pots, plastic cups and spoons, big bowls as dye baths, a large bowl for washing and rinsing, rubber gloves, thumb-tacks, small plastic palette bowl for measuring dyes aprons and wooden ladle. Tools and equipment employed included a pair of scissors, pens and pencils, cello tape, a ruler, canting, masking tape, a working table, pegs, a pressing iron for ironing, a working shed, a camera, a computer, and a water reservoir. These items were used in combinations with different ways to suit the materials and techniques employed for the project.

Methods

The research focused on new ideas in the context of techniques, and materials to expand batik production methods towards creativity and relevant innovation in producing attractive and exclusive designs. The art studio-based study explored the feasibility of using cotton fents to prove its viability for batik production. The study process riveted an appraisal of Ghanaian metaphors associated with the designing of batiks to offer a global overview of the task as well as identify the apt process to be adapted. The observational and interview data were obtained by unstructured observation and unstructured interviews used in the preliminary research and in-depth data on the subjects to evaluate the selected terms of their colour, quality, material and design. This application provided the basis for measuring the value and result of the project to ascertain their effectiveness for both functional and aesthetic purposes, motifs and design arrangements experimented.

The chosen studio (Asfatex enterprise) helped develop new knowledge, improve skills and qualities that were used in the batik making and to develop different strategic methodologies for conveying the findings to the stakeholders present. Again, it helped improve the professional qualifications throughout the field of work. The studio activity also helps participants build a sense of unity, cooperation, and partnership. Thus, participants discovered the best problem-solving concepts that the studio addressed.

This essence inspires the participants to further explore it on their own, to illustrate and promote actual process practice. It is a great way to teach hands-on skills as it allows learners to try out new methods. This studio was a full-day session where all the details of the project were discussed to clarify what the needs were, uncover areas that haven't been considered before, define the risks, and work on the project planning requirements. The gathering of experts, with a common interest in batik making, engaged in an interactive activity on the project to increase their understanding of the premise of the project. The accessible population for this studio practice was made up of ten batik experts who were also interviewed. Direct observation was used to observe the activities involved in the batik processes, tools and materials used and the types of fabrics used in batik making. Additionally, three batik producers in Kumasi and twenty cloth sellers of textile print in *Ashiaman* and Adum totalling thirty-three participants were interviewed. Below are pictures of the various designed stamps used for the waxing:

Fig. 6: Stamp a wooden block for Fent A fabric

Fig. 7: Stamp B wooden block for Fent B fabric

Fig. 8: Stamp C wooden block for Fent C fabric

Fig. 9: Stamp D wooden block for Fent D fabric

Fig. 10: Stamp E foam block for Fent E fabric

The fent fabrics were labelled A-to -E and matched with their equivalent designed stamp block for waxing and dyeing to correspond with their designated colour recipe respectively before the commencement of the entire batik process.

Production Process

Each fent fabric was firstly spread on a padded table with ends secured on the table using thump pins.

The process of waxing began with the melting of batik wax consisting of fifty per cent (50%) bee wax plus fifty per cent (50%) paraffin wax in an open pot over a heat source to obtain a hot liquid for waxing. Either the wooden-designed stamps (Figures 7 to 9) or the foam-designed block stamp (Figure 10) were dipped into the molten wax to absorb enough wax and stamped quickly onto the fabrics.

Fig. 11: Fent fabric being waxed

Fig. 12: Sizeable folded fent fabrics for dyeing

After waxing the fabrics were carefully removed from the table and then folded into soft accordion pleats both lengthwise and breadthwise direction to obtain a sizeable folded fabric for dyeing. Above are pictures of the folded fabrics (Figure 12) and the waxing processes (Figure 11).

Preparation of Dye-Bath for Dyeing

The table below summarises the vat dyeing recipe for all the stamped fent projects. The parameters below justify the resultant dye colour changes that occurred according to each dye allotted for each waxed fent.

The first dyed colours for each of the five (5) waxed fent types (fent A, B, C, D, E) were as follows; dark blue and red, red and violet, dark blue and red, dark blue and red, yellow and golden yellow. The second dyed colours for each of the five (5) dyed waxed fent types (fent A, B, C, D E) follow in this order red and violet, green, red and violet, green, red and violet. The purpose of these recipes used was for the colour dye to overshadow the initial prints used on the fents.

Table 1: Dye bath recipe for all the waxed fents with the exception of the changing dye colours

Chemical	Amount	Weight (g/litres)
Dye powder (vat)	2 tablespoons (1:1)	15g per spoon = 30g
Caustic soda	2 tablespoons	15g per spoon = 30g
Sodium Hydrosulphite	4 tablespoons	15g per spoon = 60g
Water	1 bucket	24litres per 2yards

1st fent waxed fabric colour is dark blue and red.. This keeps on changing as stated in the text above.

The general preparation of the dye bath began with the dissolving of the powdered dye, the sodium hydrosulphite (hydrous) and caustic soda in separate bowls. The sodium hydrosulphite and dye powder were dissolved in warm water while the caustic soda was dissolved in cold water because of its violent reaction when it comes into contact with warm water. The dissolved caustic soda was then mixed into the dye solution before the addition of the sodium hydrosulphite which was then poured into a large bowl full of water enough to dye the stamped fents. After the preparation of the dye baths, the fents to be dyed were soaked in water to ensure even dyeing then immersed into the dye bath and left for ten to fifteen (10-15) minutes as shown in Figures 13 to 14. While in the dye bath, the fent was moved in the form of figure 8 motion clockwise and anti-clockwise to ensure an even flow of dye around it.

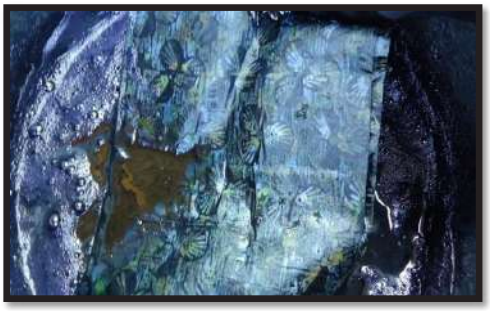

Fig. 13: Folded fent waxed fabric in Dye-Bath

Fig. 14: Dyeing Process of the folded fent waxed fabric

Oxidation of the Dyed Fents

The dyed fents were dried under shade for oxidation.

Figures 15a to 15e below show the pictures during the oxidation process.

Fig. 15a

Fig. 15b

Fig. 15c

Fig. 15d

Fig. 15e

Fig. 15a to 15e: Oxidation Process of the folded waxed fent fabrics

Dewaxing Using Hot Water

The oxidized waxed fabrics were placed into a pot full of water over a source of heat to boil. The dyed fents were carefully immersed in the boiled water and stirred until all of the wax on the fent fabrics was melted and the fents submerged (Figures 16a and 16b). The dewaxed fents were removed from the hot water and then place in a bowl containing cold water rinsed and washed (Figure 17).

The fents were washed with soap and rinsed thoroughly until all the wax left the fents, the pattern then becomes visible. During dewaxing the melted wax formed a thin film on top of the hot water, these were collected for future use.

Fig. 16a **Fig. 16b**

Fig. 16a and Fig. 16b: Dewaxing of the waxed

Fig. 17: Washing of the dewaxed fent fabrics

For effective and complete removal of wax from the fent surface, the washing was done thrice to make sure all the wax is removed thoroughly. All the dewaxed fent cloths were finally dried under a shade.

The batik fents were finished by ironing while partially dry and then folded. Below are the (Fig.1,2,3,4,5) prints of the original fent cloth and its batik form (fents batik).

Fig. 1a: Original fent cloth and Fig. 1b its batik forms

Fig. 2a: Original fent cloth and Fig. 2b its batik forms

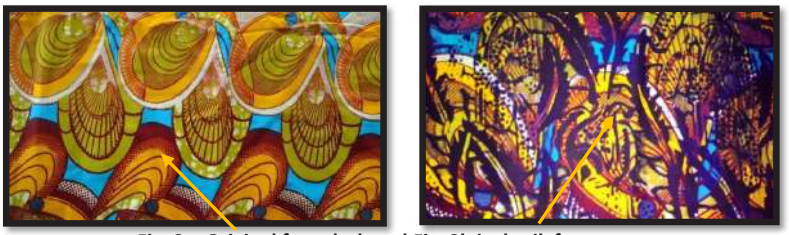

Fig. 3a: Original fent cloth and Fig. 3b its batik forms

Fig. 4a: Original fent cloth and Fig. 4b its batik forms

Fig. 5a: Original fent cloth and Fig. 5b its batik forms

Fig. 18: Original fent cloth and its batik forms

RESULTS AND DISCUSSION

This provides a discussion and examination of the results of the experimentations on the aptness of cotton fent for batik production. It defines the outcomes of the initial survey of batik using the cotton fent, the selection of the appropriate cotton fent and the techniques adopted for the experimentation, and the design and production processes adopted for the cotton fent batik sample. A survey of batik products using cotton fent from the markets, batik sales points, hostels, hotels, educational institutions and libraries in the Kumasi metropolis revealed the use of other materials other than the cotton fent fabric depicting natural and abstract Ghanaian symbolic themes used to promote Ghanaian culture. Natural and abstracted biblical, commercial, political, religious and social, themes such as feasting activities, sports, entertainment, curtains, sets of bedsheets, table cloths, serviette and bags were portrayed.

The techniques used for the batik production during the survey were mainly block stamping, sprinkling, Tjanting, dripping, splashing, dabbing and painting, which employ the use of brushes, foam and wooden blocks, Tjanting tools, and brooms. This indicates that batik makers employ orthodox techniques, materials and tools for batik production. The use of cotton fent batiks was absent from the survey, suggesting that the use of cotton fent fabrics has either not found application in batik production or is not widely available. This study, therefore, serves as a novelty that adds to and expands the scope of material used for the development of batik production in Ghana. Batik makers can now explore this new concept to enhance their work and minimise costs.

Assessment of Cotton Fent Fabrics for Batik Production

The assessment of the plain undyed mercerized cotton sample, initial cotton fent fabrics, and the final batik dyed cotton fent fabrics were subjected only to basic physical tests, to determine their response to the rate of absorption, affinity to vat dyeing, to tap water wash fastness, rub resistance, and structural stability was carried out under art studio conditions where conventional laboratory facilities for conducting chemical tests are non-existent. Table 2 shows the test results.

Table 2: Physical test results on the designated fabrics and auxiliaries

Fabric Types	Absorption Rate	Affinity to vat dyeing	wash fastness to tap-water	wash fastness to warm soapy water	Rub (Abrasion) resistance with white calico	Structural stability & strength	Quality of Colour fastness to sunlight/ ironing
plain undyed mercerized cotton	High intake of dyes and chemicals willingly	Takes dyes & chemicals willingly	Very excellent	Very excellent on mild detergent	Very good rubbed on a wooden surface	Very good	Very excellent in both cases
initial cotton fent fabrics	Good absorption compared to mercerized cotton	Good intake with fairly fewer print spaces	Good absorption compared to mercerized cotton	Very good but gets faded on strong detergent	Fairly good compared to mercerized cotton	Very good	Very good when unwanted impurities are first removed
final batik-dyed cotton fent fabrics	Good affinity to water and soapy water	turgid to dyes and chemicals	Very good	Excellent on mild detergent	Very good (same as mercerized cotton) with white calico	Very good	Excellent with a shining effect after heat application

Source: Studio experiments (2015)

As Table 2 indicated, mercerized cotton, the initial cotton fent and the final batik-dyed cotton fabrics had a good affinity for vat dyes and chemicals such as sodium hydrosulphite and sodium hydroxide only than the mercerized cotton had a higher affinity. It must be noted that any cotton material mercerized has a better dyeing affinity than the ones not treated. The vat dye, sodium hydroxide and sodium hydrosulphite used for the experiments were in the ratio of 1:2:1 respectively for a two (2) metre fabric. Mutually the mercerized cotton fabric and the initial cotton fent fabrics displayed good absorption rates and were very absorbent as they take in dyes and chemicals. They are good to wash fastness and suggest a good dyeing finish. Both fabrics suggest strong dimensional stability due to their equal structure distribution of weft and warp yarns. Nevertheless, it must be noted that the dyed fabric gets weaker as the dyeing prolongs in addition to excessive shrinkage especially when there is excessive use of sodium hydroxide thus reducing the life span of the dyed fabric.

This implies that care must be taken to observe the dyeing duration and the right quantities of materials and chemicals used to preserve the strength of the fabrics to prolong their life span. These characteristics and many more validate the suitability of plain mercerized cotton and cotton fent fabrics with their auxiliaries for the production of batik. Batik, by stamping, was the main technique engaged for the study though other possibilities can be used in the production.

A major drawback observed from the experiments is that heavily designed printed fent is ineffective for producing clear, sharp and exquisite accurate design edges in fabrics and does not generate well-defined outlines in batik prints. But with more open background spaces, batik printing is very effective with outstanding results. Washing the initial cotton fent with a strong detergent like OMO in this case makes the fabric dyed ready for maximum dye absorption (Table 2). The good news is that both fabrics are cotton woven, and mercerized with a good affinity for vat dyeing of equal structural stability and strength as Table 2 indicates.

The Colour Fastness of Batik Fent Fabrics

Colour fastness is one of the important factors in textile colouration. Colour fastness refers to the resistance of the material's colour to fading or bleeding. The colour fastness of the fent batik was determined through the following procedure; rubbing, washing, exposure to light and ironing (Table 2). This type of assessment typically simulates domestic washing machines or commercial laundering. This helped to ascertain whether the fent fabrics are likely to bleed when washed and the risk of staining other clothes within the washing cycle. Initial hand washing of the cotton fent fabric was done to remove all unwanted impurities before waxing and dyeing. All the fent batik fabrics dyed were finally washed by hand using a mild detergent like 'key soap' in warm water for about ten (10) minutes. After washing, no dye transfer, bleeding of dye colours and stains were realized even with the rubbing of the fent batiks with white calico (Table 2).

Assessment of Colour Fastness Using Sunlight (Heat Energy)

Light fastness testing involves subjecting samples to intense artificial light to assess the impact on the dyed material. All the sampled fent batik fabrics were exposed to the sunlight from morning to evening. After the cloth was introduced to intense artificial and natural sunlight, there was no fading of the colour but rather areas, where initial factory prints were made on the fent fabric became much brighter and darker adding an intrinsic beauty to the end process (Table 2).

Assessment of Colour Fastness through Ironing (Heat)

The sampled batiks were ironed both in their damped and bone-dry state. A plain white fabric was placed on both sides of the batik fent fabrics for each fabric surface and ironed to ascertain the likely bleeding of the batik fent cloths. After ironing, there was no stain on the white cloth but rather a shining effect on the fent batiks (Table 2).

Assessment of Colour Fastness through Rubbing (Abrasion)

Each batik cloth's surface was rubbed against the surface of a wooden table for thirty minutes. Two sets of each batik cloth (fent batik and mercerized batik fabric) were rubbed together for thirty minutes. The level of dye transfer was evaluated to determine the level of staining that occurred during the test.

After rubbing the fent batiks on a wooden surface and against each other, there was no sign of dye transfer recorded (Table 2). This was also applicable to the mercerized batik fabric (Table 2).

Ten experts in batik acted as decision-makers and were asked to fill in pairwise comparisons to express their preferences between fent and mercerized cotton. According to the result, the nature of the fent is the most important attribute; the quality of fent materials affects the results of batik produced. It became evident that those fent less in-colour prints and design prints registered a unique beauty (Figure 18) in their combination with the batik process. These specific findings could be helpful to batik-making and practitioners as they respond to the need to practice with this inexpensive fabric.

Table 3: Demographic data of batik expects from survey results

Demographics	
Sample Size	10
Number of Responses	10
Response Rate	100%
Tamale Technical University, Tamale	2
Kumasi Technical University, Kumasi	1
Self-employed Graduates with over six years of working experience in batik from Kumasi	4
Faculty of Art, Kwame Nkrumah University of Science and Technology, Kumasi	3
Male Students	8
Female Students	2
Age Range	35-50

Source: From field Survey (2015)

The ten batik experts were from the classified groups mentioned in Table 3, consisting of two (2) female lecturers from Tamale Technical University, Tamale, one (1) lecturer from Kumasi Technical University, Kumasi, four (4) self-employed graduates in batik making from Kumasi and three (3) lecturers from the Faculty of Art, Kwame Nkrumah University of Science and Technology, Kumasi.

The batik samples were evaluated for sharpness, clarity, evenness, overall appearance and depth of colour, on a 5.0 point rating scale by ten (10) knowledgeable batik experts using a pretested questionnaire. A total of five (5) samples in addition to a mercerized batik sample were evaluated. Visual observations were carried out to identify the best sample fabrics among the six. The 5-point Likert scale contains five (5) response options that will consist of two (2) extreme sides and a neutral option linked to the middle answer options. A commonly used 5-point Likert scale example to measure satisfaction is: Very satisfied (VS-5), Satisfied (S-4), Neither satisfied nor dissatisfied (NSND-3), Dissatisfied (D-2), and Very dissatisfied (VD-1). Nine out of ten respondents indicated "very satisfactorily" with one indicating "satisfactory". This establishes the fact that fent fabrics are a good alternate source of fabric for batik production.

Table 4: Summary of Responses to 15 Survey Questions for 10 Batik Experts Using 5-Pointoint Likert Scale

SN	QUESTIONS	% (VD-1)	% (D-2)	% (NSND-3)	% (S-4)	% (VS-5)
1	Would you say that your best preference between fent and mercerized cotton batik is very satisfactorily the fent	0	0	0	0	100
2	Compared to mercerized plain cotton would you say that the nature or the quality of fent materials affects the results of the batik produced	0	0	0	0	100
3	Do you agree that the introduction of cotton fent is one of the most important attributes in batik making	0	0	0	0	100
4	Does this establishes the fact that cotton fent fabrics are a good alternate source of material for batik production	0	0	0	10	90
5	Would you rate the overall batik experience between batik made of mercerized plain cotton and that of cotton fent as very satisfactory?	0	0	0	0	100
6	Would you say that the fent batik has excellent sharpness, clarity, and evenness over the mercerized cotton batik	0	0	0	0	100

7	With the two types of batik evaluated would you agree to the accession that fent batiks have a brighter overall appearance and depth of colour	0	0	0	0	100
8	Would you say that the fent batik introduced would help improve the performance of the batik industry?	0	0	0	0	100
9	Are you very satisfied that the blend of pigment rotary prints and the batik process has given the batik product a better outlook?	0	0	0	0	100
10	Could this innovation help batik-making and practitioners respond to the need of customers more quickly with this inexpensive fent fabric	0	0	0	0	100
11	How would you feel if such knowledge is introduced in your outfits or institutions?	0	0	0	0	100
12	Would you be very satisfied if your students can reproduce these types of batik products?	0	0	0	0	100
13	Considering your experiences would you be very satisfied that your involvement has been beneficial	0	0	0	0	100
14	Are you very satisfied that the art studio-based experimental study explored has proven the feasibility and viability of using cotton fent for batik production?	0	0	0	10	90
15	Are you very satisfied that certain factory defects like dye patches, colour bleeding, misfits, etc. can be covered up neatly with the batik process	0	0	0	0	100

Source: Answers to Surveyed Questionnaires (2015)

The study's objective was to ascertain whether cotton fent as a substitute is durable and cheaper for batik making. It was to investigate whether cotton fent can attain the following characteristics achieved with mercerized cotton in terms of sharpness, clarity, evenness, overall appearance and depth of colour. This was addressed through a series of batik production processes that unveiled the usefulness of fent fabrics as an alternate material for batik making. To verify the following characteristics accustomed to mercerized cotton required an amalgamation of technical skills that speak to issues of sharpness, clarity, evenness, overall appearance and depth of colour to fent fabrics in the batik dyeing processes

Though the aesthetic performance of the fent fabrics is difficult to describe and does not lend themselves to objective measurement due to their subjectivity, their aesthetic qualities like

colour, pattern, colour consistency, lustre, opacity, and hand are visually evident with the results (Figure 19). The durability of fent batiks is without question, exhibits the following benefits, it withstands regular use, get softer with age, are highly breathable, and absorb moisture, making them super comfortable when the temperature rises. Looking out for unevenness in tone throughout the surface of these batik fabrics reveals no streaks or spots or any defects associated with them (Figure 18). For true dyeing to take place, the colouration of the waxed fent fabric and the degree of absorption of the dye colour are crucially important in the dyeing process carried out in the dye liquor or dye bath to determine colour fastness, sharpness, clarity, evenness, overall appearance and depth of colour (Chakraborty, 2015). Its colouration at the end of the batik process is relatively permanent: that is not readily removed by rinsing in water or by normal washing procedures or with the dye fading on exposure to light (Table 2).

Breathable fabric like fent fabrics though dyed has an excellent ability to transfer or facilitate the evaporation of moisture from the human skin like any other cotton fabric material into the atmosphere. In order words, it promotes airflow irrespective of the dye or pigment print and still makes the fabric highly breathable. The levelness achieved as a result of exhaustion in the dyeing process was due to the control of dyeing conditions by agitation to ensure proper contact between dye liquor and the fent fabric being dyed, the dye type (vat dye), recipe, and the heat supplied to the dye bath (Chakraborty, 2015). Transferring dye molecules from the solution to the fibre of the fabric as well as the swelling of fibre to render it more receptive, is an important quality to attain evenness (Chakraborty, 2015).

It should be understood that the fent fabric went through all the necessary enhancement processes as good and high-quality stability fabrics featuring fibres that are closely and tightly woven together (Singh, 2017). Though it may suffer certain factory defects like patches of dyes or pigment dyes, colour bleeding, misfits, poor penetration of colour, stains, and bad colour it does not disqualify it from other forms of fabric decoration (Singh, 2017). Its dye affinity is still intact and capable of permitting dye molecules from the dye bath to its fibres within the specified batik dyeing conditions. The caution here is to avoid repeating these flaws in the process of colouration.

The batik makers will always choose the raw material at a low price but with good quality. If the price is high then the benefits of batik producers will be low and vice versa. For batik producers, the quality of raw materials is the most vital thing to be fulfilled. It is because the raw materials used will affect the final product(s). The study shows that the implementation of this new fabric could lead to new market opportunities for the batik industry. Since, no previous study had tried to propose the possibility of utilizing such resources, to promote economic benefits and the sustenance of batik production in Ghana.

Material costs in the batik production process would be minimized. The improved quality outcome, alongside improved efficiency of the batik process, is an envisioned increase in market share, lower costs, and creation of new clients, which are all key indicators for stakeholders interested in batik products. Additionally, the operational cost was reduced, resulting in improved profitability, plus the advantage of using an already-coloured fabric. The implication of this substitute potentially offers the possibility of marketing such products to both local and international markets. Its patronage will even increase especially if its end products reflect the Ghanaian identity. The effort made to invigorate batik-making is an important driver for any economy built on an available

natural resource base and has the likelihood of improving the vocational sector of the economy (Asmah, et al, 2018).

CONCLUSIONS

In conclusion, the objectives of the study were achieved. The outcomes of the research show that the innovative aspect of applying cotton-based fent materials in batik making can provide new knowledge and perspective for the batik industry, especially for block batik in Ghana. Applying the batik techniques to cotton fent fabrics significantly can be a new resource material for batik and provides an additional, source of new designs and motifs for fent batiks. The research, therefore, provides benefits to batik practitioners, textile art researchers, batik financiers, batik block producers, and even the handicraft industries and students locally and abroad. Comparatively, the quality of the fent batik cloth produced as compared to the mercerized batik fabric was the same if not better (Figure 18). The utilization of fents as a raw material for batik production has provided an additional source of fabric choice for batik workers.

RECOMMENDATIONS

It is recommended that the local batik producers adopt this knowledge to produce different batik designs using fent as the raw material. Further research on other dyestuffs applicable to the fent fabrics should be conducted to bring innovation and variation. It is recommended that other textile decorative techniques should be employed on fents as a raw material to bring diversity. Additionally, advocate for scientific laboratory studies on cotton fent fabrics for other possible outcomes.

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