

Implementation of Wet on Wet Technique in Batik Industry

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Abstract — Wet on Wet (WOW) Batik Technique is a new innovation in batik coloring, with blended gradation color effects. The long term goal of the research is to promote creativity in batik industries as creative industry based on local wisdom. There would be differences between laboratory and industry scale production, where in industry consumer expectations become one of the important factors. The research objective is to find out the effectiveness of WOW batik implementation in small scale batik industry. Two cycle of small and larger scale try out was conducted to find out productivity and efficiency, economic aspects, environmental impact, and quality of product. Calculation, observation, and interview were applied for data collecting, continued by descriptive quantitative and qualitative analyses. WOW batik technique was faster than *coletan*, with ratio 16:1. It was 5.40% more efficient in materials, 256.70% in workers, reduced cost up to 21.90%. WOW technique could be applied for synthetic as well as natural dyes, produced very limited liquid waste. WOW technique got high appreciation from the batik artisan as the alternative batik coloring, simple, easy, unique, efficient, and ecofriendly. Costumer preferences are high to medium, due to the design, color, and cheap price.

Keywords — Implementation, wet on wet technique, batik industry, sustainability

I. INTRODUCTION

A. Background

Batik industry is one of local potential creative industry. Contribution of batik sector to the national economy is very proudly, where at the beginning of 2012 there were 21,600 units of enterprises, absorbed 165,000 employees, while the export turnover reached 4 trillion USD, and the foreign exchange contribution of 41,000 USD. These figures show a significant increment in the last 5 years. An important issue that was revealed in the national strategic policy, stating that "the creative industries based on the local wisdoms, arts, and cultures were need to be developed". Small scale batik industries and enterprises has lack creativity, especially in innovation and adoption of technology [1] [3]. Artisan were not interested in the acquirement of intellectual property. It is concluded that the development of creativity is critically need to be developed in the batik industry.

Batik industry plays two important roles, as creative industry as well as the industry based on local culture and wisdom. As creative industry, innovation and creativity will be very important. However, as the industry based on

local wisdom, traditional and cultural values of batik have to be maintained.

One of batik innovation that has been developed is a batik with wet on wet (WOW) technique which generates aesthetic value of blended and gradated color effects [11] [12] [16]. Motifs can be varied exclusively. The uniqueness of WOW batik motifs are they give a hairy, unflat, graded with three-dimensional (3-D) color effects. *Coletan* batik in certain cases can also produce a gradation effects, but the difference is WOW batik give the same quality of color on both fabric surface, while the *coletan* batik produce different quality of color between back and front side fabric surface, especially on medium and weight fabric construction. Besides, the hairy color effects found in WOW batik are rarely found in *coletan* batik.

WOW batik technique meets the cultural and environmental conservation concepts, by minimizing the liquid waste. It also meets the criteria of batik as the intangible cultural heritage of humanity, able to fulfill the aspects of: (a) craftsmanship, with mostly manual works; (b) the use of *malam* as resist materials; and (c) the use of canting and copper stamp as the traditional tools for pasting *malam*. WOW batik technique was also environmentally friendly by minimized the amount of liquid waste. Coloring standard of batik with WOW technique and simple tools for industrial application also been developed [12]. The WOW batik technique is also proposed to be patented under the name "Kelebes Batik" [13].

This study focused on the implementation of the WOW techniques in small-scale batik industries, based on synthetic as well as natural dyes.

B. Problems

The research problem was formulated as follows:

- How is the result of WOW technique implementation in batik industries, in the aspect of production sustainability, including productivity and efficiency, quality of product, environment impact, and economy?
- How is the consumption sustainability of WOW technique implementation regarding artisan appreciation and costumer preferences?

C. Research Urgency

Previous research findings of WOW batik technique need to be implemented in the industry, to enhance the creativity of batik artisan. The implementation will contribute in solving the problem mentioned in national strategic issues about the lack of creativity in batik industries as the industry based on local wisdom.

Batik is the cultural heritage which need to be conserved and safeguarded. It has comparative competitiveness to the craft from other countries. The safeguarding efforts are including continuity and sustainability of production, as well as education and promotion. Besides, batik products have a great chance as potential export products. Creativity of batik artisan and craftsmen becomes very important to fulfill consumer satisfactory and demands.

Developing creativity of batik artisan in batik small and medium scale enterprises (SMEs) is very important, especially in creating motifs and designs.

The new innovations of WOW technique to create unique color and design [11]. The WOW technique gave blended and graded color effects and hairy motifs. Some tools for WOW technique in a laboratory scale and industrial scale have been developed [9], gave opportunity to develop and vary the color effect of WOW. Tools are used to create regular patterned motifs. Fabric construction affects the quality of WOW batik [16], while the water absorption and drying time affect the quality of motifs [10]. Based on those initial research, the 2nd year research has been conducted, developed standard of WOW coloring for different fabric constructions and dyes, found the formula for calculating dye concentration. All the research findings could help the batik artisan to create their batik in WOW technique. The development of industrial scale tools are intended to produce motifs and varying WOW effect, as well as productivity.

The most urgent for the research is to attain to to be implemented after the study is: Obtaining Patent Rights or Intellectual Property Rights (IPR) IPR centers after enrollment in Unnes with No. 05 / SHKI / K / 11/2013, and the Ministry of Justice and Human Rights with the registration number P00201400310 dated on 20th January 2014 [13].

II. LITERATURE REVIEW

A. Wet on Wet Batik Innovation

The idea comes from the wet on wet watercolor painting technique where paper is wetted or moistured before painting, giving a special effect of graded and blended colors. The difference between regular batik and WOW batik is only in its coloring technique. Regular batik is coloured through dyeing the fabric in dye solution, while WOW batik is colored with small amount of dye solution put on wetted fabric surface. The presence of water in the fabric instigate dispersion and spreading of dyes more quickly and easily. WOW batik technique is basically similar to fabric painting, but certain parts are covered with *malam* (batik wax) to form motifs. *Malam* is a hydrophobic material, functioned as resist agent to prevent dye

absorption in the part covered with it. The nature of the fabric is almost the same as the paper, but fabric generally has greater capillarity, water resistance and do not degraded in water.

Batik is characterised by its motifs and specific resist dyeing process, where *malam* or *lilin* batik as the resist agent [14]. Batik motifs consists of ornaments and *isen-isen*. Indonesian batik motif is different in each region. Batik from coastal areas such as Pekalongan, Lasem, Cirebon and Tuban, mostly use bright colors that are very varied, describes the fauna and flora of coastal area, such as fish, shrimp, clams, seagulls. The influence of other countries are clearly noticeable, because the coastal cities were frequently visited by foreign ships in the past. Influence of China (dragon, peacock), the Netherlands (kumpeni, fairy tales), Arabic (calligraphic and geometric), Persian (paisley sea cucumbers), and Hindu (puppet shadows) are obviously marked. Meanwhile, inland batik such as batik from Solo and Yogya, dominated by natural woody and dark color, like yellow, reddish brown, dark brown, dark blue or black. Motifs represent tropical forest fauna and flora such as eagle wings (*semen*), mountains (*argo*), and cloud (*mega*). In addition, there are also geometric motifs named *banji*, *lereng*, *kawung*, *ceplok*, *parang*, and *tambal*.

Nowadays, batik motifs are more progressive. Pioneered by Iwan Tirta, a famous Indonesian batik designer, motifs with modern concept are come up. The use of modern color combination of synthetic dyes, combination of modern decorative, abstract, and traditional motifs enliven the batik markets. Some industries develop batik in modern technology as discharge and screen printing technique. In modern batik design, ornament and isen-isen are not limited as traditional motifs, but their function to fill the empty area or batik background is still maintained.

In terms of color, modern batik was not limited to the natural and *soga* color, but it follows the concepts of modern color design which are more dynamic. Collection of synthetic dyes could give bright and complicated color combination for batik. Therefore, batik consumer will be enthusiasts and satisfied to choose batik.

B. Developing Creativity in Batik Industry

Batik industry is one of creative industries. Creativity becomes the most important part in this industry, for example: (a) variation of product, quality of design, ornamentation / patterns, and color trend [3]; (b) the innovation and adoption of tools and technology [1]; (c) human creativity; and (d) creativity in marketing. Thus, the development of creativity in batik industry could be improved in all areas.

Batik is the intangible cultural heritage of humanity that must be conserved and safeguarded. Developing creativity in batik industry should not damage the values of batik determined by UNESCO. It must fulfill the domain of "craftsmanship", where all batik process are manual. The use of canting and copper stamp for pasting *malam*, and the use of *malam* as resist agent, are main characteristic of batik. Therefore, WOW batik techniques are not contrary to UNESCO provisions. The whole process is similar to

traditional batik. However, the coloring technique is different, where in WOW batik technique, the fabric have to be wetted before coloring. WOW batik use small amount of dye solution, to be applied directly on fabric surface. Besides, the quality of WOW batik motifs are influenced by fabric construction and absorbancy, and tools for regular patterned motifs. The WOW tools are very simple, so it still meet the principles of craftsmanship.

C. Implementation of WOW Techniques in Batik Industry

Batik industry is a creative industry. Creativity becomes the most important part in this industry, including creativity in motifs and design. The high rates of pollution and the low competitiveness of the SMEs in batik district, encourage government, and non-government organization (NGO), as well as environmentalists to implement empowering programs. One of it was the Clean Batik Initiative (CBI) 2010-2013. The program implemented by the German - Indonesian Chamber of Industry and Commerce (EKONID), the Malaysian-German Chamber of Industry and Commerce (MGCC), and the CPI-Academy Munich, co-financed by the European Commission under the SWITCH-Asia Grant. The program implements three components of sustainability, those are:

- Sustainable Production associated with the supply aspects, focusing on the impact of economic, social and environmental, of batik production;
- Sustainable Consumption intended to increase demand, focusing on consumer behavior and consumer choice in the purchase of batik products;
- Policy Dialogues aims to intervene the policy framework to provide real support and intervention in business and consumer network or organization.

Implementation of WOW techniques in batik industry, should also refer to sustainability principle. As has already been explained, WOW technique is effective to reduce dangerous liquid waste, so that the social and environmental aspects could be overcome. Sustainability of productions were depend upon the motivation and creativity of craftsmen to work in developing new design. High quality of production will directly impact the economic aspects, since it will be like increasing consumer interest, although there are other factors that reasonably determine, such as the price and continuity of raw material supply. All the problems associated with To promote productivity and this can be resolved through dialogue forum for troubleshooting.

D. State of The Art

Some research leading to the development of technology and equipment implementation in batik industry, those are: *First*, research on the development of creativity in the batik industries [1]. These studies exposed some factors that influence the development of creative human resources (creative person), creative work (creative task), organizational creativity (organizational context), creativity in local resources utilization (environment), and production (product innovation) in small, medium, and large scale batik industry. The overall result found that creativity in small, medium, and large scale industry are

equal. There are significant differences between dominant and critical factors in creativity development. A critical factor in the medium scale industries is the technology adoption, where the industry generally stick to the conventional techniques (traditional). *Second*, research of consumer preferences analysis in batik [3], lead to the conclusion that the development of creativity in the batik industry can be done through increment of product variety, improvement of designs quality including decorative motifs and color trends with determination of *malam* application, and the reuse of rejected batik and patch. Government was suggested to facilitate entrepreneurship development for batik through their national policies. *Third*, innovation and development of batik design using software "Batik Fractal" that combines technology, art, and culture [5]. Fractal technology emerging the fourth transformation for batik, which indicates the presence of a fractal with a range between 1 and 2, process of *isen-isen* (charging smaller motif after motif completed large) is a significant factor that makes the appearance of the main attraction and fractal characteristics. Moreover, fractal dimensions symmetrically spread almost in every corner, except *banji* which asymmetric motifs. The presence of fractals in batik indicate the present of complexity in traditional art. The complexity arises because the effort to follow the rules of CTL (symbol meaning, harmony, symmetry) and the limits of media (canting, night). This discovery is the development of technologies to make it easier to develop batik design patterns or motifs with formula *mathebatia* long. This discovery even get UNESCO 2008 Award of Excellence as the 'Stamp of Approval' that ensures they have the highest quality products at the international level and has great potential to enter the world market. *Fourth*, canting electric pen was developed for batik production efficiently [7]. The prototype facilitate easier batik process, gave good quality of *malam* penetration into backside of the fabric and produce a neat and perfect lines of *malam*. The process of pasting malam is one of stage for WOW batik processing. *Fifth*, the study used marigold flowers as natural dyes resources and dyeing materials, like lime, alum, and lotus as a mordant, proved that WOW technique could be applied for batik with natural dyes [4]. *Sixth*, research found the effect of fabric construction to coloring quality of WOW batik is more weight fabric, lower WOW effect [16]. *Seventh*, research of O. Indah and R. Syamwil [10] identify the influence of fabric water absorption and draining time to the quality WOW motifs. The greater absorption of water, the more permeation and deviation of color diffusion, gave lighter color, but the color gradation is very good. Draining time of 10 minutes resulted optimum WOW effect. *Eighth*, one of the National Strategic research found that WOW techniques produce unique color effects [11]. *Ninth*, the research of R. Syamwil et al. [12] produced standard of WOW coloring, the formula for calculating the concentration of the dye, as well as a simple tool to generate WOW motifs. The results of the study concluded that the implementation of the WOW batik technique needs to be implemented in industry, and simple tools could help producing regular patterned motif. The research was succeeded to develop coloring standard, formula for dyestuff concentration calculation, simple tools for production of WOW batik motifs. It was concluded that

implementation of WOW technique is important to be implemented in industry. Simple tools could help to produce uniform, regular, and patterned motifs, so that it deserves to be tested in the industry.

III. RESEARCH METHODS

An action research was conducted in order to implement the WOW Batik technique in batik industry. Therefore, coordination and cooperation with the batik industry, as partners are very important. The implementation models are depend upon the agreement with partners. The research was conducted in the natural dye based batik industry "Linggo" in Gonoharjo Village Limbangan Kendal, and also in synthetic dyes based batik industry Cepiring Sekarwangi in Cepiring Kendal, and also in Iza Dewi batik industry in Pekalongan. Research variables including: (a) productivity and efficiency; (b) economic value; (c) environmental impact. Four step 4 Kemmis and Taggart [6]: (a) planning; (b) action; (c) evaluation; (d) revision was applied in 2 cycles of action research. The first cycle was a small-scale the second a wider scale. Data collecting was obtained through interviews, observations, and simple calculations. Descriptive quantitative and qualitative analyses were applied to evaluate the effectiveness of implementation.

IV. RESEARCH FINDINGS

A. Sustainable Production

- Productivity and Efficiency

Productivity were differ in each industry, depend upon the worker's skills and experiences, and kinds of dyes used. The small scale implementation trial result figured that worker/artisan could finalized the WOW coloring for 1 piece fabric with 2 m long, for 1 hour (1 piece/hour) applying the sample tools, while *coletan* technique needs 2 to 3 hours per piece, depend upon kinds of dyes used, amount of color, and the wide of area to be colored. Implementation of WOW technique in the first cycle found some problems, those are: (a) slow production due to the problem where the artisans are not familiar in applying new tools; (b) artisans are intent to develop their own way and tools to produce WOW batik, and put forward alternative ideas. The first cycle illustrated that artisans found some obstacles in implementation of WOW technique, like the lack of facilities. Tools developed in previous research were found ineffective for large pieces of batik production. The wide spread of fabric surface caused the change of fabric moisture and wetness in some location, caused uneven color of WOW effect from one location of stamping tools to the others. Existing *malam* on fabric surface disturbed the tools work, so in the part where malam was pasted, the uneven motifs effect were happened. The other obstacle is disturbance of routine production. The use of synthetic naphthol dyes gave unsatisfactory results, due to the reaction of the diazonium salt naphtholat are too fast, so the dye penetration was not even on the whole fabric

surface. Dye absorption was also different between front and backside of fabric. The formation of motifs in indirect dyes like naphthol and indigosol was quite difficult, since the color was not comes up before the treatment with diazonium salt for naphthol and oxidation for indigosol. However, the WOW technique for indirect dyes might need special tools. Reactive dyes produce good shape of motifs with tools, but some colors are fade at *malam* removal or releasing process. WOW technique in natural dyes was quite successful. In the second cycle, the artisans decided to use their own equipments, like screen printing facilities, but the technique was WOW and insist of pigment dyes they used reactive Procion dyes. The fabric was wetted, and laid neatly in the printing table. The reactive dyes solution was poured on to the screen printing frame, with specific design of the artisan collection, gave the effect of WOW. Other technique tried by the batik artisan was application of WOW technique directly to the fabric before the malam pasted with canting or stamp. So the WOW effect becomes the background of batik. By this method, the application of tools could help the production faster. This technique could increase the productivity of the industry, from 10 pieces of fabric per manday becomes 80 pieces per manday. Compared with *coletan* batik, *coletan* needs average 1-2 hours per pieces per man, or 5 pieces per 8 hours daily working time, depend upon the number of motifs color and the extent of coloring area. In *coletan* batik technique, *mopok* or *nembok* (covering the *coletan* color with malam) before dyeing, to protect the *coletan* color from the effect of dye solution in dyeing process. This stages are not happen in coloring with WOW technique, since WOW technique producing background color without dyeing, *mopok* or *nembok*. Then, the ratio of productivity between WOW technique : *coletan* technique was 16:1. The fast coloring of WOW could minimize the labor cost by 256%. Efficiency of raw materials was not so much different between WOW and *coletan* technique, but the use of dyes and chemicals can be saved up to 5.40%. The use of tools could accelerate production. Produktivity increased up to average 3,75 pieces/hour when the artisan was given chance to use and develop their own tools. Efficiency calculation from the aspect of cost was quite significant, since the WOW technique could save the workers work load up to 26% per day. Material efficiency for dyestuff and chemicals reach 5,40% compared to *coletan* technique. From the aspect of quality, WOW technique gave good penetration of dyes to the fabric. The color was absorbed from front to the fabric backside, while *coletan* batik gave different color penetration between front and backside, especially on thick fabric construction. However, the color intensity was relatively lighter compared to *coletan* technique. The color concentration decreased in the presence of water content inside the by fabric, due to wetting process. The unique motifs with color

gradation and mixing is one of the quality aspects to be considered.

- Economic Value Analysis

The production costs of WOW batik technique from the aspect of coloring process and materials and the use of synthetic colors Rp. 3125, - / piece (labor Rp. 1,700,-; dye and chemical Rp.1.425,-), while *coletan* techniques cost are Rp. 4.000, -/piece (Rp. 2,500, -; dye and chemical Rp. 1.500,-). So, mathematically WOW batik technique is cheaper and more efficient by 21.90%.

- Environment Impact Analysis

Liquid waste produced in WOW technique was minimal, even virtually non-existent. Liquid waste only comes from *nglorod* process or *malam* releasing through boiling. No difference between liquid waste produced in WOW and *coletan* techniques, since both was equally limited, so WOW technique is considered as ecofriendly process as well as *coletan*. The excessive dye can be used for further processing, so no dye is wasted as in dyeing techniques. WOW techniques was proven can be used for natural dyes, while *coletan* technique has not been applied for natural dyes yet. Therefore, WOW batik technique is environmentally friendly process, in the application of natural as well as synthetic dyes.

B. Sustainable Consumption

- Artisan Appreciation

Interview results with artisans, craftsmen and also industry owners indicated a high appreciation for WOW batik techniques considered as the alternative unique and creative batik coloring. However, to carry out mass production, further economical study and markets prediction are needed. The batik artisans were quite enthusiastic to apply this technique, with the following reasons: (1) practical; (2) very easily; (3) time saving; (4) cost-effective; and (5) gave unique motifs. However, artisan expected that the research will be continued to get information about consumer preference towards batik WOW, before taking a decision to produce.

- Consumer Preferences

The analysis results of consumer preferences towards WOW batik motifs and designs showed that 22.00% of consumers really like WOW motif, which is considered unique, modern, beautiful color, and the new. A total of 40.50% of consumers liked mainly because of the unique and beautiful color; and 37.50% percent quite liked. No consumer who does not like or do not like motif WOW. The results of the analysis of the preferences of the sale price, as much as 5.00% of consumers expressed low; as much as 87.36% of consumers stated price batik cheap WOW and the balance of 7.64% stated they were quite cheap.

This is evidenced by the uptake of most products in the industry batik WOW test site.

V. CONCLUSION

The conclusion of the research is the WOW batik technique can be applied in industry as the coloring alternatives, with high productivity, especially if it is used for background coloring. Design of WOW are more vary in the hands of batik artisan by applying their own tools and way. The WOW technique get high appreciation from the batik artisan due to high productivity, efficient, easy and eco friendly process, while high preference was also come from consumer due to uniqueness and low price.

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