

Development of Batik Crafts using Natural Colourants Mixed with Cow Powder in Bantul, Special Region Of Yogyakarta

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Batik is a feature product in Bantul Regency, which is a special region of Yogyakarta. batik has the unique characteristics of using natural dye and has been marketed overseas as an export commodity. Batik Small to Medium Enterprises (SME) in Bantul have now developed their own unique motifs and have increased their technological capabilities. Amid the booming batik industry which a key feature is the use of synthetic colour materials, one of Batik SMEs in Bantul, 'UKM Batik Wongso', still maintains the use of natural dyes, derived from plants and animals. This paper will discuss the implementation of science and technology in the batik production service includes discussion, workshop/studio work, factory operations, training and mentoring (groups and individuals). Training activities are carried out with assistance both individually, and within groups to be able to improve management aspects, which have been carried out conventionally. The application of science in mixing natural colourant and cow bone powder and the innovation of mordant basin, slide basin and other production enhancements that can improve efficiency, production quality and capacity will also be discussed and analysed. They will be discussed particularly with relevance to the ability to meet export demands, increase the assets and turnover of SMEs, which will have an impact on improving people's welfare.

Keywords: *batik, cow bone powder, natural dyes, Bantul*

Introduction

Every region in Indonesia, both in Java and outside Java, has their own batik as a reflection of their natural, cultural or craft properties. Each region has a characteristic that is expressed in batik motifs. Bantul Regency is one of the regions in the Special Region of Yogyakarta that produces batik.

Bantul Regency has the potential for featured products, namely naturally dyed batik. Batik centres in Bantul Regency are located in several regions, namely Wijirejo Pandak and Giriloyo Wukirsari. One of the SMEs in Bantul, which still maintains the production of batik with natural colourant amid the rise of the modern batik industry that uses synthetic dyes is Batik Wongso SME. Batik Wongso SME is located in the Wijirejo Pandak Bantul industrial centre. The production capacity of Batik Wongso SME's is still very minimal, there is also limited quality due to the lacking skills and knowledge of the craftsmen. Besides, the chosen colouring process using natural dye requires a longer time and is a more complicated process.

Batik products with natural colours have potential as export commodities. Wongso's batik products have been sold internationally and have the opportunity to be able to have an increase in demand if the organisation is managed appropriately. The quality of batik products continues to be developed not only in production facilities but also in production process technology, motif design innovations, colouring materials innovations, business management, networks and marketing channels, and developing and increasing skills of craftsmen.

Commodities of batik with natural dyes continue to be developed because they have several advantages, including the fact that batik is highly attractive and holds significant cultural value. This cultural value is evident due to batik being a handmade product that is produced from generation to generation, thus containing ancestral heritage as well. In addition, the particular products have an export market share, which is driven by demand in overseas markets.

To improve efficiency, effectiveness and competitiveness of batik artisans with natural dyes; training and assistance must be carried out following the needs of SMEs. The goals of Regional Featured Product Development, through training and mentoring activities, are:

1. To nurture and help Batik Craftsman SMEs to develop with innovation in natural dyes and innovation in machinery and production tool.
2. Increasing production capacity to fulfil both local and export orders.
3. Increasing the development of SMEs in seizing export opportunities through improving product quality and marketing.
4. Increasing added value and higher selling prices, which has an impact on the income of batik artisans in Pandak District, Bantul Regency.

5. To encourage locals to be an entrepreneur.
6. Creating jobs, which then reducing unemployment and overcoming poverty.

Table 1 describes the conditions of partners as follows:

Table 1. Conditions of Batik Wongso SME partners

Business Aspects of SMEs	Batik Wongso
1. Raw Materials	
Raw Material	<ul style="list-style-type: none"> • Fabric: prime cotton / mori cloth, primis fabric, super silk fabric. • chemical colourants • Malam (wax) that is used is made from paraffin (wax fragments), and re-used wax or jeboran (from recycled used candle), which include klowongan wax and tembokan wax • Batik mixture: caustic soda, sodium carbonate washing mixture, HCl, TRO, alum, and starch.
Supply	Continuous, easily obtained from the Surakarta region, which is 25 km from the location of the SME
Quality	Controlled, by use of "self control" method by using it as a shirt to check on its durability.
2. Production	
Production	Hand drawn batik, stamped batik, combination
Equipment	Traditional
Capacity	<ol style="list-style-type: none"> 1. Silk 100 pcs 2. Cotton 300 pcs 3. Premis 100 pcs 4. Demand based silk
3. Process	
Layout	Not well organised
Product quality assurance	Guaranteed
4. Product	
Variety	<ul style="list-style-type: none"> • Sekar Jagad (the most salable), Sido Mukti, Sido Mulyo; • Contemporary motifs: fish, bird, butterfly; • Nature themed motif (flora fauna) • Materials: silk, cotton, and premis
Quantity	100- 300 pcs per month
Specification	Has not promoted the unique motifs of Bantul
5. Management	
Production Planning	On demand

Accounting-Bookkeeping	There is no formal way of bookkeeping
Auditing	Never
Taxation	Not paying taxes (Only PBB)
Management Style	Family based
Intellectual Property Rights	None
Inventory	No inventory records, hence inventory is based on estimates only
6. Marketing	
Market	Limited area
Marketing Techniques	Through friends who have families outside the island, Exhibition, and Based on acquaintances (Word of Mouth)
Selling Price	Stamped Batik: 110.000-180.000 Combination hand drawn Batik: 180.000-300.000 Hand Drawn Batik: 300.000-2.000.000
Customer	Workers (for uniforms, both outside Java and locally)
7. Human Resource Management	
Qualification, and Total	SD-SLTA, mostly Secondary school graduated (as long as they are willing to work) The number of workers is around 30 craftsmen, contract/ order based
8. Facility	
Administration room	None
Production room	Occupying a 4,300 m ² land, hence that the waste does not affect the neighbouring yard, but it has not been arranged according to the conveyor belt
Storage room	No particular room to store, using the showroom instead
Show room	Only the main showroom; Not in the city 5 x 6 m, being used as storage room
Access to the Highway	Good (500 m)
Electricity	900 Watts mostly allocated for production process, especially for water pumps,
Telecommunication	Mobile phone
9. Finance	
Capital	Rp500,000,000
Cash Flow	None

The obstacles faced so far are:

- a. Lack of production equipment that limited production capabilities.
- b. Lack of experts in the field of product design and colouring techniques

- c. Lack of competent staff in business management (Business management is still done conventionally)
- d. Limited network/marketing channels.
- e. Technology/production processes that are still traditional or very simple.
- f. Lack of product diversification
- g. Lack of product packaging quality
- h. Lack of market access and business cooperation networks

Detailed performance indicators for three years can be detailed as follows. For the first year are:

- a. Production field: Innovation and engineering of production equipment (such as mordant basin, colour mixture, colouring technique, feeder machine, design table, press machine, gas / electric stove.
- b. Layout arrangement and development of stamped batik and natural colour batik.
- c. Batik motif design, improvement on the stamp, and improvement on hand drawn batik motifs design.
- d. Marketing management development, promotion media and establishing marketing collaboration, developing packaging and bag designs, participating in exhibitions, making websites
- e. Assistance in the bookkeeping process (Financial Report)
- f. Improving the skill of batik craftsmen with training and assistance.
- g. Modules on naturally dyed batik, marketing management, and accounting.
- h. National or international seminar.
- i. Publication in mass media
- j. Local / National Batik Exhibition

Methods

The methods that need to be carried out are: entrepreneurship, production management, marketing management and financial management training are needed.

For this reason, it is necessary to design various activities, evaluations and implementers of the following activities:

Design of Activities:

1. Preparation. Activities carried out include:
 - a. Preparation of materials and instruments for trainee selection and recruitment.
 - b. Coordination with stakeholders, such as: institutions or village governments and private institutions / batik craftsmen.

- c. Coordination with the teaching team which includes lecturers from Sebelas Maret University, Yogyakarta State University, PGRI University of Yogyakarta and Universitas Pasundan Bandung, as well as related technical practitioners.
- d. Preparation of materials/modules / training materials.
2. Providing training: in the form of inhouse training and out house training.
 - a. Entrepreneurship training: given by Sebelas Maret University, Yogyakarta State University, University of PGRI Yogyakarta, Universitas Pasundan Bandung lecturers in the form of inhouse training and out house training.
 - b. Technical training, making natural colourant batik products mixed with cow bone powder with a new design of batik, given by Ms. Sarah Rum H.
 - c. Business management, marketing management, production management, and financial management practical training, business plan preparation, and business management in-house training, given by Sebelas Maret University Faculty of Economics, Yogyakarta State University, PGRI Yogyakarta University, and Universitas Pasundan Bandung lecturers.
 - d. Technical production, business management, and financial management assistance, also establishing a business network for future marketing of the products.
3. Activity evaluation: from the participation in training activities from the entire set of materials, participants will be evaluated by:
 - a. At the end of the training program, participants are required to make products from those feature elements of the training, individually.
 - b. At the end of the program, participants must show the results of the practice of preparing financial reports, and show effective ability in managing the business.
 - c. Inviting partner entrepreneurs related to the scope of local, regional, and export-oriented businesses to see the products of participants in order to form a business network that will be carried out.

Parties involved:

- a. Lecturers of related fields from the Faculty of Economics and the faculty of arts from Sebelas Maret University, Yogyakarta State University, University of PGRI Yogyakarta, Universitas Pasundan Bandung.
- b. Technical practitioners Ms. Sarah Rum Handayani and Dr. Edi Kurniadi, M.Pd.
- c. Practitioners from related industries from DIY and Surakarta.

The Learning Process is carried out in the following way:

- a. Andralogy approach.
Personal approach according to the personal needs and abilities of students by minimising practice that leads to the instructional approach.

- b. The ratio of theoretical and practical subjects is 20% and 80%.
The material given in Entrepreneurship Training is designed to sharpen four main skills, namely: Interpersonal, Social, Academic, and Vocational skills

Details of program implementation activities in the following 3 (three) years are as follows:

1. **Year I (2019) includes:** a) Conducting Training Need Analysis for batik craftsmen in Bantul. b) Engineering of mordan basin with stainless material, like slide basin c) Innovation in defining the right mixture of natural colourant with cow bone powder, d) developing colouring techniques based on the type of colour material, and type of motif design to produce nice and even colour, e) layout arrangement (production flow) f) development of batik design, g) assistance in the process of bookkeeping, h) mentoring computer utilisation for batik production system database and online bookkeeping, i) development of marketing management,
2. **Year II (2020) includes:** a) Validation of training modules and trials in a limited scope. b) Implementation of entrepreneurship training models according to validated modules. c) Module evaluation and improvement. d) development of fabric colouring machines (feeders), print tables, e) development of stamped batik, f) developing batik motif designs, g) mentoring computer utilisation and communication information technology, h) marketing and market analysis assistance
3. **Year III (2021) includes:** a) Validation and trials after using the New Machine in a limited scope. b) The implementation of the New Machine model has been validated. c) New Machine Implementation Evaluation and improvement, d) development of stamped batik, f) development of contemporary motifs designs, g) product exhibitions

Technology improvements were implemented in the first year (2019) by the method of selecting science and technology used in the implementation of activities, namely: Observation to improve naturally dyed batik products and the process of making batik designs and equipment used by batik SMEs in the Wijirejo neighbourhood. Discussions with Craftsmen will as be implemented particularly to find the right concept in determining the design so that they understand designs that are least favoured by customers, also to determine new colours to be made. Observation will be undertaken to find weaknesses and strengths in the application of mordan basin, lorot basin and freeder with new technology. Engineering mordan basins from stainless steel gives the following effects: The remaining colour is not easy to stick (stainless steel rust against strong heat, acid and base), so that the results of colouring on the fabric appear cleaner and brighter, besides that it can also be used on different colours, the basin is easy to maintain, lightweight to move around, and more durable in use, hence it can be used in a longer period of time. The copper-thin innovations have the

following impact: the night-time process is further perfected, so the colouring results are better. Engineering freeder statistics have an impact on how balanced and perfect the colouring results are.

Factory layout/production process flow seems more organised. Bookkeeping improvements and marketing management are starting to be implemented, specifically through collecting purchase notes and bookkeeping expenses.

Second year (2020) Technology Implementation. The use of freeder machines is expected to colour batik cloth with natural colourants more efficiently and effectively so that it can improve the quality of batik as a regional featured product.

In Year III (2021). The application of new technology and innovation in batik design is more varied so that it can adjust to market preference and have greater export opportunities.

Results and Discussion

In the first year of The Regional Featured Product Development Program (PPPUD) the needs of craftsmen (Training Need Analysis) for batik craftsmen in Bantul is being analysed. Instruments for collecting data with a questionnaire consisting of 84 questions. The purpose of the training needs analysis is to adjust the content of the needs of the craftsmen. The preparation of training needs analysis as it is carried out by the enterprising small business concept. Enterprising small business is a small business that is managed by the approach of a company or small business that implements management functions in managing its business. The management functions are planning, organising, implementing and controlling.

Small business activities include activities that involve production/technology, marketing, financial/capital management and business management. From the business description of craftsmen in the research area, it can be concluded that the obstacles commonly found in craftsmen's business are poor access to technology, limited access to marketing, limited capital/financing opportunities and lack of managerial skills.

The following study concerning the five variables, namely the entrepreneurial spirit, management, production, marketing and finance related to the analysis of training needs based on the results of analysis of the primary data collected.

1. Entrepreneurship aspects

The score on entrepreneurship aspects is illustrated in the following table:

Table 2. Measurement of Entrepreneurship Aspects

No	Description	Yes (1)	No (0)
1	Confidence	25	0
2	Self Motivation	25	0
3	Prefers Challenges	24	1
4	Ownership	4	21
5	Extending Knowledge	17	8
6	Communication	24	1
7	Good Listener	25	0
8	Achievement	24	1
9	Positive Self Image	24	1
10	Decision Maker	20	5
Total Score		212	38
Averaga Score		84,8%	15,2%

Based on the table above the total score obtained from the aspect of entrepreneurship is 212 with an average score of 0.848, meaning that to be able to achieve the ideal, the entrepreneurial spirit of small-scale entrepreneurs is currently in the position of 84.8%. To reach the ideal position, efforts are still needed to improve it, while 100% of the respondents agree to participate in various pieces of training.

2. Management and Organisation

In general, the profile of artisans businesses are in the form of individual businesses (92%), small scale businesses (64%), with the type of business being in the handicraft trade industry (92%), which can be considered a home industry because the average has a workforce of fewer than five people.

The establishment of the business is from the results of their own effort (48%), inheritance (28%) and others (24%) with the duration of business mostly under 2 years (60%). Most of the craftsmen make this business as a main job (80%) to establish a business is to seek profits and growth and provide employment.

Based on data analysis as many as 64% of respondents do not have business licensing, 44% of respondents do not share tasks and delegate authority, 52% of respondents do not have clear job descriptions, 68% of respondents do not have salary and employment regulations, 96% of respondents make business planning, 40% of respondents did not direct on how to implement the activities, 20% of respondents did not carry out coordination and communication in the implementation of activities, 30% of respondents did not supervise the activities. The potential for training in management are specifically in business management

skills, business organisations, small business prospects, forms of business and licensing, cooperation and partnership, and lobbying and negotiation.

3. Marketing Aspects

Generally, the marketing activities for Batik is done by the craftsmen are: product distribution is carried out by the business owner himself (64%) within the local marketing area (84%).

With the conditions of payment of sales on credit (4%), cash (96%), in the past three years sales turnover tended to be stable (64%) along with a stable level of demand (68%). These results have been good considering the competition in this business is (56%). Demand forecasting is 96%, and good future prospects are 100% agreed.

The objective conditions of the respondent's marketing activities are identified from the answers to 11 questions to the respondents with aspects including: marketing planning, marketing strategies, and selling skills. The degree of management of the business is known by giving a score of 0 for the answer "None", as well as a score of 1,2 and 3 for the answer "There" in the conditions of "less", "sufficient" and "good".

Based on the needs analysis as much as 96% make plans but still live and are active in poor conditions, 100% make sales records, 100% of respondents have calculated product selling prices, 100% made efforts to position products on the market with variable prices, 96% of respondents made very simple marketing plans 100% use distribution and promotion channels, 76% of respondents have made demand predictions, 36% of respondents do not observe the situation of visual competition, 88% of respondents determine the target market for their products, 100% have sufficient product selling skills. The training potential in the marketing field is mainly focused on selling techniques, marketing strategies, market opportunities, competitor analysis, market analysis and marketing information.

4. Production Aspects

The batik small business production system is based on order and process (80% daily production system). Most craftsmen (72%) experience ease in the procurement of raw materials and with good quality (92%).

The real conditions of small businesses seen from the aspect of production management can be identified from the answers to 7 questions given by respondents. The degree of management of production activities can be known by giving a score of 0 for the answer "None", and giving a score of 1, 2 and 3 for the answer "There" with conditions "less", "sufficient" and "good".

Based on the needs analysis obtained data that 100% of respondents simply plan product quality, 4% of respondents did not plan to procure production used, 88% of respondents had supervised the use of equipment, 92% of respondents had supervision, 100% of respondents have organised activities related to work safety efforts in production.

Small business production systems are based on orders and processes, while most craftsmen do not experience difficulties in procuring quality raw materials. Even though the batik market competition situation was stable, there were difficulties in selling themselves to the export market, respondents had the motivation to have technical skills about developing batik using natural dyes.

5. Financial Aspects

The general description of the financial aspects of small businesses is that most of the capital comes from banks/cooperatives (40%), operational funds are quite available (56%), the majority of craftsmen have bank accounts (92%), financial management is handled by owners (92%), many had difficulty accessing bank credit (44%), business working capital was chiefly in the form of cash (64%) with current conditions (72%), while current assets in the form of merchandise inventory are sufficient (60%). Business performance seen from profits over the past three years shows a stable tendency (64%).

The degree of financial management of a small business is obtained from the answers of 8 questions given by respondents who are given a value of 0 for the answer "None", and scores 1,2 and 3 for answers "Yes" in conditions of "less", "sufficient" and "good".

Based on the needs analysis obtained 52% of respondents did not keep proof of transactions, 68% of respondents recorded financial transactions, cash flow and cash planning, 12% of respondents did not perceive business profit planning, 76% of respondents supervised the occurrence of storage of cash budgets, 84% of respondents exercised control over profitability, 88% of respondents made a separation between personal and business wealth. Financial planning and control and practical accounting for small businesses have the potential to become training needs as well especially, insights into the separation of personal and business wealth.

The benefits of training and mentoring for batik artisans which is as many as 25 people, that namely having four types of life skills, namely: Personal Skills, the ability to know oneself, people who think rationally and the ability to appear with confidence. Social skills, namely the ability to communicate, work together, be tolerant and have caring and social responsibility in community life. Academic skills, namely skills to formulate and solve problems faced through critical thinking, analysis, and systematic processes and have the ability to conduct research, exploitation, innovation and creation through a scientific

approach. Vocational skills, namely skills related to the field of batik craft skills that can be used to work as employees or independent businesses. Ownership of Entrepreneurship Ability by Craftsmen which includes: Ability to manage and compile business planning, ability to develop business through creative and innovative thinking skills. ability to do business professionally and independently.

Improved partner industry performance after the application of technology: increasing the amount of profit, employees and increasing investment, and expanding the marketing area, improving the skills of craftsmen in planning and managing batik crafts so that they earn a decent income to fulfil their daily needs, develop insights from entrepreneurial spirit among craftsmen so that it has a high work ethic and can produce superior works that can compete in the global market, This will also improve the ability of craftsmen to manage natural, social, cultural and environmental resources and be able to utilise various technologies in the field of handicraft business. Having the ability to understand themselves, others and the environment and the ability to work in teams both formal and informal sectors.

Benefits from Development:

- 1) Poverty Reduction. Improving business performance and the socio-economic life of the craftsmen community through increasing the potential of the craftsmen community, which in the long run, will accelerate Indonesia's economic recovery.
- 2). Provision of Employment, expanding employment for the wider community through the growth of entrepreneurship, new in the field of batik crafts, especially the use of natural dye that is environmentally friendly.

Based on the problems that have been raised and need analysis, the alternative solution offered to Wongso batik craftsmen in Bantul, Yogyakarta Special Region is to be able to be independent and be able to start a business by having adequate skills sets:

- a. Training and assisting, natural colouring techniques to mix beef bone powder is needed.
- b. Entrepreneurship attitude development training is needed
- c. Organisational training and business management are needed.
- d. Marketing management training is needed
- e. Production management training is needed
- f. Financial management training is needed
- g. Export-import training is needed.

For this reason, various designs are needed, which include the implementation of activities, evaluations, and implementers of the activities, which will be shown as follows:

1. Implementation Plan:
 - a. Preparation: activities carried out include.

- i. Arrange materials and instruments for selection and recruitment for the training participants.
 - ii. Coordination with stakeholders, such as: agencies, SMEs, village governments, district governments
 - iii. Coordination with the teaching team which includes lecturers from Sebelas Maret University, Yogyakarta State University, PGRI University of Yogyakarta, Universitas Pasundan Bandung, as well as related technical practitioners, Dr. Sarah Rum Handayani, M. Hum and Dr. Edi Kurniadi, M.Pd,
 - iv. Preparation of materials/modules / training materials.
 - b. Recruitment:

Participants who participated in the training consist of 15 craftsmen that will be trained to use natural dyes mixed with cow bone powder, as well as covering subjects of business management, marketing management, production management, financial management and import-export management.
 - c. Providing training: training provided, in the form of in house training and out house training.
 - Entrepreneurship training: given by the Sebelas Maret University Lecturer in the form of inhouse training and out house training.
 - Training on import-export and product diversification.
 - Business management training, marketing, production management, financial management in the form of practical training, business plan preparation, business management carried out in in-house training, provided by lecturers from Sebelas Maret University Faculty of Economics, Yogyakarta State University, University of PGRI Yogyakarta, Universitas Pasundan Bandung with assistance UNS Economics Faculty students.
 - Technical production, business management, and financial management assistance, as well as establishing a business network for future marketing of products.
2. Evaluation. After participating in training activities from the entire set of materials, participants will be evaluated on:
 - a. At the end of the training program, participants are individually required to diversify their products and understand both export and import documents.
 - b. At the end of the program, participants must show the results of the practice of financial report preparation and business management.
 - c. Inviting partner entrepreneurs related to the scope of local, regional, and export-oriented businesses to see the production of participants in order to form a business network.

3. Parties involved are:

- Lecturers of the related field from the Faculty of Economics from Sebelas Maret University, Yogyakarta State University, University of PGRI Yogyakarta, Universitas Pasundan Bandung.
- Technical practitioners Ms. Sarah Rum Handayani and Dr. Edi Kurniadi, M.Pd.
- Practitioners from related industries from DIY and Surakarta.
- Technical practitioners from related entrepreneurial background.
- Industry service agencies and Batik MSMEs as institutions that have relevant competency with training participants.
- Craftsmen who still exist and have business development prospects.

Learning Strategies

The Learning Process is carried out in the following way:

- a. In groups.
For the purpose of efficiency and effectiveness, learning strategies will be carried out with a group approach model through the formation of 3 (three) groups of 5 people each, the total number of students was 15.
- b. Andralogy approach.
Personal approach according to the personal needs and abilities of students by minimising practice that leads to the instructional approach.
- c. The ratio of theoretical and practical subjects is 20% and 80%.

Location

At Wongso Batik SME and the Faculty of Economics, UNS.

Training materials

Entrepreneurship is a discipline that learns about a person's values, abilities, and behaviour in facing the challenges of his life.

The essence of Entrepreneurship: the ability to create something new and different through creative thinking and acting innovatively to create opportunities.

Create something new and different through:

1. Discovery of new scientific knowledge.
2. Development of new technology.
3. Improvement of existing products, goods and services.
4. Discover new ways to produce more goods with more efficient resources.

The ability to develop new ideas and new ways of solving problems and thinking of new things.)

- Creativity: think something new
- Innovation: doing something new
- The ability to apply creativity in order to solve problems and find opportunities (doing new things)
- The ability of someone who becomes the object of entrepreneurship includes:
 1. Ability to formulate life/business goals.
 2. The ability to motivate oneself to develop to a burning desire.
 3. The ability to innovate will lead to creativity (creativity).
 4. Ability to gain capital of money or capital goods (capital goods).
 5. The ability to manage time and get to the habit of always being on time and not delaying work.
 6. Mental ability based on religion.
 7. The ability to be able to taking lessons from good and painful experiences.
 8. Understanding the nature of entrepreneurship as a tip in improving the quality of life.
 9. Although until now there is no exact same terminology about entrepreneurship, in general it has almost the same nature, namely referring to the nature and character traits inherent in someone who has a strong will, innovative into the real world and develops it with a tough attitude.

Training and Assistance in the Implementation of Science and Technology in partner industries in 2019 (First Year)

Introduction to innovative production and engineering (such as mordant basin, colour mixture, colouring techniques, colour boiler basin, copper sink) and innovation Natural dye innovation as the dye is mixed with cow bone powder. The purpose of the introduction of the tool is to introduce the parts of the tool and find out the functions and how to use them.

The implementation of the innovation of production is made in order for the dye will be less wasted due to sticking to the tubing. The production equipment in the mordant basin that was applied by Wongso batik before is as follows:



Figure 1. Partner's Mordan Basin



Figure 2. Mordan Basin Innovation



Figure 3. Partner's Lorot Basin



Figure 4. Lorot Basin

Innovations in creating a colour mixture to create batik colours (high colour, contrast) and compose these colours in the design. While the purpose of the implementation of the development of colouring techniques with a mixture of cow bone powder aims to make the colour even and more vivid. Presented below, is the composition of colours with natural colour dough innovations:

Tabel 3. Natural dyes applied

No.	Natural colourant material	The colour produced
1.	True indigo (<i>indegofera</i>)	Blue
2.	High soga bark	Red
3.	Soga tegeran bark	Yellow
4.	Soga jambal bark	Brownish red
5.	Javanese soga bark (<i>secang</i>), <i>tekik</i>	Red
6.	Noni root (<i>Morinda cyrifelia</i>)	Brownish red
7.	Javanese cumin (<i>Curcuma zanthorrhiza</i>)	Milky white
8.	Cumin	Orange
9.	Tea	Brown+black
10.	<i>Uncaria</i> /areca nut	Red-brown-black
11.	Mango skin and leafs (<i>Mangifera indica</i>)	Light brown
12.	Cat whiskers (<i>orthosiphon aristtaus</i>) and mimosa leafs	Brown
13.	Banana flower	Red-black
14.	Peanut leafs	Brown

The implementation of natural dye batik science and technology mixed with cow bone powder has several features, namely:

- a. Colour stays and is not easy to fade and not harmful to skin health.
- b. Natural colours and appear to fit to natural characteristics because the intensity of natural dyes is lower when compared to the colour of synthesis.
- c. Natural dye waste is environmentally friendly so it does not pollute the environment.
- d. Natural dye waste can be used as fertiliser.
- e. Natural dyes materials are renewable so that they can empower local potential and reduce the import of synthetic colours.
- f. Making natural colour extracts is easier because it only uses boiling water.
- g. Lower production costs
- h. The colour intensity is lower than the colour synthesis, resulting in a more natural and calm colour
- i. It has high overseas market opportunities and high selling prices so that it can be a genuine Indonesian commodity product.

Conclusions and Recommendations

Results of Year I (2019) are:

- a) Conducting Training Need Analysis for batik craftsmen in Bantul DIY.
- b) Develop models and training modules for Batik Design Innovations and innovate natural dyes with a mixture of cow powder bone.
- c) Application of science and technology like mordant basin, lorot basin (dyeing batik cloth to be coloured) the results of colouring are more even and vivid.
- d). Entrepreneurship training.

The Qualitative Indicator for the First Year (2019) that has been achieved are:

- a) Developing potential and building regions through productive people-oriented economy.
- b) Carry out the transformation process of fostering the sectors that nurture a people-oriented economy. Improving the quality of human resources and its human beings who are critically dynamic and constructive.
- c) Developing a culture of learning, working and seeking entrepreneurial insight for the community.
- d) Develop an education and life skills program to develop the small business sector, micro-businesses and the informal sector.
- e) Organising Training with new technology for batik craftsmen.

Suggestions for the second year are training and mentoring of the use of natural dyes with the application of freeder machines. Limited tool validation tests will be carried out before being applied to partners. Evaluation of the application of natural dyes results applied in the first year so that there were improvements in the second year. The training model and module about the new design of the unique Bantul batik motif is validated and aims to get the motif protected legally by copyrights.

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