The implementation of green industry standard at batik industry to develop eco-friendly batik

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Abstract. Since UNESCO has established batik as Indonesia's cultural heritage, batik has become increasingly recognized internationally. However, many parties are concerned about environmental problems due to the waste from the batik production process. Therefore, the batik industry must change its thinking about the concept of environmentally friendly industries by applying green industry principles. This paper will explain the application of green industry principles that can be fulfilled at every stage of the batik production process. The technical and management requirements are covered by the Green Industry Standard (GIS) for the batik industry which is stipulated by the Minister of Industry Regulation Number 39 of 2019. GIS includes the efficiency of input materials, namely raw and auxiliary materials as well as the selection of alternative materials that are more environmentally friendly, energy-efficient and minimize water consumption and pay attention to the principles of water conservation, good waste treatment, and limitation of air emissions due to the use of technology and low-carbon energy options. It is expected that with the application of green industry principles, the batik industry will not only experience an increase in the economic sector but become an environmentally industry.

1. Introduction
Batik has received the International recognition by UNESCO as a non-material Indonesian cultural heritage (Masterpieces of Intangible Heritage of Humanity) on September 2009. This is confirmed by the government through Presidential Decree No. 33 Year 2009 by setting October 2 as national batik day. This recognition is followed by the emergence of many new batik industrial centers. The batik industry sector has a strategic role in development, especially to foster employment absorption and its contribution in fostering the growth of the national creative industry. Along with the improvement of the batik industry, the environmental problems are also increasing. One of UNESCO’s assessment criteria which is stated as good is that batik is considered to have an eco-friendly value or green value.

The batik industry is demanded to continue to improve in order to improve its performance standards and performance in all fields, including in terms of handling the potential for environmental pollution due to the emergence of waste from the batik industry.

Environmental problems in the batik industry usually start from the production process which resulted in a waste of raw materials, water, energy, and the disposal of waste that will burden the environment. One of the dominant environmental problems today is liquid waste from the process of making batik. It is estimated that the use of water in the process of making batik on average is approximately 25 - 50 m² per meter of batik. Data from the Ministry of Industry in 2017 shows that batik production in Indonesia averages 500 million meters per year, meaning 25 million m³ of water per
year. Water supply for the batik industry per year is equivalent to supplying fresh water needs for 2,500 households [1]. This can be seen from the excessive use of synthetic dyes and acid base, and use of recycling batik wax is not optimal. This is an example of an activity in the batik industry which not only results in waste but can also result in a high burden on its liquid waste so that it has the potential to pollute the environment.

Therefore, it absolutely needs a strategic effort that is a set of policies and regulations about carrying out efforts to prevent pollution and damage to the environment through efforts to select environmentally friendly raw materials, increase efficient use of resources (raw materials, energy and water) at each stage of production, renewal the use or improvement of low carbon production technology, the selection of effective and efficient process types, the design of environmentally friendly products and the minimization of waste, bearing in mind that it is a challenge to implement a comprehensive form of environmental management efforts in the batik industry that is predominantly small and medium enterprise, not only oriented towards improving the economic sector but also more concerned with environmental sustainability.

To overcome the above problems, a strategic effort is needed in the form of a set of policies and regulations concerning efforts to prevent pollution and environmental damage. These efforts are carried out at every stage of production starting from the selection of environmentally friendly raw materials, increasing the efficiency of resource use (raw materials, energy, and water), renewing the use or increasing of low-carbon production technology, selecting effective and efficient types of processes, product design environmentally friendly until the end, namely waste handling. This is a challenge in itself for the batik industry which is dominated by small and medium enterprises, which are not only oriented towards improving the economic sector but also more concerned with environmental sustainability.

Green industry is one of the objectives of industrial operations as stipulated in article 3 of Law No. 3 Year 2014 concerning Industry [3]. Green industry is an industry that in its production process prioritizes efforts to efficiency and effectiveness in the use of resources in a sustainable manner so as to be able to harmonize industrial development with the preservation of environmental functions and can provide benefits to the community. To encourage the realization of the green industry, the Ministry of Industry facilitates green industry certification services to industries that have contributed to the country’s economy, benefits society and participating in preserving environmental functions through the efficient use of resources and the application of environmentally friendly production processes. The certification facilitation aims to motivate the industry to further increase efforts towards a green industry. Certainly, the industries that obtain green industry certification must meet the terms and conditions set out in Green Industry Standards (GIS). The Ministry of Industry is developing GIS for various industrial groups. GIS for the batik industry is stipulated by Regulation of the Minister of Industry Number 39 Year 2019 [4].

2. Methodology
The research method is a qualitative descriptive approach that includes technical requirements and management requirements. The technical management requirements include the selection of raw materials, auxiliary materials, energy, water, production processes, products, packaging, waste and greenhouse gas emissions. While in the aspects of policy and organizational management, strategic planning, implementation and monitoring, management review, corporate social responsibility, and employment. The research was carried out by conducting a literature study and study of Minister of Industry Regulation Number 39 of 2019 concerning GIS for the batik industry [4].

3. Results and Discussions
According to Indonesia Nasional Standard or SNI 0239 : 2014, the definition of batik is a handicraft as a result of using hot wax or batik wax as a color barrier with the main tool of batik wax sticks in the form of writing or stamp canting forming a specific motif that has meaning. The batik industry is an industry with the Indonesian Business Field Standard Classification No. 13134 which includes batik
wax, whether done by written, stamp, or a combination of stamp and written. The production process in the batik industry consists of several steps starting from designing motifs, making patterns, batik process, coloring (dyeing), washing and rinsing, drying to producing finished products of batik.

The application of GIS in the batik industry is a challenge as the majority of batik industries are small and medium enterprises. The environmental problems that often arise in the batik industry are mainly due to the production process often resulting in waste of material and energy as well as due to the disposal of waste which will burden the environment and the higher cost of waste treatment. The batik industry annually produces the highest levels of CO₂ emissions when compared to other small and medium industrial sectors that still depend on the industry for fossil fuels such as kerosene. A large number of batik industry also still uses batik wax, chemicals in the form of dyes and excessive acid and base solutions which all have a negative impact on the environment and society.

Excessive use of water by the batik industry also results in scarcity of fresh water, while the limitation of fresh water is a major problem for many other regions. On one hand, the batik industry requires large amounts of water as raw material, but disposes of it into liquid waste in the final stages of the process. Overall, the main source of batik industry liquid waste comes from processes related to the dyeing process. In addition to the high content of dyes, the batik industry liquid waste also contains synthetic materials which have the potential to contain heavy metals that are difficult to dissolve or difficult to decompose so they can be categorized as hazardous wastes that cause environmental pollution. Therefore GIS needs to be implemented in the batik industry. The advantage of the application is not merely to increase efficiency, save production costs, and fulfill the market for environmentally friendly products, but more than that, namely the fulfillment of laws and regulations, conservation of raw materials and energy, and efforts to preserve the environment.

Green industry standard technical requirements for the batik industry:

3.1. Raw Materials
3.1.1 Sources of raw materials. Raw materials for the batik industry consist of fabrics originating from natural and synthetic processes in the form of cotton, silk, woven, etc. Fabric as the raw material can be obtained through the purchase of origin of textile and non-mechine weaving equipment raw materials, both from internal sources (local / domestic) and external (import through agents).

3.1.2. The ratio of products to the use of raw materials. One indicator of the efficiency of resource use is seen from the amount of optimization of raw material consumption. This value is determined by the ratio of the finished product to the use of raw materials. The limit value of the ratio of products to raw materials desired in GIS for the batik industry is 98% (ninety eight percent), the ratio value of products to raw material usage is the ratio between batik cloth products produced in m² using raw materials such as cloth, silk and others. others in m².

In the batik industry, often in one production process, it must have a reject product, not small in quantity, due to an error in the production process. With a product to raw material ratio of 98%, it has a different meaning, namely the maximum number of rejected products that are allowed at 2%. Therefore, batik industry players need to record and analyze the causes of product failure (reject product) in order to take corrective action. These corrective actions are useful to minimize the number of reject products.

3.2. Auxiliary materials
3.2.1. Types of auxiliary materials. The auxiliary materials in the batik industry are batik wax, natural dyes, synthetic dyes, fixators, and other auxiliary materials such as fixators, catalysts, soda ash, water glass, etc. One way to reduce the negative impact on the environment and human health is to limit the content of harmful dyes used in these auxiliaries.

3.2.2. Auxiliary material specifications
3.2.2.1 Batik wax. In GIS, the criteria for recycle of batik wax of the former batik industry are required to process the used night and reuse for the production process up to 95% (nine five percent) of the total batik wax used by the production process. The calculation for batik wax recycle used equation 1.

\[
\text{Recycle wax} = \left( \frac{\text{number of wax recoverable per year per wax usage per year}}{} \right) \times 100\% \quad (1)
\]

This showed that the rest of batik wax that was allowed to be carried in liquid waste in WWTP is only 5% (five percent). Therefore batik industrialists need to use batik wax as efficiently as possible and carry out the stages of handling batik wax in each process starting from the stages of batik, pelorodan (wax removal) until the processing of liquid waste on every batik fabric products both written batik, stamp or combination in order to meet the above numbers. Some efforts conducted to save the batik wax can be done in the following ways including recording the identification of the use of the batik wax for batik process and perform a recovery system (recovery) of batik wax in batik wax removal process using the wax trap method, the kowen system. Based on the data from the Clean Batik Initiative (CBI) [2], it was stated that kowen system could capture evening products as much as 20% (twenty percent) of the batik wax used in the production process. Restrictions on the use of wax on each product and the batik process on GIS for the batik industry are presented in the data in table 1.

**Table 1.** The value of wax use limitations on each product and the type of dyeing process[5,6].

| No | Wax Criteria | Limitation on the number of wax (g/m²) cloth both sides |
|----|--------------|------------------------------------------------------|
| 1  | Written batik single dyeing process | 276 |
| 2  | Written batik with double dyeing process | 316 |
| 3  | Written batik with triple dyeing process | 336 |
| 4  | Written batik with double wax removal with tembokan motif | 476 |
| 5  | Written batik with triple wax removal without tembokan motif | 356 |
| 6  | Stamp batik with single dyeing process | 320 |
| 7  | Stamp and combination batik with double dyeing process | 360 |
| 8  | Stamp and combination batik with triple dyeing process | 380 |
| 9  | Stamp and combination batik with double wax removal with tembokan motif | 520 |
| 10 | Stamp and combination batik with twice wax removal without tembokan motif | 400 |

3.2.2.2 Dyes In the batik dyeing process there are 2 (two) processes, namely coloring using synthetic and natural dyes. Synthetic dyes is a dye derived from the reaction of chemicals, while natural dyes is derived from natural ingredients which are generally derived from plants (roots, stems, leaves, skin, flowers, etc.). Currently batik dyeing using natural dyes began to be developed as a substitute for synthetics dyes, considering that Indonesia is a country that has the largest biodiversity in the world, then changes in the batik sector will have a very wide impact on the Indonesian economy. Economic improvement is caused by an increase in economic value natural resources from the use of local plants become natural dyes resources. This is one of the real efforts to develop environmentally friendly batik for the sustainable batik industry.

In the GIS for the batik industry, the use of a quantity of dyes also has a maximum limit value for both natural dyes and synthetic dyes. That is for the efficient use of dyes in the production process without reducing the color quality of batik fabric products and minimizing the quantity and quality of
batik industry liquid waste. Table 2 presents the maximum value limitation for the use of natural dyes and synthetic dyes as well as supporting materials which are the criteria in GIS for the batik industry.

**Table 2. Maximum quantitative limitation for utilization of natural and synthetic dyes and auxiliary for batik industry [5,6].**

| No | Type of Dyes | Dyes and Auxiliary materials | Maximum Quantitative Limitation |
|----|--------------|------------------------------|---------------------------------|
| 1  | Natural Dyes | All color item               | 200 g/m² both sides cloth       |
| 2  | Synthetic Dyes | Naftol Dyes | 3.6 g/m² both sides cloth       |
|    |               | Diazonium Salt              | 10.8 g/m² both sides cloth      |
| 3  | Synthetic Dyes | Coustic                  | 1.8 g/m² both sides cloth       |
| 4  | Synthetic Dyes | Indigosol Dyes | 2.4 g/m² both sides cloth       |
|    |               | Nitrit                     | 4.8 g/m² both sides cloth (double dyeing) |
| 5  | Synthetic Dyes | Indigosol Dyes | 1.2 g/m² both sides cloth       |
|    |               | Nitrit                     | 2.4 g/m² both sides cloth (double dyeing) |
| 6  | Synthetic Dyes | Indigosol Dyes | 16 g/m² both sides cloth       |
|    |               | Coustic                    | 2 g/m²                          |
|    |               | Ash Soda                   | 4 g/m²                          |
|    |               | Water Glass                | 0.4 kg/m²                       |
|    |               | Water                      | 1.6 kg/m²                       |
| 7  | Synthetic Dyes | Indigosol Dyes | 8 g/m²                           |
|    |               | Coustic                    | 1 g/m²                          |
|    |               | Ash Soda                   | 2 g/m²                          |
|    |               | Water Glass                | 0.2 kg/m²                       |
|    |               | Water                      | 0.8 kg/m²                       |

3.3. Energy consumption

The energy in the batik industry is generally used for the process of producing batik using both canting, tasting, and wax removal. But most of the energy is used in the wax removal process. In the batik industry, the use of energy does not only use electricity but it is also possible to use other types of energy such as gas, kerosene, and even firewood. The amount of energy consumption reduction in the batik industry is calculated from the amount of savings obtained by implementing an energy saving program. To quantify the large decrease in energy consumption it is assumed that there will be a reduction in energy and emissions based on the type of energy implemented at a certain period. Table 3 presents the data on the types and quantities of maximum energy used at each stage of the industrial production process according to the criteria in the GIS for the batik industry.

3.4. Water consumption

3.4.1. Use of process water. The use of water in the batik industry plays a very important role considering that in every stage of the batik production process uses water. Efforts to save water by using water as efficiently as possible are beneficial in maintaining the sustainability of resources and conserving water. In the green industry standard, it is necessary to record industrial water use (source and amount of water
demand) for the production and utility processes, as well as real production data for the last 1 (one) year. Table 4 presents the data on the use of process water for batik cloth with the coloring process natural and synthetic dyes that meet the GIS criteria.

**Table 3.** Data on the type and quantity of maximum energy used at each stage of the industrial production process [5,6].

| No | Type       | Energy Consumption | Maximum Quantity /m² cloth | Note                                      |
|----|------------|--------------------|----------------------------|-------------------------------------------|
| 1  | LPG        | 3.7 MJ             |                            | Batik process, stamp process and wax removal |
|    | (liquid petroleum gasses) or kerosene |                   |                            |                                           |
| 2  | Biomass    | 2.3 MJ             |                            | Wax removal                               |
| 3  | Electricity| 0.2 Kwh            |                            | Batik process, lighting, water pump, etc  |

**Table 4.** The batik fabric water use data with natural and synthetic dyeing process [5,6].

| No | Water consumption | Maximum limitation |
|----|-------------------|--------------------|
| 1  | Natural dyes      | 10 L/m² cloth      |
| 2  | Synthetic Dyes    | 50 L/m² cloth      |

3.4.2. **Process water recycling ratio.** The efficient use of water can be interpreted by using less water to produce the same amount of product. In addition, the efficiency of water use is also indicated by the criteria for the ratio of water reuse. Calculation of the minimum process water recycling ratio can be calculated using the equation

\[ D_A = \left( \frac{R_A}{T_A} \right) \times 100\% \]  

(2)

Where, \( D_A \) is water recycling (%), \( R_A \) is the amount of water returned to the production process in the last 1 (one) year (m³) period, and \( T_A \) is the amount of water used for the production process in the last 1 (one) year (m³) period.

Table 5 presents data on the water reuse ratio for the batik industry with the natural and synthetic dyes processes that meet the GIS criteria. From table 5 it showed that the batik industrialist must make efforts to use water recycling not only for water efficiency and saving but for water conservation efforts. One of the efforts to use water reuse is to separate concentrated liquid waste from dilute liquid waste and to dispose of the flushing wastewater. The second and third rinsing wastewater or so on does not need to be directly discharged to the WWTP but can be reused for other processes, such as washing equipment.

**Table 5.** The minimum limit value is the use of the water recycling ratio for the batik industry with the natural and synthetic dyeing process [5,6].

| No | Reuse water ratio | Minimum limitation |
|----|-------------------|--------------------|
| 1  | Natural Dyes      | 75%                |
| 2  | Synthetic Dyes    | 30%                |
3.5. Products
To maintain the quality of the products produced by the batik industry, batik products must meet certain quality standards. This is to protect the comfort and health of consumers and reduce the negative impact on the environment. Table 6 presents the quality standards of batik products for the batik industry with types of batik products that meet GIS criteria.

| No | Batik Product       | Product Quality Standard                                                                 |
|----|---------------------|------------------------------------------------------------------------------------------|
| 1  | Written Batik       | INS 8302:2016: Written Batik – Cloth-Identification, Quality requirements and test methods |
| 2  | Stamp Batik         | INS 8303:2016 : Stamp Batik – Cloth- Identification, Quality requirements and test methods |
| 3  | Combination Batik   | INS 8304:2016 : Combination Batik – Cloth- Identification, Quality requirements and test methods |

3.6. Packaging
The reduction of negative impacts on the environment and health is done by limiting the use of hazardous substances in packaging materials. Packaging can be made of plastic or paper according to the size, quality, and amount of batik cloth. This package is intended to improve the appearance of batik cloth that is packaged and protect the goods from the surrounding influences. In the GIS for the batik industry, plastic is only used as a secondary packaging, with the minimum amount possible, as a protector. Paper is used as primary packaging.

3.7. Waste
3.7.1. Means of liquid waste management. Most of the batik industry in Indonesia is a small-scale industry, perhaps even a home industry that involves the local community as a buffer for the creative economy. Efforts to manage waste in a significant quantity are unlikely to be completed by small-scale batik industry. For example, in the manufacture of Wastewater Treatment Plant (WWTP) and its operation, it is impossible for small-scale batik industrialist to independently do it. Therefore, the government needs to arrange for the facilitation of assistance for the manufacture and operation of small scale WWTP for the batik industry. Several approaches to using the communal WWTP for the batik industry are located in an industrial center area. It is necessary to procure portable liquid waste processing equipment that can alternately process small-scale batik industries. Likewise, liquid waste processing technology is needed, which is an appropriate technology for the medium-scale batik industry, which has a higher production capacity, which must manage its batik waste independently.

3.7.2. Fulfillment of liquid waste parameters to environmental quality standards in accordance with statutory provisions. Based on the statutory provisions, each region that has a batik industrial center has the authority to compile regional regulations that apply to its respective regions. So far, the regulation regarding batik waste follows the provisions or regulations related to the textile industry regulations. Therefore, the green industry standard for the batik industry is allowed to dispose of its waste on condition that it meets the environmental quality standards set by the regulations in each region. Laboratory test results on samples of batik industrial waste must go through a nationally accredited laboratory.

The Ministry of Environment Decree No. 5 of 2014 concerns that the quality standards for wastewater does not specifically regulate the quality standards for the batik industry, but regulations regarding the limits of wastewater that can be discharged into the environment can refer to the quality standards for the textile industry[3]. Therefore, almost all regulations related to regional batik wastewater also follow the Ministry of Environment Decree No. 5 of 2014 concerning the quality standards for wastewater determined by each region in accordance with their authority[3].
3.7.3. Means of exhaust and air emissions management. The batik industry emits flue gas emissions but the quantity is not as large as other large manufacturing industries but the batik industry is still obliged to comply with the technical requirements, namely supporting requirements in relation to compliance with ambient emission quality standards, and noise for example adequate conditions of room air ventilation and technical requirements the other. Examination of the existence and operational conditions of the means of managing exhaust emissions and air need to be considered properly.

3.7.4. Facilities for hazardous waste management. In the process of making batik, it always involves acids and bases as raw materials, namely in the coloring process and also as a supporting material, namely the initial mordanting process and the process of strengthening the color (fixation). According to Article 5 paragraph 3 and paragraph 4, Government Regulation Number 101 of 2014 concerning management of hazardous waste, expired acid-base conditions used in the process of making batik are hazardous waste with category 1, namely waste that has explosive characteristics, flammable, reactive, infectious, and / or corrosive [3]. In the appendix section Government Regulation No. 101 of 2014 explains that batik waste is waste with waste code number 22, namely for the textile industry, including bleaching and dyeing of fibers and textile materials, making fireproof, coating, coating, or absorbing clothing, with batik business process with wax is done by writing, stamp or combination with waste in the form of sludge from WWTP which is included in category 2 [3].

The legal consequences of Article 11 and Article 12 of Government Regulation Number 101 of 2014 concerning hazardous waste management stipulate that batik waste that categorizes acids and bases in batik waste is category 1 and the mud (sludge) of WWTP batik category 2 is that batik industrialist must follow the provisions of the treatment, transportation, and storage of hazardous waste. This is certainly not a simple thing that can be adhered to by the batik industry. Batik industrialists need to make certain efforts to comply with the regulation, one of them is by having a hazardous waste Temporary Storage (TS) completed with a hazardous waste management permit.

3.7.5. Means of solid waste management. The implementation of waste management includes waste reduction and handling. The batik industry is required to make waste reduction and waste management. Waste management includes sorting, collecting, transporting, processing and final processing of waste.

3.8. O2 emission levels
Emissions for the batik industry are generally generated from sources derived from the use of energy in each batik-making process, either directly or indirectly. Energy usage calculations can be used to verify carbon emission calculations for the batik industry. The maximum carbon emission limit according to GIS for the batik industry is 1.58 kg CO$_2$ equivalent / m$^2$ of the finished products.

Green Industry Standard Management Requirements for the Batik Industry

3.9. Policy and organization
3.9.1. Green industry policy. The batik industry must have a written policy on the application of a green industry. The principle of application is accompanied by a policy document on the application of the principle of green industry, which at least contains the target of savings or efficiency in the use of raw materials, energy, water, CO$_2$ emission reduction and waste (hazardous waste and non hazardous waste) reduction in a period of 1 (one) year, which is set by the top leadership (owner of the batik industry).

3.9.2. Organization. The existence of implementing the implementation of the green industry has an organizational structure with clear duties and obligations and is determined by the owner of the batik industry. This can be demonstrated through increased training or human resources capacity enhancement of human resources capacity on green industry principles.
3.9.3. Socialization. Policies on the application of the green industry must be disseminated to all employees and all people involved in the batik industry.

3.10. Planning
The batik industry must establish policies for implementing green industry principles that can be measured through established technical and management requirements. The policy is written in the program to achieve the goals and objectives of the application of green industry principles. The program is also a joint policy that will be carried out from the top leadership to the smallest part of the batik industry.

3.11. Implementation and Monitoring
3.11.1. Implementation of the program. The program is carried out in the form of activities according to the schedule and reported regularly to the policies of the top leaders (owners) of the batik industry. Implementation of the program, at least includes efficiency in the use of raw materials, energy use, water use, GHG emission reduction, and waste reduction (hazardous and non-hazardous).

3.11.2. Program monitoring. The owner of the batik industry is obliged to monitor the implementation of the program to determine the success rate of implementing green industry principles in his company. The monitoring program is carried out regularly and is complemented by a report from the program at least once a year.

3.12. Implementation of management review
3.12.1. Implementation. The batik industry conducts management review. The report on the results of management conducts management reviews on a periodic basis in the last 1 (one) year period.

3.12.2. Company consistency. The batik industry consistently uses reports before and against the results reports after the follow-up act of monitoring, continued requirements or audit results, to take corrective actions.

3.13. Cooperate responsibility response
The batik industry must have a social concern for the sustainable CSR (Cooperate Responsibility Response) program. One example of a possible form of CSR is the partnership program. The concept of the partnership program can be done one of them by placing the private sector as a component of good governance, then its existence is expected to contribute to development activities. For example, the large-scale batik industry produces batik cloth and clothing products and those that produce a variety of fabric products, including batik, have relatively not yet carried out CSR programs optimally in accordance with the standard CSR program criteria and existing regulations. This CSR program does not only apply to the large scale batik industry but can also be carried out by other large-scale industries which are located close to the centers of the small-scale batik industry so that it is expected to be able to make a large contribution both in the form of funds and technology in environmental management, especially in management batik wastewater at small industrial centers.

3.14. Employment
In the batik industry there are often minor work accidents. Therefore, the provision of labor facilities under physical provisions, reporting of regulations and their implementation. Providing facilities at least includes: training of workers (Law No. 13 of 2003) health checks (Ministry of Manpower and Transmigration Decree No. 2 of 1980) monitoring the workplace environment (Ministry of Manpower and Transmigration Decree No. 5 Year 2018) provision of first aid kits (Ministry of Manpower and Transmigration Decree No. 15 Year 2008) the provision of personal protective equipment (Ministry of Manpower and Transmigration Decree No. 8 Year 2010)
4. Conclusion

The implementation of green industry principles following the Minister of Industry Decree Number 39 Year 2019 concerning Green Industry Standards (GIS) for the batik industry, it is hoped that the batik industry can make the batik industry, which in its production process puts forward efforts to utilize resources efficiently and effectively in a sustainable manner so that it can able to harmonize industrial development with the preservation of environmental functions and can provide benefits to the community and make batik as an eco-friendly product.

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