Assessment tool to understand the readiness of Batik SMEs for Green Industry

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Abstract. Batik industries in general are classified as Small Medium Enterprises (SMEs) with major problems related to environmental management and inefficiency of resource consumption. These problems cannot be solved by end of pipe approaches, instead, management since the upstream of the production process needs to be employed. The green industry is a concept that relevant to those problems since this prioritizes efficient resource use. The Indonesian government has developed the Green Industry Standard as a tool to assess the soundness of the industries and to promote the capability to compete in the global market. Globally, there are several concepts similar to the green industry, for example, eco-innovation and resource efficient and cleaner production (RECP) that have their own assessment tools to measure the readiness of the industries. This study aims to elaborate aspects in Green Industry Standard with other assessment tools to understand the readiness of Batik industries through Ministry of Industry Regulation Number 39 of 2019 regarding Green Industry Standard for Batik Industries. Finally, the new assessment tool was developed consisting of four major aspects, namely company characterization, description of the business model, analysis input and output, and readiness area. Each aspect included some criteria and required relevant data that need to be collected for assessment of the readiness of Batik SMEs in future research.

1 Introduction

Batik is known to the world as a symbol of Indonesian culture, especially since UNESCO recognized batik as a Masterpiece of Oral and Intangible Heritage of Humanity in 2009. There are several types and motifs of traditional batik which have philosophies according to their regional cultures [1]. Batik is also considered to have eco-friendly values, due to the efforts of traditional development from arts and crafts that lead to environmentally friendly and sustainable activities [2]. However, on the other hand, batik still faces considerable environmental problems, such as related to waste management.

Wastewater is one of the most common problems when discussing the production process of batik. Nearly 85% of clean water consumption becomes wastewater with a large volume, dark color, and strong odor [2]. In general, batik wastewater is discharged directly into absorption wells or other water bodies without proper treatment, so it potentially pollutes the water environment nearby [3]. This happened to the batik industry in Kulon Progo, which received complaints from residents due to changes in the quality of well water which also became muddy, smelly, and itchy. This condition has been felt by nearby residents since about 4-5 years ago [4].

The dependence of the batik industry on kerosene fuel and electricity consumption has made the batik industry contribute to greenhouse gas emissions. This industry is predicted of having the highest annual CO₂ emissions among other SMEs [1]. In addition to greenhouse gas emissions, the batik industry also produces air emissions that contain particulates or gases such as NO₂, CO₂, and SO₂ [5]. Batik industry still uses traditional and very simple technology, which could be one of the major problem sources because it generates waste from the inefficiency of the production process. This inefficiency causes a large volume of waste generated from raw materials, additives materials, and production processes [6].

According to the problems that arise, it is difficult to rely solely on the end of pipe environmental management. It must be done from the upstream of the production process by increasing the efficiency and effectiveness of resource consumption. This is in line with the principles of the green industry, that is defined in Act Number 3 of 2014 regarding Industrialization as any Industry with a production process which places a priority on efficiency and effectiveness in the sustainable use of resources, to enable harmonization between Industrial development and the preservation of environmental functions as well as to grant benefits to the community. To assess the implementation of the green industry, the Indonesian government creates a tool that can be used by industry as a reference for its production process, called the Green Industry Standard. This standard consists of the limitation of resource consumption and waste generation, as well as company management that must be carried out. For the batik industry, this standard is stipulated in Minister of
2 Material and methods

This study conducted a qualitative comparison using the head to head approach. There are three main sources, namely:

1. Green Industry Standard for Batik industries which developed by the Ministry of Industry (2019)
2. Eco-innovation screening tools which developed by Pigosso et al. (2018), and
3. RECP indicators for SMEs which developed by UNIDO and UNEP (2010)

The comparison was based on two major key points, the definition and the assessed aspects of each source. Furthermore, the aspects in the Green Industry Standard were elaborated with aspects in eco-innovation screening tools and RECP indicators.

2.1 Green Industry Standard

According to Act Number 3 of 2014 regarding Industrialization, the green industry defines as any Industry with a production process which places a priority on efficiency and effectiveness in the sustainable use of resources, to enable harmonization between Industrial development and the preservation of environmental functions as well as to grant benefits to the community. Completing that regulation, the Ministry of Industry established a tool to assess the production process of industries whether efficient and effective or not, called the Green Industry Standard. This standard consists of technical requirements as well as managerial requirements. The technical requirements determine resource use limitations, such as material, energy, and water. Moreover, it specifies waste management, product quality, and product packaging. Green Industry Standard for Batik Industries is regulated in the Minister of Industry Regulation Number 39 of 2019. The aspects in technical requirement consist of (1) Raw material; (2) Auxiliary material; (3) Energy; (4) Water; (5) Product; (6) Packaging; (7) Waste; (8) Greenhouse Gasses.

2.2 Eco-Innovation Screening Tools

According to the Eco-innovation action plan by Commission of the European Communities (2001), eco-innovation is defined as “any form of innovation resulting in or aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment, enhancing resilience to environmental pressures, or achieving a more efficient and responsible use of natural resources”. Furthermore, United Nations Environmental Programme (UNEP) defined eco-innovation as “the development and application of a business model, shaped by a new business strategy that incorporates sustainability throughout all business operations based on life cycle thinking and in cooperation with partners across the value chain”. This screening tool has been developed in the Danish project “Residue to Resource” which was conducted in collaboration between the Danish Symbiosis Centre, the Technical University of Denmark, and six municipalities. This tool also has been implemented to 108 SMEs from various sectors, including service industries, distributed in six municipalities. Through this study, the screening tool has been determined with four major aspects, namely (1) Company characterization; (2) Description of the business model; (3) Analysis of input and output flows, and (4) Readiness areas [8].

2.3 RECP Indicators

RECP for SMEs is introduced by United Nations Industrial Development Organization (UNIDO) and United Nations Environmental Programme (UNEP) through their publication “Enterprise-level Indicators for Resource Productivity and Pollution Intensity: A Primer for Small and Medium-Sized Enterprises” (2010). In this publication, RECP is defined as “a preventive, enterprise-level approach to improving resource use, reducing environmental pollution and contributing to sustainable industrial development based on the continuous application of an integrated preventive environmental strategy to processes, products, and services in order to increase overall efficiency and to reduce risks to humans and the environment” [9]. The indicators system that is developed by UNIDO and UNEP consists of six absolute indicators, three relates to resource use, and three relates to pollution, and one reference-indicator. Indicators relate to resource use are energy use, material use, and water use. On the other hand, indicators relate to pollution are air emissions, wastewater, and waste. The reference indicator or absolute production indicator covers the product output or value created by the enterprise.

3 Result and discussion

This section has presented the result and discussed the comparative analysis using a head to head approach from three kinds of literature. The result and discussion
are divided into two major key points, the definition and the assessed aspects.

3.1 Comparison of the definitions

From the brief explanation in the previous section, the definitions of the green industry, eco-innovation, and RECP are presented in Table 1.

| Green Industry¹ | Eco-innovation¹ | RECP³ |
|-----------------|-----------------|-------|
| Any industry with a process which places a priority on efficiency and effectiveness in the sustainable use of resources, to enable harmonization between industrial development and the preservation of environmental functions as well as to gain benefits to the community. | Any form of innovation resulting in or aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment, enhancing resilience to environmental pressures, or achieving more efficient and responsible use of natural resources (Eco-Innovation Action Plan, 2011). | A preventive, enterprise-level approach to improving resource use, reducing environmental pollution, and contributing to sustainable industrial development. |

Table 1. Definition Comparison

Table 2. Assessed Aspects Comparison

| Green Industry Standard¹ | Eco-innovation Screening Tool² | RECP Indicators³ |
|--------------------------|-------------------------------|-----------------|
| 1. Raw Material | Block 1: Company | 1. Energy use Characterization |
| 2. Complementary Material | Block 2: Description of the Business Model | 2. Materials use Output Flows |
| 3. Energy | Block 3: Analysis of Input & Output Flows | 3. Water use Energy Streams |
| 4. Water | Sub Block 3.1: Preliminary Assessment | 4. Air emissions |
| 5. Product | Sub Block 3.2: Mapping | 5. Wastewater |
| 6. Packaging | Sub Block 3.3: Mapping | 6. Waste |
| 7. Waste | Water Streams | 7. Material Streams |
| 8. Greenhouse gasses | Sub Block 4.4: Readiness Area |

Table 3. Aspects in eco-innovation screening tool linked with the barriers

| Aspects in screening tool | Barriers |
|--------------------------|----------|
| Block 1: Company Characterization | owner/manager influence and structure; strategy |
| Block 2: Description of the Business Model | owner/manager influence and structure; strategy; knowledge of environmental issues; market requirements; communication and information sharing |
| Block 3: Analysis of Input & Output Flows | environmental culture; market requirements; geographical separation of production and consumption |
| Block 4: Readiness Area | owner/manager influence and structure; strategy; knowledge of environmental issues; market requirements; communication and information sharing |

4 Conclusion

In this paper, an assessment tool to understand the readiness of Batik SMEs was developed and presented.
Green industry standard as a basic tool for the assessment was synthesized with other tools, such as eco-innovation screening tool and RECP indicators. Through the result and discussion section, it is shown that the eco-innovation screening tool has more assessed aspects than other tools. In addition, this tool not only focused on the production process but also the business model. Besides, this tool could address the main barriers that are faced by SMEs. Therefore the new assessment tool was developed using four main blocks from the eco-innovation screening tool, with the specific criteria for each block was the result of synthesizing those three tools.

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