

# **Eco-Design in the Initiation of the model development Eco-Batik Area Cluster Kampoeng Batik Laweyan Surakarta**

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## **Abstract**

The center of the batik cluster in Kampoeng Batik Laweyan Surakarta is the center of industrial activities of the batik UMKM cluster and is one of the local economic potentials in the city of Surakarta, Central Java. The activity of Kampoeng Batik Laweyan Surakarta has a role of economic growth, but on the other hand it also encourages environmental damage, the concept of eco-batik development model in the cluster area appears, so that environmental, economic and social benefits can be achieved to the fullest. In the cluster eco-batik development model, there are several things that must be considered, namely integration with natural systems, energy systems, material flow and waste management throughout the region, water use systems, effective management, construction and rehabilitation of buildings, and integration with local communities. The development model of the cluster eco-batik area is a study model that integrates between industrial and natural systems by creating a new concept that implements sustainable development by considering industrial systems, economic activities and fundamental relationships with natural systems, then becomes part of the Eco-Design principle.

**Keywords:** Eco design, eco-batik area, sustainable design, eco-friendly engineering

## **Diseño ecológico en la iniciación del desarrollo de modelos del clúster del área Eco-Batik Kampoeng Batik Laweyan Surakarta**

### **Resumen**

El centro del grupo de batik en Kampoeng Batik Laweyan Surakarta es el

centro de actividades industriales del grupo de batik UMKM y es uno de los potenciales económicos locales en la ciudad de Surakarta, Java Central. La actividad de Kampoeng Batik Laweyan Surakarta tiene un papel de crecimiento económico, pero, por otro lado, también alienta el daño ambiental, aparece el concepto de modelo de desarrollo eco-batik en el área del clúster, de modo que se puedan lograr beneficios ambientales, económicos y sociales. Al máximo. En el modelo de desarrollo de cluster eco-batik, hay varias cosas que deben considerarse, a saber, la integración con los sistemas naturales, los sistemas de energía, el flujo de materiales y la gestión de desechos en la región, los sistemas de uso del agua, la gestión eficaz, la construcción y rehabilitación de edificios, y Integración con las comunidades locales. El modelo de desarrollo del área de agrupación eco-batik es un modelo de estudio que se integra entre los sistemas industriales y naturales al crear un nuevo concepto que implementa el desarrollo sostenible al considerar los sistemas industriales, las actividades económicas y las relaciones fundamentales con los sistemas naturales, y luego se convierte en parte del Eco. -Principio de diseño.

**Palabras clave:** diseño ecológico, área eco-batik, diseño sostenible, ingeniería ecológica

## **Introduction**

Industrial ecology using the Eco-Design principle is an embryo of an eco-batik cluster area development model (EBAC) Kampoeng Batik Laweyan that works hand in hand to work together to care for the surrounding industrial environment, through sharing resources, information, materials, energy and water with the goal of obtaining environmental and economic benefits in the long term, and to generate energy positive impacts on the surrounding community. The model for developing eco-batik area clusters (EBAC) is to imitate natural ecosystems that work, there is a flow of energy, material and waste from one organism to another. The EBAC development model creates a reduction effort to zero, unused waste, as an objective of Industrial Ecology (Fleig, 2000).

In the EBAC has Eco-Design for Ecologinomics is an Ecodevelopmentalism movement that has an understanding as a building movement by raising environmental issues that use economic principles (Prabang, 2015).

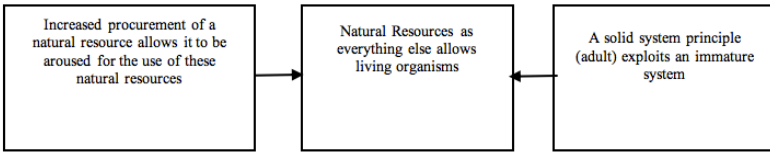


Figure 1. The principle is based on environmental science (Source: Prabang, 2015)

The implementation of the EBAC development model is a global competition strategy innovation that demands the creation of an area's competitiveness in attracting investment and maintaining it continuously, and creating industrial activities contributing to climate change, scarcity of resources and reduced biodiversity globally, thus requiring industrial system transformation be environmentally friendly (Redzuan, 2010). Many SME industry players who consider waste disposal are not important to pay attention to, even though if the production is higher then the results of waste disposal are also increasing. Using the concept of EBAC development model, namely the concept of grouping industries in one area, it will be easier to monitor the energy and raw materials used, as well as the waste produced to how to manage it (Hadiwijoyo, 2013). In the EBAC development model, there are several things that must be considered, as a system of energy and resource flows, namely (Jelinskiet, 2002)

1. linear system
2. a closed circle system with cooperation between components in the ecosystem
3. a perfect closed circle system that represents ecological equilibrium

Of the three are integrated in natural systems, energy systems, material flow and waste management throughout the region, water use systems, effective management, construction and rehabilitation of buildings, and integration with surrounding communities (Lowe, 2001). Research on industrial estates has been carried out by several researchers. Researcher Lambert, A.J.D and F.A. Boons in 2002, in his research on the Eco-Industrial area in the design of eco-Industrial area development, found that natural systems, energy, material flow, area management and service support are through the approach of profits from industrial estate ecosystems or collaboration between industry actors in the region eco-Industrial. In addi-

tion, Stephanie Marion in a 2005 study found that the eco-Industrial area could be developed using the basis of the lifespan cycle through variable stages of sorting, cleaning up to bleaching and re-forming from recycled packaging waste sources into quality, safe, healthy products. and environmentally friendly.

Another researcher from the University of Indonesia, Luciwati Sunarjo in 2008, stated that the Jababeka-bekasi industrial area, developed an eco-industrial area in collaboration with the Ministry of Environment using the principle of integration into natural systems, water principles, infrastructure rehabilitation principles and effectiveness and efficiency in technology development environmentally friendly, then classifies the problem of sustainability resources. In 2009 there were collaborative studies of four countries, Indonesia, China, Thailand, Sri Lanka led by Professor Dr. Tjandra Setiadi said that the three countries of Indonesia, China and Sri Lanka in the development of environmentally-oriented industrial areas are using the parent industry network of SME industry to be able to make industries that are competitive and sustainable, grow and do eco-restructuring for developing Asia.

The results of Broerie Pojoh's research in 2010, about building a Bitung agro-eco-industrial development model in North Sulawesi, showed that eco-industrial areas could be developed, using the process of generating energy with renewable sources and increasing inter-industrial cooperation voluntarily. Sunarjo's 2007 study, that the Jababeka Bekasi Industrial Area shows the significance of being an eco-industrial area needs to touch the development of systems integrated into natural systems, water principles, and structural rehabilitation principles, which are related to sustainability resources issues and cost savings.

### **Problem Formulation**

EBAC Kampoeng Batik Laweyan development model, there is a classification of how eco-batik Industrial Approach is integrated in eco-industrial and ecology concepts, so that the purpose of this study is how the EBAC Kampoeng Batik Laweyan development model can be developed to support sustainable development?

## Research Methodology

This study uses a qualitative approach that refers to existing theories, as well as literature studies on the results of research conducted on the development of industrial estates in the perspective of the principle of eco-design eco-industrial area

## Development of Kampoeng Laweyan

The process is quite long Kampoeng Batik Laweyan developed into a cluster of Batik SME industries. Kampoeng Laweyan is included in the heritage area of Surakarta City because it has historical value that has contributed to the development of Surakarta City to date. The existence of Kampoeng Laweyan since 1,500 during the reign of Pajang Kingdom and is the center of royal trade with batik as its main product Kampoeng Batik Laweyan experienced a heyday in the 20th century. At that time the batik industry developed very rapidly and gave birth to batik merchants whose wealth exceeded the royal nobility.

Kampoeng Batik Laweyan experienced a decline in the era of the 1970s after batik printing appeared on the market. The community turned to printing batik because the price was cheaper, so many batik entrepreneurs chose to stop producing batik because it could not compete with batik printing, until in the 1990s, only a few businessmen still survived. On September 25, 2004 through the Decree of the Mayor of Surakarta, a committee was formed for the formation of a batik cluster in the batik industrial area in Laweyan Village. This was motivated by awareness from the community, batik entrepreneurs in Kampoeng Laweyan, the government and several other parties to revive the glory of Laweyan's village

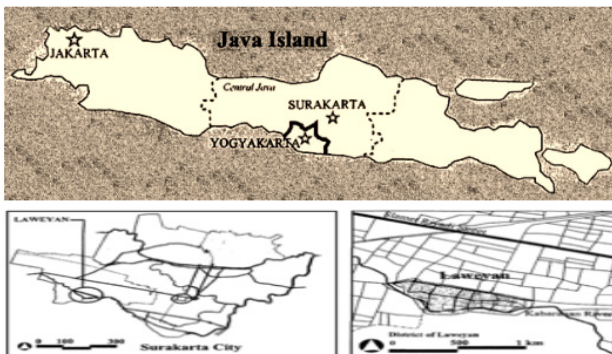


Figure 2.

Map of cluster Batik laweyan SME industries.

(Source: Surakarta City Statistics Bureau, Surakarta City in Figures, 2016)

## Results and Discussion

The Law of the Republic of Indonesia Number 3 of 2014 concerning Industry, includes an ecology-based industry which is an industry which in its production process prioritizes efforts to efficiently and effectively use resources in a sustainable manner so that it is expected to be able to harmonize industrial development with the preservation of environmental functions and can provide benefits for the community. The United Nations Industrial Development Organization (UNIDO) in 2011 described the green industry as an ecology-based industry as a form of two-way efforts to separate resource use and pollution from industrial development while promoting the growth of a productive entrepreneurship sector in developing and transitional countries.

### 1. Initiation of Eco-Design EBAC Regional Development in Eco-Industrial

Development of an environmentally-oriented industrial area is a business community that collaborates with each other and with local communities to streamline the distribution of resources (information, raw materials, water, energy, infrastructure, and natural habitats), which leads to economic growth, environmental quality improvement, and equitable improvement of human resources for businesses and local communities (Deppe, 2003). Industrial development programs that are environmentally sound can be carried out in 3 forms, namely (Purwanto, 2005):

- 1) Eco-industrial park, which is an industrial area developed and managed to achieve as many environmental, economic and social benefits as possible and also business benefits
- 2) virtual eco-industrial park, namely industries in an area that do not have to be in an area, but are connected through waste exchange and cooperation at different levels.
- 3) By-product exchange, which is a group of companies that exchange and use side products (energy, water, and materials) rather than throw them away as waste.
- 4) Eco-industrial network, namely groups of companies in an area that work together to improve environmental, social and economic performance.

2. Basic industrial ecology of the Eco-Batik area of the Cluster area  
The basic concept of developing EBAC kampong batik Laweyan area is covering industrial ecology, clean production, urban planning, archi-

ecture, and sustainable construction. The basis of industrial ecology used to develop an environmentally-oriented industrial area (Purwanto, 2005).

- 1) Integrating a company into an industrial ecosystem using an approach:
  - a. Closed circumference through reuse or recycling
  - b. Maximizing the efficiency of material and energy use
  - c. Minimize waste generation
  - d. Utilize all waste as potential products and seek waste markets
- 2) Balancing inputs and outputs into the capacity of natural ecosystems.
- 3) Reengineering the use of energy and materials for industrial use.
- 4) Adjustment of industrial policy to a long-term perspective of the evolution of industrial systems.
- 5) Designing an industrial system that cares for the social and economic needs of the local community.

The basic concept of EBAC development in Kampong Laweyan batik is part of an eco-industrial system in the form of an industrial system that conserves natural and economic resources, reduces production costs, raw material costs, energy costs, guarantee costs, processing costs, and obligations, improves operating efficiency, quality operation, health of workers, and public image, and provide opportunities to generate income from the use and sale of waste (Cote and Hall, 1995).

In designing an EBAC kampong batik Laweyan there are several strategies that can be done as follows (Lowe, 2001).

- 1) Integration with natural systems
  - use the study of environmental carrying capacity and design according to the environmental carrying capacity.
  - Integration of local landscapes, hydrology and ecosystems.
  - Minimize global environmental impacts, such as greenhouse gas emissions.
- 2) Energy system
  - Maximizing energy efficiency
  - co-generation and energy cascading
  - energy efficiency of energy flow between factories
  - Use renewable resources
- 3) Material flow and waste management for the entire region
  - clean production
  - pollution prevention
  - reuse and recycle materials between industries

- integrated waste processing.
- resource exchange and recycle network.
- 4) Water
  - Designing water flows to conserve resources and reduce pollution through similar strategies for energy and materials.
- 5) Effective environmental management
  - increase the performance of individual companies and also industrial areas in the environmental field.
  - an open information system to support communication between companies in industrial estates,
  - inform local environmental conditions, and provide EBAC feedback.

## Conclusion

Based on the results and discussion above, Eco-design on the initiation of the EBAC Development Model Kampoeng Batik Laweyan Surakarta needs to develop principles that prioritize the achievement of as much environmental, economic and social benefits as possible, then support the implementation of sustainable development.

The EBAC development of Kampoeng Batik Laweyan Surakarta is necessary and potential, in order to increase certainty that the cycle of manufacturing management of SMEs in the Kampoeng batik cluster of Laweyan batik requires eco-design modeling of public infrastructure projects carried out to be environmentally friendly.

The modeling process to the application of eco-design on the initiation of EBAC development model is still dependent on several factors including the standard planning process at the Model initiation stage, the existence of criteria and model selection procedures that are accountable and the performance of the model can be measured, so that EBAC development gives advantages:

- a. Reducing environmental impact or ecological footprint through substitution of toxic substances, carbon dioxide absorption, exchange of raw materials, and integrated waste treatment.
- b. Conservation of raw materials through the design and construction of facilities, reuse, recovery and recycling.
- c. Linking raw material suppliers and customers in the wider community
- d. Improve environmental performance continuously



- e. Use economic instruments to prevent waste and waste.
- f. Using an information management system that facilitates the flow of energy and raw materials.
- g. marketing orientation to attract the attention of companies to be able to complement and complement the business.

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