River Pollution in Dibanyurip Caused by Batik Waste

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***ABSTRAK**:*

Semenjak diakuinya batik oleh UNESCO sebagai warisan bangsa, industri batik di Kota Pekalongan semakin meningkat, namun hal tersebut menimbulkan peramasalahan lingkungan. Pemerintah Kota Pekalongan kemudian mengeluarkan Perda No 9 tahun 2015 tentang pengelolaan Air Limbah guna meminimalisisr dampak limbah di Kota Pekalongan. Pembangunan berkelanjutan dapat diartikan sebagai konsep pembangunan yang memenuhi kebutuhan masa kini tanpa mengorbankan hak pemenuhan kebutuhan-kebutuhan pada generasi yang akan datang. Terdapat tiga aspek pemahaman dalam pembangunan berkelanjutan, yaitu aspek sosial, ekonomi dan lingkungan. Secara umum implementasi Perda Kota Pekalongan No 9 Tahun 2015 Tentang Pengelolaan Air Limbah merupakan suatu penyeimbang dari pembangunan berkelanjutan dari industri batik yang telah terlaksana. Terdapat tiga prinsip pembangunan berkelanjutan yang sesuai dengan Perda No 9 Tahun 2015, yaitu prinsip keadilan antar generasi (Intergenerational equity), Prinsip Keterpaduan antara Perlindungan Lingkungan Hidup dan Pembangunan, dan prinsip tindakan pencegahan. Pada implementasinya, semua sudah terlaksana, namun penggunaan IPAL yang belum maksimal sehingga menimbulkan kadar baku mutu air diatas yang seharusnya dan menjadi indikasi pencemaran sungai.

***Kata kunci**: batik, air limbah, peraturan daerah, pembangunan berkelanjutan*

***ABSTRACT**:*

Since batik is recognized by UNESCO as a nation heritage, batik industry in Pekalongan is increasing, but it caused environmental issues. Then, the government of Pekalongan issued local regulation No. 9 of 2015 about waste water management to minimalized the waste impact in Pekalongan. The sustainable development can be meant as a development concept which fulfills needs of the present without forfeiting the fulfillment rights of needs for future generation. There are three understanding apects in the sustainable development, such as social aspect, economy and environment. Generally, the implementation of local regulation No. 9 of 2015 about waste water management in Pekalongan is a balancer of the sustainable development from batik industry which has been done. There are three sustainable development principles which are suitable with local regualation No. 9 of 2015, such as principle of intergenerational equity, principle of integration between environmental protection and development, and principle of preventive measure. In its implementation, these principles have been already done, but the use of IPAL which has not been maximized caused less water quality standard and become an indication of river pollution.

***Keywords**: batik, waste water, local regulation, sustainable development*

1. INTRODUCTION

Pekalongan is one of the major centres of the batik industry. The majority of its citizens earn a living as batik entrepreneurs, ranging from home industries to large international companies. Banyurip is one of the villages in Pekalongan that adjoins the villages of Buaran, Kradenan and Kertijatan, which are also centres of this industry. The impact of this industry produces solid waste in the form of wax and liquid waste from bleaching and dyeing batik cloth, which can cause pollution because the waste is discharged directly into the surrounding rivers (Zammi et al., 2018).

Every year, the circulation of money in Pekalongan City is almost entirely generated by the batik business. Whether in remote areas, along the highway, or in the corners of Pekalongan City, the feel of batik is very pronounced. Business activities are mostly driven by the batik business, ranging from providers of batik raw materials such as canting, malam, stoves, to several boutiques that specifically display batik products (Romadhon, 2017).

In its production process, the batik industry uses a lot of chemicals and water. These chemicals usually contain suspended solids, organic and inorganic substances containing heavy metals. These substances are used in the colouring or dyeing process so that pollution occurs everywhere at a rapid rate.

Water resources are a very important component of the ecosystem for human life. The need for water is increasing, both for basic needs for drinking water, clean water for sanitation, and for economic development such as industry, recreation, agriculture and power generation.

Waters are the final place of all waste disposal, both household and industrial waste and some heavy metals in high concentrations. So waste becomes a logical consequence of every establishment of an industry although not all industries produce waste. When waste containing certain chemical compounds with various hazardous and toxic materials are released into the environment, it will cause pollution, both in rivers, soil and air. Pollution parameters can be physical and chemical parameters. Temperature parameters in water can be a determining or controlling factor in the life of aquatic flora and fauna, namely the type, amount and presence of aquatic flora and fauna often change with changes in water temperature, especially by an increase in temperature in the water (Chay, 2004). In addition to temperature, another important parameter is water pH, Mackereth et. al. in Effendi (2003) argue that pH affects the toxicity of a chemical compound. Ammonium compounds that can be ionised are found in waters that have a low pH. Other parameters DO water, oxygen concentration (DO) is too low will cause fish and other aquatic animals that require oxygen will die. Conversely, too high oxygen concentration also causes the process of rusting to accelerate because oxygen will bind hydrogen that coats the metal surface (Fardiaz, 1992).

The increase in temperature in the water causes a decrease in dissolved oxygen (DO) levels in the water. DO is too low, which can cause unpleasant odours due to the degradation or decomposition of organic or inorganic materials in the water (Unus, 1996).

The existence of batik production causes the river flow in the Banyurip area to be exposed to batik waste. fish as aquatic biota can be used as an indicator of the level of pollution that occurs in waters (Supriyanto, 2007). From observations so far, there are almost no fish species living in the waters of the Banyurip river. In addition, Lin (2011) in his research stated that of the four observation stations studied, at station III no macrozoobenthos were found, namely the value of the diversity index, uniformity index, and dominance index (0). This is because the location of station III is a meeting centre between batik industry waste waste that is flowed into the river.

Based on these problems, to create harmony between human relations and the environment in Pekalongan City, which is a city located in the downstream or lower part of the pollutant trap area, it must be accompanied by legislation or a legal basis.

There are many ways to reduce textile dye waste by using natural materials. Natural dyes applied to natural fibrous cotton fabrics are able to absorb colours well. In addition to reducing the amount of waste, this method can increase creativity in making textile variations, so that textile products have a higher selling value (Enrico, 2019) (Ragil et al., 2023).

The efforts that have been made by the Environmental Agency in handling batik waste in Pekalongan City consist of several steps. The preventive step is the first step to control social by delivering moral messages or socialisation carried out by community leaders aimed at batik industry players and conducting environmentally friendly batik education. The second step taken by the Pekalongan City Environmental Agency is repressive. Repressive measures overcome after the problem of batik waste pollution occurs. Steps taken by building a wastewater treatment plant (IPAL), both communal IPAL and household scale IPAL.

Batik is a commodity that is currently growing rapidly. Batik has now become a fashion trend in all circles, making batik craftsmen more eager to develop their products. Starting from creating new motifs to making colour combinations that were not common in batik cloth. Therefore, start a batik business wisely.

The main purpose of wastewater treatment is to reduce the content of pollutants in the water, especially compounds, organic, solids or suspended, pathogenic microbes and organic compounds that cannot be decomposed by microorganisms found in nature. However, there are still several batik industries in Pekalongan that have not maximised the wastewater treatment plant system. Based on the seriousness of the batik waste problem in Pekalongan City due to waste disposal without any treatment of soil and river water conditions and aquatic animal life.

This research aims to develop a batik waste treatment strategy in Pekalongan City. To review this research, interviews are needed on batik wastewater management in Pekalongan City. So that it can produce strategies to realise batik wastewater management.

2. METHOD

The method used in this research is qualitative method with literature study. Qualitative research is research to understand the phenomenon of what is experienced by the research subject holistically and in a descriptive way in the form of words and language in a special natural context, and by utilising various natural methods (Moloeng, 2007).The purpose of descriptive research is a study aimed at making a systematic, factual, and accurate description of the facts and characteristics of a particular population or area. This research is used to find out how the growth of the batik entrepreneur group in Pekalongan City is.

This research aims to obtain a clearer, more complete picture and information, as well as making it possible and easy for researchers to conduct observational research. Therefore, the author determines the research location is the place where the research will be conducted. In this case, the research location is Banyurip Village, South Pekalongan Subdistrict, Pekalongan City. This research was conducted in March 2024

3. RESULT AND DISCUSSION

Overview of batik and Pekalongan city Social.

Dimension

Batik is a textile that originated as a traditional handicraft and has been passed down through generations in Java and beyond since the early 19th century. Batik is a material decorated with patterns of dots and lines produced by the application of hot wax using canting tulis as a pen. The batik motifs then symbolise social status, local community, nature, history and cultural heritage (UNESCO, 2009). However, in its development, there was a development of the image of using batik, which previously gave a formal impression to a formal and informal impression (Permata, 2012). Now, batik has its own place for the people in Indonesia. Especially since the recognition of batik by UNESCO (Educational, Scientific, and Cultural Organisation) on 2 October 2009. This has made the batik industry increasingly appear in each region in Indonesia, one of which is in Pekalongan City which is an iconic Batik City in Indonesia, and there is also a trend of increasing demand for batik in Indonesia (Fitinline, 2013). Batik craft is one of the creative industries that has the potential to improve the community's economy. In Pekalongan City, there are various kinds of batik craftsmen, from small-scale (home industry), medium, to large-scale whose products can penetrate the international market.

The increasing value of batik shows the existence of a social dimension in the concept of sustainable development. The existence of social interactions in the form of increased batik 'branding' which makes the value of batik higher and batik production increases is one form of the social dimension that exists in sustainable development. This is in accordance with Otto (2004) who explains that sustainable development cannot be separated from three aspects, namely the environment, economy and social. The increasing value of batik along with the recognition of batik as a world heritage by UNESCO is one proof of the existence of sustainable development from the social aspect. Otto (2004) states that social sustainability is development with a human dimension in terms of interactions that are closely related to cultural aspects. Batik is an Indonesian cultural heritage that exists until now.

This shows that since the recognition of batik as a cultural heritage by UNESCO, the existence of batik has increased, marked by the increasing demand for batik production, and this is proof that batik can continue to exist into the future.

Economic Dimension

Pekalongan City is one of the cities in Central Java that has a large number of MSMEs and is dominated by the garment and batik industries, which account for 90.10% of the total number of industries in Pekalongan City. Based on data from the Central Java Province Department of Industry and Trade (2007), Pekalongan City has 714 small-scale batik industries, more than any other batik-producing city in Central Java. Overall, the batik industry sector contributes approximately 26.29% to Pekalongan City's Regional Original Revenue (PAD).

Based on a 2012 report from the Indonesian Ministry of Trade, the value of batik production in 2011 increased to Rp3.9 trillion compared to Rp2.9 trillion in 2010. The value of batik demand, especially exports, shows an increasing value. In the period 2008 to 2012, the average growth of batik exports was 33.83%. When viewed in the last 3 years, the export value calculated from the total of all batik cloth products and batik derivatives shows that in 2010 it was USD 22.3 million, USD 69 million in 2011, and increased to USD 278 million in 2012 (Ministry of Industry, 2012).

The large output of the industrial sector certainly has an impact on the increase in economic growth in Pekalongan City. According to data from BPS Central Java Province (2011), the economic growth rate of Pekalongan City from 2006-2010 increased. However, in 2008, the economic growth rate of Pekalongan City decreased by 0.03% from the previous year. This was due to the high competitiveness of the batik industry in Indonesia. Coupled with the entry of batik products from China. But then, the economic growth of Pekalongan City increased again in 2009 by 1.05% and in 2010 it increased again by 0.28%.

This continuous increase in economic value due to the batik industry shows that the batik industry is a form of sustainable development. Otto (2004) explains that sustainable development in the economic dimension is an effort to improve the welfare of the present generation without reducing the ability of nature, society, and the economy to improve the welfare of future generations, which then has an economic flow that runs continuously without reducing the level of welfare from generation to generation. The inheritance of batik culture and the high demand for batik make the economic value increase and ensure the welfare of future generations so that there will be economic value that runs continuously without reducing welfare from generation to generation. Meanwhile, Harris (2000) explains that economic sustainability is a development that is able to produce goods and services continuously and is able to maintain the sustainability of government and avoid sectoral imbalances that can damage agricultural and industrial production. Batik's continuous and sustainable production to balance the sector can also ensure its welfare.

Environmental Dimension

The blessings of Pekalongan's batik industry must be inversely proportional to its impacts. The rapid growth of the batik industry shows that more and more waste is released and causes complex problems for the surrounding environment. Especially if the waste generated from the batik industry is discharged directly into the river.

In response to this, the Pekalongan City government then issued Regional Regulation No. 9/2015 on Wastewater Management. This regulation was made in order to balance or solve the impact caused by the sustainable development of the batik industry. The regulation explains that every person in charge of a business and/or activity that generates and discharges wastewater is obliged to have an IPAL, in order to treat its wastewater in accordance with wastewater quality standards.

The decline in environmental conditions in the form of wastewater contamination is one of the threats to the implementation of sustainable development. The Pekalongan City Government then issued a solution in the form of Local Regulation No. 9/2015 on Wastewater Treatment, which serves as a counterweight so that sustainable development can continue to be implemented. Hardjosoemantri (2000) explains that law has an important role in the implementation of sustainable development. According to Koesnadi Hardjosoemantri, the first time in the evolution of the concept of sustainable development is the effort that has been made to outline a comprehensive legal framework to establish sustainable development. In arguing for the importance of legal mechanisms at national, regional and international levels to establish and implement sustainable development, Hardjosoemantri states that environmental law in its broadest sense is an essential tool in achieving sustainable development (Hardjosoemantri, 2000). Therefore, the existence of a law in the form of a local regulation can certainly harmonise the sustainable development of the existing batik industry.

The issuance of Pekalongan City Local Regulation No. 9/2015 also fulfils several important elements (principles) in sustainable development, such as the principle of intergenerational justice, the principle of integration between environmental protection and development, and the principle of preventive action.

The use of WWTPs, both communal and household scale, aims to make people aware of and willing to participate in wastewater management in order to create a clean and healthy environment. The Pekalongan government has built a batik wastewater treatment plant (IPAL) located in Jenggot urban village in 2009, and later built a batik IPAL located in Kauman urban village (Pekalongan City Planning and Environment Office, 2007). However, the use of the integrated batik WWTP has not been adequate in dealing with water pollution. Mardiatno (2012) reported that the batik IPAL in Kelurahan Jenggot can only cover about 400 m3 volume per day of wastewater discharge. Meanwhile, the total wastewater discharge in Pekalongan has sharply increased to 700

volume m3 per day. Moreover, the two WWTPs are not located in a location that covers all the batik wastewater for the entire batik production in Pekalongan.

The impact of not maximising the use of WWTP in Pekalongan City certainly affects the level of water quality standards and river pollution in Pekalongan City. Based on research conducted by the Pekalongan City Environment Agency in 2012, the condition of rivers in Pekalongan BDO levels which the standard is 2 Mg/l, in the field levels reached 5 Mg/l (in class 1 and Pkl). Meanwhile, COD, whose standard is 10 Mg/l, reached 58.43Mg/l in the field. The results and inventory of 2010-2015 show that Pekalongan City has a high level of pollution caused by 1,052 small and large industries that pollute the environment with a discharge of 4,440 M3/day (Aulia, 2014).

In fact, in the Pekalongan City Regional Regulation No. 9/2015 on Wastewater Management, it has been explained about the level of waste quality standards before being discharged into the river, so as to minimise river pollution. This is stated in article 5 paragraph 1, which reads: "Every person in charge of a business and/or activity that discharges wastewater into receiving water bodies must fulfil the established wastewater quality standards." This polemic regarding the batik industry and its waste and the regulations that have been made is one of the impacts of sustainable development. The increase and development of businesses, especially those that utilise natural resources, both in the form of industry and those carried out by the community, have great potential in contributing to environmental problems. The rapid population growth has brought about changes in people's behaviour, culture, and development patterns that have led to massive exploitation of natural resources under the pretext of improving people's welfare. This resulted in the depletion of the availability of natural resources and the environment, especially non-renewable natural resources, and then caused environmental pollution and damage (Aulia, 2014).

Wastewater stems from household, human and animal waste, besides that wastewater comes from industry, one of which is the batik industry. The batik industry produces liquid waste from dyes. Batik dyes have a high substance content, besides that batik waste contains synthetic materials that are difficult to decompose. After the dyeing process will produce liquid waste that is cloudy and concentrated. The characteristics of liquid waste produced by the textile industry are closely related to the materials used in the stages of the textile manufacturing process. To find out how entrepreneurs process their batik waste, researchers conducted interviews with several batik industry owners. From the interviews, the researcher obtained the following results:

The primary source of this research is Mr Hj Ahmad Fadholli. He is a Batik business owner located in Banyurip Alit who has been in the batik business for decades. In processing his batik waste, he disposes of the waste directly into the river. The reason he throws batik waste into the river is because the waste is liquid, so it is thrown into the river. However, he actually knows how to process batik waste so that it is ready to be thrown into the river, namely by treating batik waste before being thrown into the river. As for how to process it, the remaining plorotan waste will flow into the night filtering tub or solid wax and oil traps and precipitation which will then proceed to the liquid waste storage tub. The waste will flow again through four filtering tanks before finally entering the clean water reservoir and the remaining liquid waste located at the bottom of the cloth drying place. That way the waste discharged into the river is clean and the remaining dirty waste is collected in the basin.

The second source was Mr Khoirul Umam, the owner of a batik factory located in Banyurip Alit. In processing his waste, Mr Umam also discharges waste directly into the river because his batik factory is close to the river, besides that, he has not been able to make a waste filtering filter device because it requires a very large fee. However, according to him, the government is currently making filtering facilities at my place. The government is making 3 types of culverts to drain batik waste disposal in Simbang wetan

to batik waste disposal in alley 1 Simbang kulon where the waste will be filtered before being discharged into the river.

The third source is from H. Syukron, the owner of "Batik Isti". Unlike the batik entrepreneurs above, H. Syukron treats his batik waste by processing it first. According to him, even though the waste filtration filter tool is very expensive it is not worth what we produce. Because the batik industry always generates very satisfying income so that if a filtering device is made, of course for me it is quite comparable to what I produce, apart from the results of the above research, it can be concluded that batik entrepreneurs still throw a lot of their waste directly into the river due to very expensive operational costs. Actually, the owners of the batik industry know how to treat batik waste before disposing of it directly into the river, but the entrepreneurs prioritise high operational costs so that they take a shortcut to throw it directly into the river.

From the results of the above research, it can be concluded that many batik entrepreneurs still dispose of their waste directly into the river due to very expensive operational costs. Actually, the batik industry owners know how to treat batik waste before disposing of it directly into the river, but the entrepreneurs prioritise high operational costs so they take the shortcut of disposing of it directly into the river. In addition, the government has also facilitated by building culverts for the waste channel to the filter in Banyurip Alit.

4. CONCLUSION

There are three aspects of understanding in sustainable development, namely social, economic and environmental aspects. In general, the implementation of Pekalongan City Regional Regulation No. 9/2015 on Wastewater Management is a counterweight to the sustainable development of the batik industry that has been implemented. However, in its implementation, there are still many things that have not been implemented optimally, such as the use of WWTPs that have not been maximised, water quality standards that are above the standard, and river water pollution. This is the impact of sustainable development, where there is maximum use of natural resources but has not been limited by the management of the natural resources themselves to remain sustainable, resulting in environmental pollution. The results and discussion in the research show that the batik industry fulfils the criteria in the concept of sustainable development, namely the economic, social and environmental dimensions. In terms of the environmental dimension, the existence of Regional Regulation No. 9/2015 on Wastewater Management shows that the regional regulation is a counterweight to the existence of sustainable development. Some of the sustainable development principles contained in Regional Regulation No. 9/2015 on Wastewater Management are as follows: First, the principle of intergenerational equity. This principle is focused on article 2 paragraph 2 which states about efforts to preserve the environment by conducting wastewater management, so that the impact of pollution can be minimised and can realise environmentally sound sustainable development. Second, the principle of integration between environmental protection and development. The essence of this principle is the enactment of AMDAL and the need for the availability of environmental information in the government's decision-making process. The principle of preventive action. Article 8 paragraph 3 explains that every industrial operator who will dispose of waste must have a waste disposal permit, one of the requirements of which is the existence of environmental documents such as EIA and UKL-UPL. Third, the principle of preventive action. The essence of this principle is the existence of preventive measures to minimise the occurrence of environmental impacts. The precautions taken in Perda

No. 9/2015 are in the form of requiring every person in charge of an industry to have an IPAL, either domestic or communal. In the implementation in Pekalongan City, the use of communal WWTP is still unable to cover the amount of wastewater discharge in Pekalongan City, resulting in river water pollution. This is characterised by BOD and COD levels that are above the threshold value.

From this research, it can be concluded that a strategy is needed in batik processing in Pekalongan City. These efforts include regulatory approaches, government assistance or facilitation, industrial partnership programs, socialisation of clean production programs and mentoring programs. There is a need for coordination between related parties involved in the development of the batik industry to formulate and implement strategic efforts regarding batik waste management in realising environmentally friendly batik

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