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Environmental Impact Assessment (EIA) Framework for Ekolabel Certification Initiative in Indonesia: Case Study of a Rattan-Plywood Based Furniture Industry

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Abstract: The "*Ekolabel"* logo is a pro-environmental program legalized by the Indonesian Government, which is targeted to companies for certifying their products with ecolabel as one of a representation on environmental awareness. This research presents the utilization of the environmental impact assessment (EIA) framework for *Ekolabel* certification initiative. An exploration of environmental impact assessment was performed in rattan-plywood based furniture industry at Sidoarjo, Indonesia. Analysis result shows that the use of EIA framework could detect the occurred environmental impacts on the entire manufacturing process, which cover the liquid, solid and air waste. The dust problem was seen as the highlighted impact with the combination values of 5-strongly important. The existing dust collector system needs to be enhanced to accommodate the dust collector quantity. The analysis forecast that in 4-5 years the environmental impacts will be resolved post the initiation of mitigation. Thus, after the EIA realization was completed, the company can actualize the ecolabel certification.
Keywords : Environmental impact assessment, Framework, Ecolabel, Indonesia.

Introduction

Indonesia is one of the largest tropical countries in the world, which has a large resource of forest material and it can be used conveniently for furniture industries. It was recorded in 2012, where 10,25% of total export or roughly US $ 750.000.000 were earned from the industries that used forest as the material resources[1]. As one of the members in the International Tropical Timber Organization, Indonesia legalized the sustainable forest management policy based on the International Tropical Timber Agreement in 2006[2,3]. One positive realization to manage the sustainable forest management is by performing a green certified process such as ecolabel program.

The world first ecolabel program was introduced by the German government in 1977[4]. German government used a "blue-angel" logo to guide the consumer in purchasing quality products with fewer adverse environmental impacts as well as encouraging the manufacturers to develop the environmental friendly products. The idea of attracting both consumers and producers to use greener products was followed by the five continents with many nations globally. The examples of the programs include the EU-Ecolabel in European Union countries, Environmental Choice in New Zealand, EPA Energy Star in United States, EcoMark Africa in

Africa, China Environmental Labeling in China, Ecomark in Japan, Green Mark in Taiwan, and *Ekolabel* in Indonesia.

Indonesia adopted the ecolabel accreditation concept in 2006[5,6,7] to accommodate the recognition of green manufacturing products. The *Ekolabel* term was firstly mentioned in by Indonesia Ministry of Environment in the regulation that talks about the guidance and supervisions of environmental management, ecolabel, clean production, and environmental based technology. In the *Ekolabel* usage regulation, the Indonesia Ministry of Environment describes two logos that can be used for ecolabel certification (Fig. 1) namely *Ekolabel* Indonesia and *Ekolabel* self-declared Indonesia. The first logo, *Ekolabel* Indonesia, is used for product certification logo based on multi-criteria standard and it is categorized as the Type 1 logo adapted from ISO 14024[8]. The *Ekolabel* Indonesia logo considers the life cycle of the product in the certification process, which include the material productions, consumptions, and end-of-life cycle[9]. In the certification process, the agency namely Komite Akreditasi Nasional (KAN) is the responsible organization that can perform the legal certification. The second logo, *Ekolabel* self-declared Indonesia, is being used as a verification logo for self-declared claim in one or many environmental parameters in a product. The Ekolabel self-declared Indonesia is categorized as Type 2 logo based on ISO 14021. The verification agencies, which they are registered in Ministry of Environment, have the authority to verify the claim proposed by the company based on their pro-environmental achievement aspects. To meet the requirements of attaching the logo on the product, manufacturing company should fulfill the prerequisite ecolabel certification aspects. The prerequisite certification covers the fulfillment of several environmental management regulations, implementation of environmental management system, the implementation of quality as well as standardization product and the use of environmental friendly packaging product[10]. All the prerequisite aspects will be used as the assessment materials for ecolabel in the certification process.

Fig. 1. Ekolabel Indonesia (left) and Ekolabel self-declared Indonesia (right)

Under the Ministry of Environment regulation, the procedures to certify the manufacturing products were updated recently in 2014[7]. Furthermore, only few studies discuss the context of Indonesia's ecolabel[5,11,12]. This study, hence, is the first attempt to identify the Indonesia's ecolabel initiative through environmental impact assessment (EIA) framework. A sample of rattan-plywood based furniture industry was taken in Sidoarjo and was analyzed by EIA framework. The expected result is to reveal the company achievement in green process and to help actualize the green *Ekolabel* certification through the EIA framework.

Materials and Methods

EIA can be seen as the implementation of pro-environmental action to reduce or avoid the potential environmental impact caused by human activity from the beginning to the end of the project[13]. EIA serves as a control function from the environmental perspective to ensure the owner in managing the balance between profit and sustainable environment in the development project. In general, the framework of EIA is divided into four big sub domains (Fig. 2)[14]. The first sub domain performs the initialization of project assessment, while the second sub domain analyzes the initial impacts and identification of mitigation approaches in environmental aspect. The third sub domain presents the result and the discussion of the findings. The last sub domain evaluates the decision with monitoring and auditing activities. The framework basis of EIA in Indonesia refers to seven regulations[15,16,17,18,19,20,21,22,23] legalized by Indonesia government and the entire regulations cover the general framework in Fig.2. In some situation, the environmental impact assessment can be performed only in operation stages (sub domain 2 except number 6, sub domain 3 and sub domain 4), when the company has the

business license but never conducted an EIA study. This situation, however, will obligate the company to perform the environmental impact assessment projected by the environmental evaluation document.

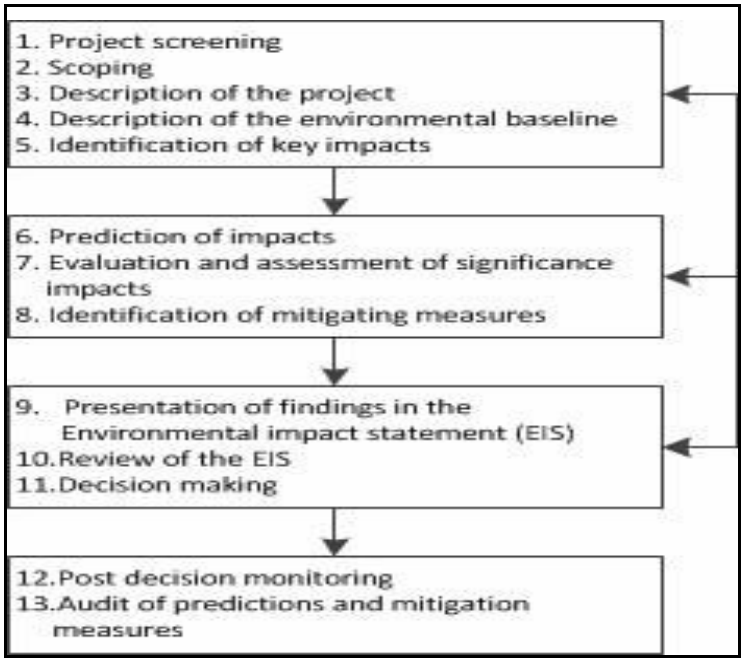

Fig. 2. The general framework of EIA process[14]

Results and Discussion

A rattan–plywood based furniture company was assessed as a case study in this research. The company has been established since 2005. The company made several furniture intended to national and international markets, which it has the average amount of 2.680.000 items and 240.000 m^3 boards per year (Table 1).

Table 1. Product varieties

No	Product Varieties	Quantity	Unit
1	Rattan based home furniture accessories.	130.000	Item
2	Wood based home furniture		
	- Table, Drawer, Shelf	1.200.000	Item
	- Bedroom furniture accessories	1.350.000	Item
3.	Building components		
	- Frames of door and window	200.000	Item
	- Flooring	10.000	m^3
	- Finger joint laminating board	27.000	m^3
	- Wood Briquette	3.000	m^3
Source: Sidoarjo Environmental Agency[22]			

The company employed 3150 workers from upper level to the operational level, divided into 2605 males and 545 females. Although the company owns the business license, the company did not perform the environmental impact assessment yet. From manufacturing processes, seven main and three supporting processes are captured (Fig.3). We identify three impacts resulted in the manufacturing activity such as liquid waste, solid waste, and air waste.

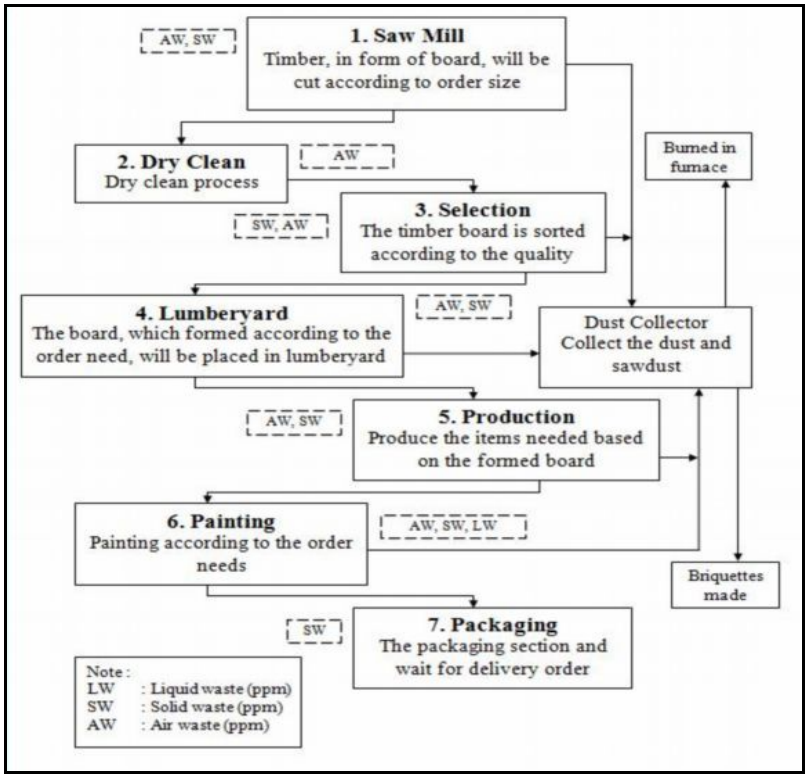

Fig. 3. Manufacturing activities

Based on Figure 3, air waste is found in the activity from no.1 to no.6, while on activity no.7 is not found. Based on the audit exploration, the dominant air waste are dust and noise. The details of air wase time series explorations are shown in Figure 4-9.

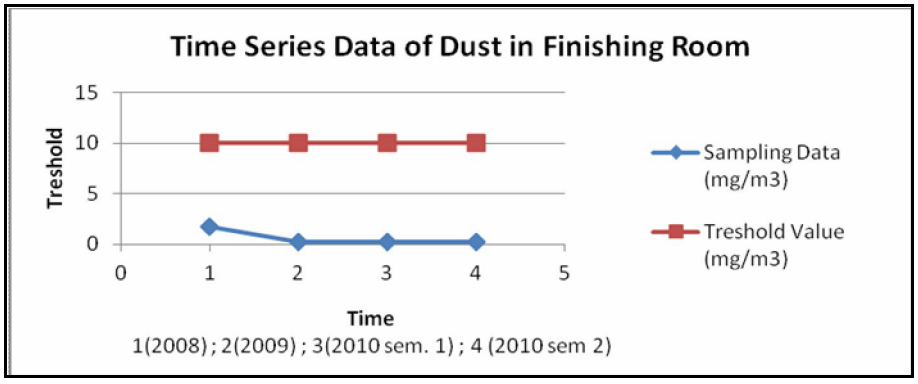

Fig. 4. Dust sampling taken in Finishing Room at the manufacturing company[22]

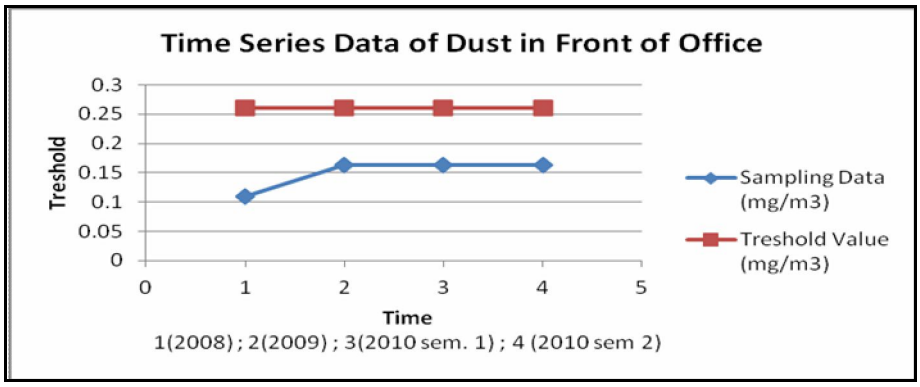

Fig. 5. Dust sampling taken in Front of Office at the manufacturing company[22]

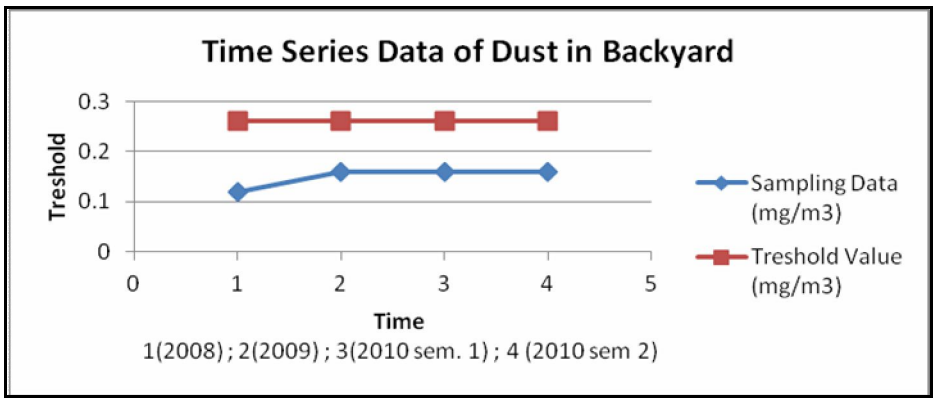

Fig. 6. Dust sampling taken at the manufacturing company[22]

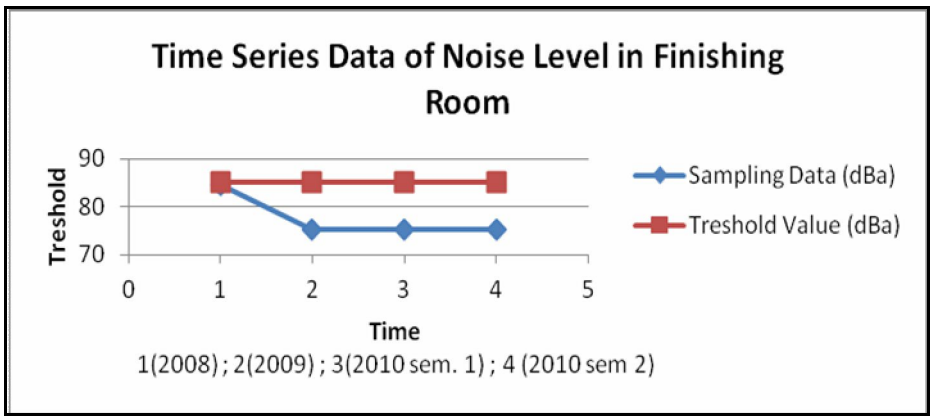

Fig. 7. Noise Level sampling taken in Finishing Room at the manufacturing company[22]

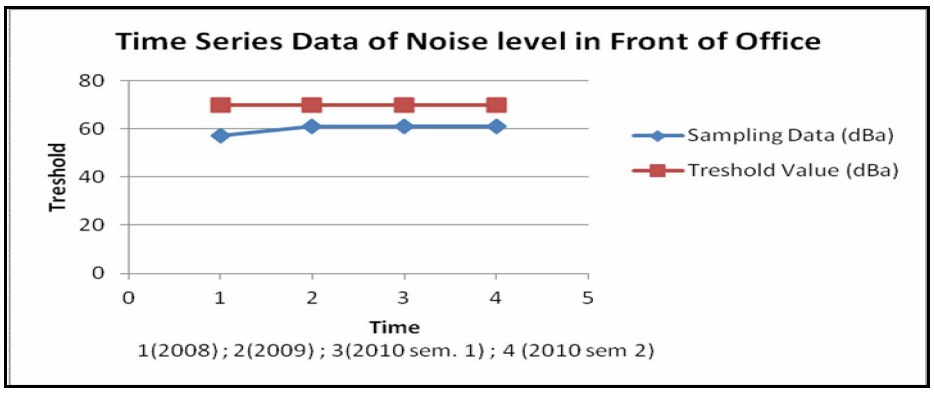

Fig. 8. Noise Level sampling taken in Front of Office at the manufacturing company[22]

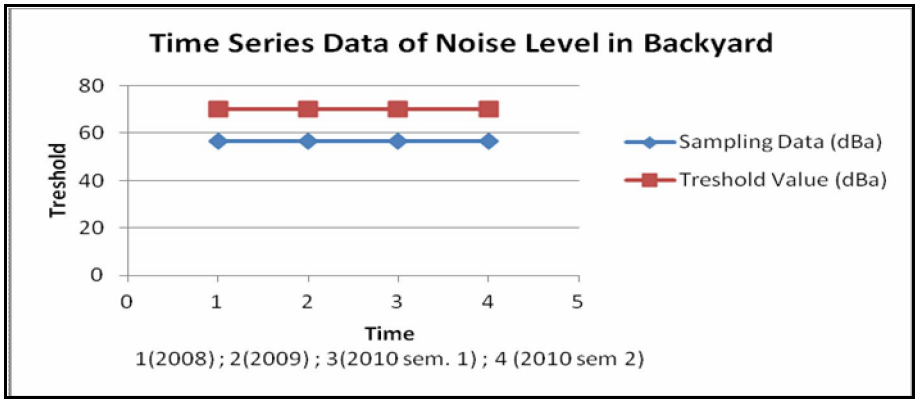

Fig. 9. Noise Level sampling taken in Backyard at the manufacturing company[22]

Furthermore, as it can be seen in Figure 3, the liquid waste is found in activity no.6, while the other activities are not found. Based on the audit exploration, the liquid waste parameters are BOD (Biological Oxygen Demand), COD (Chemical Oxygen Demand), TSS (Total Suspended Solid) and DO (Dissolved Oxygen). The details of liquid wase time series explorations are shown in Figure 10-13.

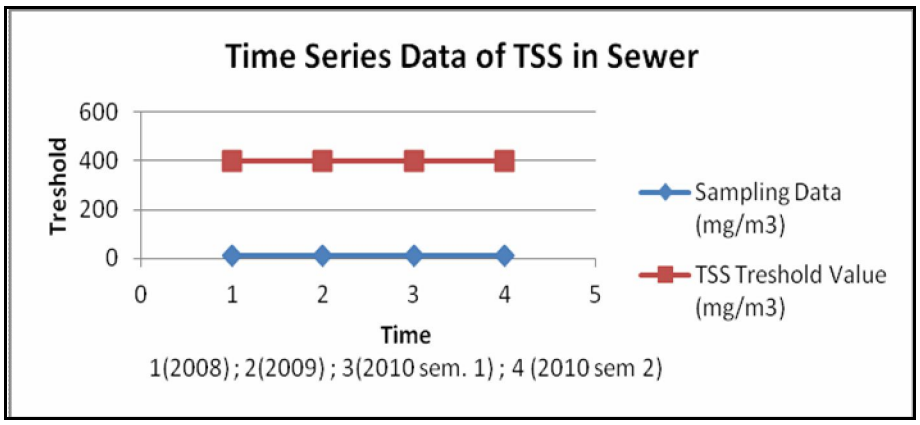

Fig. 10. TSS sewer sampling taken in Sewer at the manufacturing company[22]

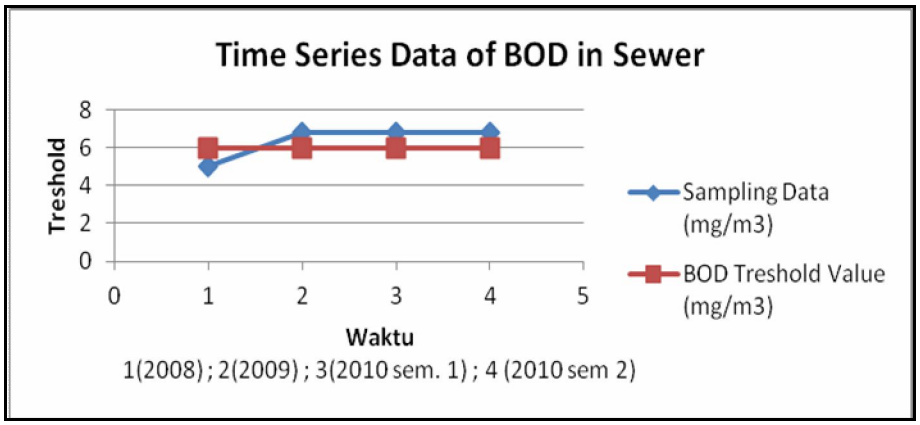

Fig. 11. BOD sewer sampling taken in Sewer at the manufacturing company[22]

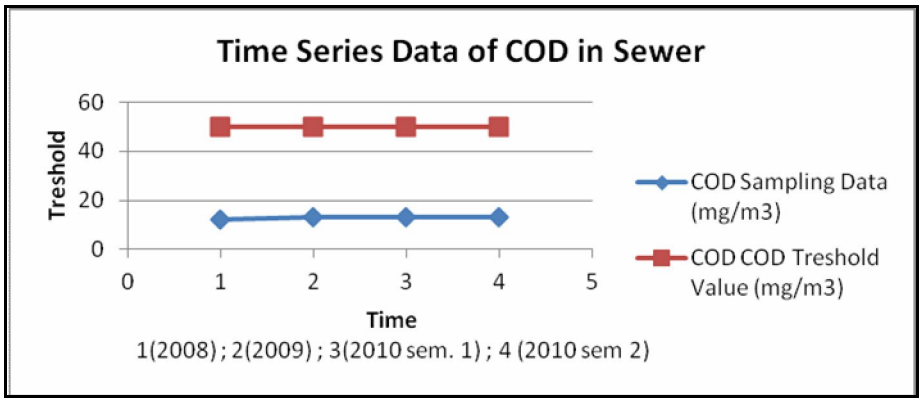

Fig. 12.COD sewer sampling taken in Sewer at the manufacturing company[22]

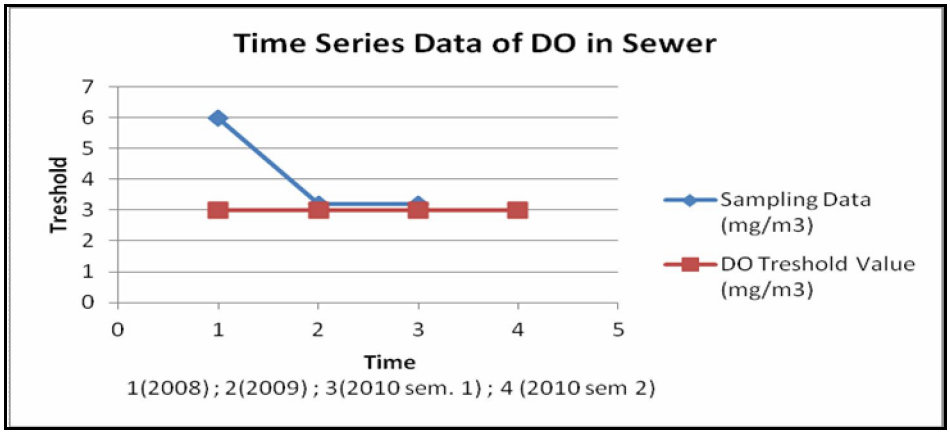

Fig. 13. DO sewer sampling taken in Sewer at the manufacturing company[22]

From Fig 10-13, we can see the concentrations of TSS, BOD, COD and DO are in the range of standard quality. This parameter is one of the criteria assessment in ecolabel certification. The approach to anticipate the fluctuation and over quantity that could contaminate the sewer and river can be performed by wasterwater treatment plant[24-26]. If the time series data from the water quality monitoring are enough, then the prediction can be performed to see the fluctuation with system dynamics[27]. If the river in which contains the water is still being used by the domestic activity, then a further research needs to be conducted to see the impact that will happen from the present activity[25,26]. The ecolabel require the entire process and the sampling process safely guaranteed to societies who live in the site location. Thus, the calculation of environmental impact cost and the approaches to manage the impact needs to be performed before the ecolabel certification. Furthermore, the participation of societies in site location is one of the highlighted parameter in the certification process and it is mandatory[28,29].

Both EIA expert and EIA commission agree that the mitigated actions were set and the details are shown in Table 2.

Table 2. Mitigation Approach

No	Environmental Impacts	Mitigating Approach
1.	Solid waste from timber residues	Collects the waste and making it into wood-based fuel
2.	Solid waste from sawdust	Reusing sawdust for wood-dust based board or briquettes
3.	Solid waste from domestic activities	Optimize the waste management internally and good cooperation with third parties garbage disposal management
4.	Solid waste from iron knife	Collects the iron waste and sell it to third parties for other purpose
5.	Liquid waste from oil machine	Cooperate with the third parties, who has the license from the environmental agency to reuse it
6.	Liquid waste from solvent materials	Collects the solvent waste and re-extract it so it can be used again
7.	Liquid waste from toilet and rinse activities	Rearrange the toilet-rinse system with a septic tank system, instead of flows it to the sewer
8.	Air waste from dust dispersion in the production room	Use and enhance the dust collector performance
9.	Air waste from dust dispersion outside production room	Enhancing the greening efforts in the location, and watering activity in the dry season
10.	Air waste from dust dispersion of timber unloading activity	No further action (almost no waste appeared)

Based on Table 2, the dust problem was seen as the highlighted impact. This situation happened because most of the manufacturing activities produce dust (Fig.3) and it requires the good performances of dust collector. The existing dust collector system (Fig.14) needs to be enhanced to accommodate the dust collector

quantity. For air waste monitoring (dust and noise) can be overcomed by expanding the site monitoring from activity no.1 to no.6. The following environmental impacts, liquid waste and solid waste, require some good treatments, either in internal manufacturing location or outside location through the third parties. For liquid waste monitoring, a site monitoring on activity no.6 needs to be added.

Fig. 14. The existing dust collector system[22]

The mitigation approaches were planned to be able to handle or eliminate the waste as well as improve conditions in about 20-25% in each year based on the initial implementation. Hence, in 4-5 years, the environmental friendly manufacturing process will be achieved. When the environmental friendly process is realized, the company could conduct the *Ekolabel* self-declared Indonesia certification. The initiative of certification can be performed in 4-5 years after the initial EIA mitigation activity started. Furthermore, because the entire environmental aspects are covered in EIA analysis, there is no significant effort needed in preparing all the prerequisite requirements as well as the documents for certification administration. The rattan–plywood based furniture company could delegate a representative manager and the internal environmental auditor to submit all the necessary documents for *Ekolabel* self-declared Indonesia certification (Type 2 logo) to the verification agency.

Conlcusions

Ekolabel logo is one of the pro-environmental activities that can raise the awareness in producing a product with environmental friendly process. In this research, the *Ekolabel* certification initiative was analyzed by the EIA framework to see the existing environmental impact in the manufacturing process and a case study in a rattan–plywood based furniture company was examined. Because there is no standardization procedure yet in *Ekolabel* Indonesia (Type 1 logo) for furniture industries, the company could apply the *Ekolabel* self-declared Indonesia (Type 2 logo) by claiming the green process in manufacturing activity. Ten environmental impacts were revealed by EIA framework, consisting of solid, liquid and air waste. The values, furthermore, were determined by using ranking and scoring technique in EIA framework to know the magnitude and the importance in each impact. Based on analysis and review, dust impact was revealed to be the most highlighted environmental impact and enhancing the performance of dust collector was suggested. The analysis forecasted that in 4-5years the environmental impacts will be resolved. Thus, after the EIA realization was completed (4-5years), the company can actualize the *Ekolabel* certification.

Finally, the utilization of EIA framework was able to detect the environmental impact and mitigation approaches were used to actualize *Ekolabel* certification initiation based on the environmental friendly manufacturing activity. This research has some limitation, where the consideration details by both EIA expert and EIA commissions were not revealed. Thus, the objectivity on each impact was majorly based on expert-judgment. The duration of EIA mitigation approaches was varied between each company according to the measured impact. The EIA report was submitted to the Sidoarjo Government Environmental Agency and it was approved[22].

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