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# Environmental Management Efforts at Fillet Fish Processing Industry in Coastal Fishing Port Tegalsari Tegal—Indonesia

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Indonesia is a maritime country with a rich catch of fishery products, as it has a sea area that is quite extensive and diverse fish species. By looking at the geographical situation, the potential of natural resources Indonesia in the field of marine is large enough to be developed. Similarly, development in the field of fisheries, especially in Tegal is located on the coast of Central Java's is growing rapidly. The Industry which is currently the most productive in Tegal is fish fillet industry and supported by the industry's fishmeal processing to recycle solid waste. Processing of fishery products in Tegal mostly concentrated in the Coastal Fishing Port (CFP) Tegalsari. The development of fish processing business is a double impact, in addition to improve the local economy it also causes odor nuisance to the surrounding environment. The results of this study stated that the indicators of clean production in the processing of fish fillets include the formulation of the problems facing the company, the activities to be carried out, clean production principles, actions taken, and the target value indicators include efficiency, increased productivity, and waste reduction. Recommendations from the study include: (1) the need to do the training and technical assistance to employers to have an awareness of environmental management in the handling of fish waste as well, (2) The need for the establishment of institutions in environmental management, (3) The efforts of law enforcement to businesses which is not environmentally friendly, (4) Restoring and improving the quality of the region into a center for the fishing industry with more modern technology, (5) the application of cleaner production in each fishery product processing business unit.

**Keywords:** Fish Fillets, Environmental Management, Cleaner Production.

## 1. INTRODUCTION

The fishery product processing industry develops corresponds to the fishery catches. Industrial growth took place in order to meet the needs of the community. According Sutejo,<sup>7</sup> that the result has an important role and strategic in the development of national economy, especially in increasing the expansion of employment opportunities, income generation, and improving the living standard of the nation in general, small fishermen, small fish and those businesses in the field fishery while maintaining the environment, sustainability and availability of fish resources. One of the activities fishery products processing industry in CFP Tegalsari considerable potential is agro industry fish fillets, fish flour, salted fish processing and so forth. Industry which is currently the most productive in Tegal is fillet fish industry. This is according data from the Department of Marine and Agriculture Tegal,<sup>4</sup> the number of Micro, Small and Medium Enterprises (SMEs) the processing of fishery products in the form of home industry processing fish fillets, processing salted fish and

fish flour of approximately 94 business units with the amount of power work that absorbed reaches approximately 1,675 people, including the carrier, weighing, cutting and cleaning the fish. The results of the average production of 840 tons/year. Fish processing activities in Tegal is largely done in the area of CFP Tegalsari.

The development of micro-enterprises fish processing provide a sizeable multiplier effects for improving the local economy around. However, because most of the household agro industry in the area of CFP Tegalsari run with little capital and limited knowledge about the environment, the negative impact of fishery product processing industry is causing harm to the surrounding environment, especially the odor nuisance. According Purwanto,<sup>5</sup> the industri not processed waste and managed well can caused effect of environment.

According Raharjo,<sup>6</sup> the fact that development affects environmental ecosystem that is not followed by the care and preservation of the environment it is essential to create a mechanism, institutional and communications network that ensures the preservation of the environment. Because whatever its form, an industry has a tendency to damage the environment so that in addition to

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the formal legal action, as well as the need for the establishment of maintenance and monitoring system at the level of a small group with the principles of sustainable development.

Therefore it is necessary to apply measures good development, integrated and environmentally sound, so the development of the fishing industry is not very negative impact in the form of environmental degradation. The fishing industry expected to increase the potential positive impact, it indirectly to boost the economy and welfare of the community and increase local revenue. Thus it can be recommended an environmental management system through clean production performance indicators for waste management in CFP Tegalsari fish fillet.

## 2. EXPERIMENTAL DETAILS

The scope of the study consisted of the scope of research material and spatial scope. The scope of the research materials is implementing Environmental Management Systems (ESM) as a pattern of waste management approaches in the fishing industry in CFP Tegalsari, Tegal. Develop clean production performance indicators for waste management small and medium agro industries. The scope of spatial research is CFP Tegalsari, District Tegal Barat, Tegal City, Indonesia. The survey was conducted to obtain data as information and analysis on environmental management of the waste management fillet on the fishing industry in PPP Tegalsari include data general overview of Tegal, Central Java in the form of the geographical situation and climate, population and employment, Gross Domestic Product, Tegal, spatial and land conditions, Tegal, Tegal environmental problems, and Environmental Management at Tegal. Techniques data collection is interview questionnaire and observation.

## 3. RESULTS AND DISCUSSION

The fillet production can expand the business diversification efforts, especially from the utilization of waste. Fish head, offal and fish bones in large quantities can be re-processed into fish meal, fertilizer or other products. Fish skin can be processed into fish skin crackers or sold to tanneries which are still a shortage of raw materials. So, as a whole increased efficiency because no waste is wasted. So if viewed as a whole in an effort to fillet fish efficiency for their activities of waste minimization and no solid waste is wasted. Fish fillets from the tail upward to the neck but the chest fish are discarded as part of the barb, then meat by means of scraped with a knife, and then his skin was collected for raw materials fish meal.

Technology processing fish fillets and fish meal factories in Tegalsari PPP is mostly still using simple methods and equipment, filleting done by hand. The equipment used in this technology is easy to obtain because the equipment is often used in households in general. Labor is a major factor in the production of fillets because all of the production process relies on human power. The first selected fish that are still in good condition and does not rot. Fresh fish used to be so easy in fillet and obtain high-quality products. Fresh fish is used is chosen that has passed through the phase stiffening/rigor mortis. Then the fish is washed with clean water to remove impurities and removing blood or mucus.

The amount of fish to be processed is known by weighing using hanging scales. Fish to be weighed are placed in plastic baskets. In the process of slicing the fish, the fish is placed on

a table/cutting board. The lower part of the gill sliced crosswise until it touches the spine. The meat was sliced from the incision direction leads to the tail. Blades attempted to touch the spine and abdominal ribs that limit the body to the abdominal cavity is not cut off at the time slicing, but not to hurt her. Fish is reversed, and the procedure as above is repeated. Slices obtained is called fillet. Meat left on the bone scraped with a fork and mixed with a fillet. Fillet obtained must be packed in containers that fit as soon as possible. Every time the fillet must be cooled to prevent deterioration and always keep.

Packaging is done by inserting fillets into a plastic bag. Each bag is filled with a fillet 1 kg, then a plastic bag tied with a rubber band. The air inside the bag kept to a minimum. Fillet already packed stored in a cool box or iced bulk and ready to be marketed. The results of this effort is the fillet and waste. Number of fillet production depends on the availability of raw material, is fresh fish. Fillet quality is influenced by the quality of raw materials and production processes. Supervision of raw materials is important because the quality of the resulting fillet is determined by the raw material in terms of the freshness of the fish. In order to obtain quality results need to apply cold chain system at each stage to keep the fish stay fresh.

Fillet quality depends on the freshness of the fish. Cold chain ranging from raw material selection, production process to delivery fillets must be kept. For the role of supervising the quality and provision of sufficient bulk ice is needed to ensure the freshness of the fish is maintained. To determine the mass balance processing fish fillet samples then performed experiments on four (4) types of fish used as raw material for fish fillets. Types of fish include *Pomadasys macullatus*, *Upeneus sulphureus*, *Nemipterus nematophorus* and *Priacanthus tayenus*. The raw material of the above samples after filleting fish the separation between fish meat with bones, head, skin and viscera obtained brackish their size, weight is 17.1 kg, 13.4 kg, 12.2 kg and 12.85 kg.

Then earned rest as much as 29.75 kg of fish waste is processed into fish meal. The results obtained from the pressing process waste by weight 20.35 kg, the rest of the waste water, weighing 9.4 kg. Furthermore, do the drying up to dry, after being weighed result is 9 kg of fish meal. So it can be concluded to be a process of reduction of fish meal required amount of water approximately 70%.

Some of the parameters that will allow fish meal production activities in Tegal impact the odor are due to the following:

- (1) Raw materials form the rest of the pieces of the fish's head and the head, bones and fins of the fillet is not wholly a fresh raw material, so it was decomposing,
- (2) From the drying process of raw materials and fish meal is still a majority still take advantage of the sun's heat. The drying process by using the sun's going to happen evaporation so fishy smell of raw materials fish meal will be accumulated by the ambient air,
- (3) The existence of the rest of the storage of raw materials cut fish head and head, bones and fins from the fillets as a reserve of raw materials production, storage of raw materials this will be a process of decay that will bring up the odor,
- (4) Water from the boiling process in the production of fish meal is not processed properly, and generally discharged directly into drains without being processed first, the accumulation of these waste results in the environment to become rundown and smelled.

There are several ways that can be used to make fish meal of fresh fish. The simplest way is to do the drying in the sun. This method is still used in some areas where the quality of the product is lower than those using modern techniques. In general, fish meal production process in Tegal done simply with the stages include cooking, pressing, drying and grinding into fishmeal. There are potentially increasing solid waste and waste water such as cooking fish pressing of fish. At the stage of drying the fish that have been pressed, potentially increasing solid waste cooking dried fish scattered. At the stage of grinding dried fish, potentially increasing solid waste is dried minced fish.

The fishmeal manufactures mostly using simple and inexpensive technology investments. Fish meal contains protein, minerals and vitamin. Fish protein is composed of amino acids that are not found in plants that are often used for mixed fodder such as poultry, pigs and fish food. The fish meal industry uses raw materials of the fish that are no longer worthy to be processed or of the rest of the fish fillet processing industry consisting of the head, tails and entrails. In addition to fish meal produced by big industry, there is also a fish meal produced on a small scale. The quality of fish meal depends on the raw materials used.

#### 4. CONCLUSION

The results of this study stated that the indicators of clean production in the processing of fish fillets include the formulation of the problems facing the company, the activities to be carried out, clean production principles, actions taken, and the target value

indicators include efficiency, increased productivity, and waste reduction.

Recommendations from the study include:

- (1) the need to do the training and technical assistance to employers to have an awareness of environmental management in the handling of fish waste as well,
- (2) The need for the establishment of institutions in environment management,
- (3) The efforts of law enforcement to businesses which is not environmentally friendly,
- (4) Restoring and improving the quality of the region into a center for the fishing industry with more modern technology,
- (5) the application of cleaner production in each fishery product processing business unit.

#### References and Notes

1. Mustafa Yıldız, *Turkish Journal of Fisheries and Aquatic Sciences* 4, 81 (2004).
2. Kementrian Lingkungan Hidup, Kebijakan Nasional Produksi Bersih, Jakarta (2003).
3. Shahidul Islam, Saleha Khan, Masaru Tanaka, *Marine Pollution Bulletin* 49, 103 (2004).
4. Department of Marine and Agriculture Tegal, Potensi Sumber Daya Perikanan, Tegal (2013).
5. Purwanto, Teknologi Produksi Bersih, Badan Penerbit Universitas Diponegoro Semarang (2013).
6. M. Raharjo, *Valuasi Ekonomi Sumber Daya Alam dan Lingkungan*. Cakra Books, Solo (2008).
7. Sutejo, *Sumberdaya Perikanan dan Kelautan Berbasis Ekonomi Kerakyatan*, UI Press Jakarta (2000).