Food ScienTech Journal Vol. 1 (1) 2019 ISSN : 2685-4279 DOI:10.33512/fsj.v1i1.6245

THE EVALUATION OF GOOD MANUFACTURING PRACTICES (GMP) IN FISH PROCESSING SME CENTER CASE STUDY OF BALIKPAPAN CITY

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ABSTRACT

The application of Good Manufacturing Practices (GMP) is a parameter towards Hazard Analytical Critical Control Points (HACCP). The Center for Small and Medium Enterprise (SME) X in Balikpapan needs to evaluate its production process to improve the fisheries processing industry that fits the GMP criteria. This study aims to evaluate the application of GMP in fish processing SME Center. GMP evaluation carries out by looking at the production and building processes through interview and documentation. The evaluation result shows that the facilities and infrastructure of SME center need to be improved to meet the implementation of good GMP, since it has many critical and major deviations that need to be enhanced in terms of buildings and production processes. Based on the observations, it shows that there are 20 minor findings, 30 major findings, 28 serious findings, and 30 critical findings that are found. Deviations in the SME center is categorized as D grade, so they are not feasible for a production process.

Keywords: Fish processing, fish product, food safety, SME

INTRODUCTION

Fish processing SME center in Balikpapan City experiences increasing development. The processed fish industry is a major factor in improving the economy of Balikpapan city. The development of SME center needs to be done to standardize the process of SME fish processing in order to maintain the quality and quantity. One way to improve the value of SME products is the quality practices. One important and fundamental quality practice is the application of Good Manufacturing Practice (GMP).

Good manufacturing practices (GMP) are the minimum sanitation and processing requirements needed to ensure the production of safe and healthy food. GMP is one of the basic pre-requisite programs or basic requirement program in implementing the HACCP system, which ensures the practice of preventing contamination that causes unsafe product. GMP is divided into several sub-sections, each of which has detailed requirements and is related to activities at food processing facilities. These GMP subdivisions are personnel, building, distribution, and measurement of product defects (Katsuyama and Jantschke, 1999). The revised GMP in 1986 was officially announced by the FDA to meet the criteria set by the Federal Food, Drug and Cosmetic Act (FD & C Act) to achieve contamination-free food (Katsuyama and Jantschke, 1999).

GMP is not a new quality system known in Indonesia, as the Ministry of Health of Republic of Indonesia has introduced it since 1978 through the Minister of RI Decree No. 23/MenKes/SK/1978 dated January 24th, 1978 concerning Guidelines for Good Production Methods for Food (CPMB). Guidelines for implementing Good Food Production Methods (CPMB) explain the

procedures for producing food to be qualified, safe and suitable for consumption (Dirjen POM, 1999). GMP covers all basic principles and important requirements to produce food. This study purposes to evaluate the application of GMP in fish processing SME X center.

MATERIALS AND METHODS

This study was conducted at the SME X Center in Balikpapan City with the focus of industries are the fish processing (amplang and crab chips) and fruit processing (dragon fruit) industries. The data and information obtained from direct observations. Conformity assessment of GMP application is carried out on 13 elements, involving: location, building, sanitation facilities, production equipment, materials, processing, final products, laboratories, employees, packaging, labeling, storage, and maintenance. From each of these elements an assessment is carried out relating to the standard parameters set.

Research Procedure

This research method is data retrieval and chemical testing. The methods of collecting data are done by interview and direct observation referring to the regulation of the Ministry of Marine Affairs, namely the decision of the Minister of Marine and Fisheries No. Kep. 01 / MEN / 2007. Analysis of irregularities is carried out based on the classification of deviations by the Directorate General of P2HP 2007.

Technical constraints in the application of basic feasibility requirements result in incompatibility with existing regulations or deviations presented in Table 1. Preparation of deviations classification as follows (DG P2HP 2007):

1. Minor deviations, is deviation in which if it has no corrective action taken will affect food quality
2. Major deviations, is deviation in which if it is not corrected will cause potential affect to food security
3. Serious deviations, is deviation in which if it is not corrected will affect food security
4. Critical deviations, is deviation in which if it is not corrected will immediately affect food security

Value criteria				
Rating	Total Deviation			
	Minor	Major	Serious	Critical
Grade A (Very good)	0 – 6	0 – 5	0	0
Grade B (Good)	≥ 7	6 –10	1 – 2	0
Grade C (Enough)	NA	≥ 11	3 – 4	0
Grade D (Not Qualified)	NA	NA	≥ 5	≥ 1

Table 1. Value criteria of feasibility

RESULTS AND DISCUSSION

Evaluation of GMP Implementation in Balikpapan SIKHPK

GMP is a guideline for the food industry regarding how to produce good food and drinks. GMP is a popular guideline of most countries in the world, especially for industries in Indonesia through the decision of the Minister of Health No. 23/MenKes/SK/1978. This GMP of Minister of Health's decision includes: factory location and environment, buildings and rooms, final product quality, production equipment, raw materials, employee hygiene, processing control, sanitation facilities, labeling, packaging containers, storage, maintenance and sanitation programs, transportation, documentation/recording, product withdrawal, and laboratory and inspection.

The results of observation shows that the X fishery SME center building does not meet GMP standards by means of 20 minor findings, 30 major findings, 28 serious findings, and 30 critical findings. Architectural design layout is a critical deviation because it is not in accordance with KEP.01 / MEN / 2007 regulations, CHAPTER V. B, 2 points 1.3 and 1.4 which indicate that the SME area has to be clean, separated from the dull area and can prevent contamination. The SME area in X industrial center has not been separated from the dirty space. The storage section of the laundry is a pile of rubbish and unused items.

Reception space is a critical deviation as it is not in accordance with KEP.01/MEN/ 2007 Regulations, CHAPTER V. B, 3 which shows that the regulation that reception rooms

must be clean and easily repaired, floors and walls made of material that is easy to clean. SME X does not have its own reception space.

Non-protected lamps considered as critical deviation because if it has no corrective action taken, it immediately affects food security. Water supply in SME X is not in accordance with the CAC / RCP 52-2003 guidelines, that is the availability of drinkable quality water.

Location and Environment of the Factory

A good and healthy food industry should be located in a free of pollution area. The location of Balikpapan SME center is far from densely populated settlements and polluted factories. The area is free of puddles and the road to get to the location is good, however the construction of houses which is in the form of stilt houses is risky and easily get flooding while heavy rain. Besides, the buildings that are made on swampy land has a risk of landslides. In order to defense the building from flooding, a good drainage system is needed. The central location has a very small drainage system and the buffer is easily corroded so that a wider water channel should be made to facilitate running water in order to decrease congestion that cause flooding.

Figure 1. Location of SME

Figure 2. The appearance of Balikpapan SME

There are still many empty locations that will be used for constructing the next stage of production houses. This can be seen in Figure 1. The appearance of SME center buildings is shown in Figure 2, the appearance of SME center buildings built on swamps is shown in Figure 3, and the appearance of processed fisheries and agricultural production house is shown in Figure 4.

Figure 3. The appearance of SME center buildings on swamps area

Figure 4. House of processed fisheries and agricultural production in Balikpapan

Buildings and Processing Rooms

In general, the factory layout is in accordance with the process sequence, but there are several processes carried out in the same space. Placement of processing equipment looks unorganized. There is a buildup of items in the processing room. The processing room must also be designed in such a way as to facilitate the cleaning and maintenance process. The angle of meeting between the walls, and the wall with the floor is in the elbow shape instead of curving, making it difficult to clean. The walls are not tiled yet so they easily dirty. The production room floor is made of cement tiles which are very difficult to clean and to drain water, and else there is a drainage hole that can cause slippery when production process involves wet raw materials. The absence of partition between production spaces, and the incompatibility of buildings with production

sequences and similarity of facilities has failed to meet the GMP feasibility element.

The ceiling construction is made of durable and brightly colored internal material. The ceiling has a height of 3 meters from the floor. The building has a wooden door and some rooms left untidy. The windows have ventilation for air circulation. Hence the air circulation in the frying chamber is not yet visible. The heat of air temperature causes the cooking room door to open during the production process. This should not be done since it increases the chance of contamination during the production process. The room should be equipped with an air circulation regulator.

Lighting uses a bulb lamp that has no buffer to support. The lamp is used only in the packaging room and the intensity is not enough to illuminate during the process. The blower used is very similar to the shape of a fan. This is not in accordance with production house standards and should be replaced with a room blower that has higher in speed because the production process uses high temperatures as Heating Ventilating Air Conditioning (HVAC). For building doors, it is also seen that there is only one door as the entrance and exit gate, so the additional one needs to be added so that it does not depend on one door only.

Drying places need to be made in the form of rack. The thing that also needs to be considered in the building is the manufacture of Waste Water Treatment Plant (WWTP) channels. WWTP for the fish and fruit processing industry must be differentiated so that the handling of sanitation and hygiene will be easier. The conditions found in production houses can be seen in Figure 5 to Figure 6, Figure 7, and Figure 8.

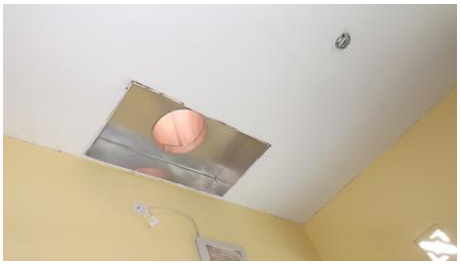

Figure 5. Ceiling and lighting

Figure 6. Ventilation and window of SME center

Figure 7. Blower

Figure 8. Floor

Sanitation Facility

Water source comes from well water. The use of water for processing and sanitation or cleaning is not differentiated. Well water is directly used for processing and has not been tested for its quality. According to Yunita and Dwipanti (2010), if turbid water used and there is absence of regular water checks can result in cross contamination of food products.

The location of toilet is outside the production room. There is one toilet that can be used for all total 6 employees. Sanitation of the building has been equipped with a sink to wash hands in the processing room, but hand washing soap, towels or other means are not provided to dry hands and covered trash cans. Shoe rinse (foot dipping) is provided. The dressing room is separate from the production room but is integrated with the storage space for raw materials (flavor, packaging, etc.). According to Anggraeni *et al* (2019), the provision of sanitation facilities that have not been maximal, can cause cross contamination of products so that the hygiene is not maintained.

The central processing unit does not yet have a liquid waste processing facility. Therefore it is necessary to build an IPAL of at least 3. According to Yunita (2008), processed wastewater is usually treated first, in which the waste is flowed directly into the septic tank and then sucked into the pump and into a one meter depth reservoir coral, gravel, palm fiber, sand, gravel with a thickness of 20 cm each and the upper part planted with plants that can bind poisons, i.e. walini plants. These plants function to bind poisons, and the layers that are formed serve to filter out impurities. Filtering causes the water that comes out of the reservoir to be clear and harmless, then it directly flows into the river. Solid waste is not processed but is immediately disposed of to landfill (final disposal site) or burned. Sanitation facilities in production houses such as water tanks, and sink are shown in Figure 9 and Figure 10.

Figure 9. Water tank

Figure 10. Sink

Production Equipment

The equipment in the packing room should consist of a freezer and sealer, then equipment as a container for the product that must be maintained from hygiene. All equipment is washed immediately after being used by clean water and soap (detergent). Hot water is used for the final rinsing after washing the equipment. The process of cleaning or washing processing facilities including equipment is a routine process that is very important to ensure the quality and safety of food products produced by a food producer.

At the SME center, packaging room is separated with freezer. Freezers in SME are only used for storage of raw materials. SME of fish processing does not provide freezers for storage of fish crackers, because the fish products that is produced are dry. However, SME that process fruit need to provide a freezer as storage product because the products produced are wet (brownies, fruit chili, syrup). The space for the packaging process still looks empty therefore the need for production room must be completed (Figure 11).

Figure 11. Packaging room

In addition, production equipment should be made of strong materials, durable, non-toxic, easy to move or dissamble so that they are easy to clean and maintain and facilitate monitoring and control of pests (National Agency of Drugs and Food Control, 2012). Cleaning equipment is absolutely done as a form of treatment. This condition is related to the remnants of the previous production material which contains microbes to shorten the shelf life of the product, thereby reducing the quality of the product from the next production process. The main machines and equipment needed in the manufacture of products are: scales, pulper (fruit crushers), screener (filter), homogenizer (mixing material), pasteurizer, bottle sterilizer (bottle sterilizer), and freezer (refrigerator). Supporting equipments needed are: plastic containers (containers), buckets, stainless pans, knives, and other kitchen utensils needed in the preparation process of the material (especially washing and stripping).

Employee Health and Hygiene

The cloth must be changed every day to prevent contamination to the product. Employees working in the processing center unit are in a healthy condition, but no periodic checks are carried out. This greatly affects the health of employees processing. Employees who are sick do not handle the production, and

there is no recording of employee health. Some hygiene practices that have not been carried out by employees in the processing unit include the use of work clothes when carrying out production, namely laboratory suits and masks, and special slippers worn in the packaging room (sterile room) during the process of filling products into packaging containers and the clothes are not used when out of the packaging room. Employees have used masks during the packaging process, washed their hands after doing a job or process, did not eat, spit, sneeze, and did not smoke while doing production.

Storage

The storage space for raw materials and final products needs to be separated. The storage space for raw materials also differentiates between wet raw materials and dry raw materials. The storage system is first in first out (FIFO), both for storing raw materials, and storing end products.

Raw materials must be stored in a warehouse in clean room conditions, smooth air circulation, and not in direct contact with floors, walls and ceilings. Food additives must be stored on a shelf in the processing room. Wet raw material that is easily damaged is immediately stored in the freezer in the processing room. Specific records of storage (using a card system that contains; name of material, date of receipt, origin of material, number of receipts, date of warehouse exit, final remaining packaging, date of inspection, and inspection results) have not been carried out. SME only makes a simple record of the number of entering and leaving items.

The raw material stored in the production room is the raw material used only for 3 production times. The final product is stored separately from the processing room. The condition of the storage room is quite clean and there is a record of products entering and leaving.

The warehouses in processing industry should be divided into two, which are: material warehouse and product warehouse. Meanwhile the raw material warehouse needs to be divided into wet and dry warehouses. Ideally, the materials sent by suppliers are stored in material warehouse and the products produced are stored in the finished goods warehouse that has been provided by the SME Center management according to the warehouse standard. Based on observation, the raw materials and finished products are stored in each SME warehouse.

In addition, warehouse conditions will greatly determine the quality of the product produced. In materials, warehouse conditions with extreme temperature changes will cause damage to the material. This condition will be very detrimental to business actors. According to Purnomo and Adiono (1987) in Handajani (1996), the conditions of storage temperature affect the total number of microbes because temperature affects the metabolism and growth of microorganisms. While low air humidity can accelerate the transpiration process so that it can cause considerable weight shrinkage during storage process. Similarly, the product storage room, temperature and humidity must be kept as optimal as possible to maintain product shelf life.

Quality of Final Products

Organoleptic examination is carried out on the product before being sent to market. Chemical, physical, and microbiological examination of products must be done in the laboratory, as well as in a planned (periodic) manner. The organoleptic inspection procedure is carried out in a sampling manner for each product that is ready to be marketed, then the product is stored in the laboratory. Storage of this product is done to find out how the condition of the product that has been circulating in the market.

Laboratory and Examination

The product processing unit does not have a special laboratory for testing the end products. SME Center in Balikpapan City has to have a laboratory (currently there is no testing laboratory). The final product inspection is carried out periodically in the laboratory so that the products quality entered in the market is maintained.

Packaging

The type of packaging used is polypropylene-based packaging which is lightweight, easy to form, large tensile strength, not easily torn and also food grade. Packaging is supplied from the Surabaya area.

Product Description or Labelling

The information stated on the label consists of product name (trademark), product expiration date, producer name, product composition, product net weight, PIRT number and halal certification logo from MUI (Indonesian Ulama Council). However, all of these products are not uniform, all are listed, some are not halal labels, some have number of P-IRT number, and some only include trademarks and manufacturers. In the future, all the skills in the integrated center in Balikpapan can be uniform in terms of labeling on the packaging. Suggestions for improvement from the author for labeling are to include the number of nutritional adequacy (AKG) and the inclusion of SNI so that SME products can enter in the modern retail and supermarkets.

Transportation

Product distribution tools must be available. Distribution equipment used is a four-wheeled vehicle, such as a private car to guarantee the product remains good and distribution process can be maintained. Shocks when distributing make the products in cool boxes vulnerable to damage. The vehicle cooling system (AC) must be turned on frequently and the hygiene of the car is maintained. Car cleaning management must be regulated by SME and submitted to each employee who distributes the product.

Management and Supervision

Existing buildings must be well maintained, especially in the production room. Transportation equipment used for distribution requires periodic maintenance. The inside of production room should be needy. Monitoring of the effectiveness of the sanitation process activities both employee sanitation, tools, and space is very important.

Preparation of Material (Pre-Process)

In order to produce safe and quality products, the process of preparing materials for both raw and auxiliary materials is an absolute quality control procedure. The raw material of fish and fruit received must be off from contamination, both in physical, chemical and microbiological. Raw materials can be the main source to endanger the safety of the products produced. The condition of raw materials that is not suitable for consumption will produce inappropriate products even though they have been processed. Supervision of auxiliary material especially food additives is also mandatory. The use of food additives must be chosen from the safest type for consumption. It is recommend that in the process of storing each type of material is labeled or coded to avoid the occurrence of errors in its use. Chemical additives are placed in special storage cabinets to make them safer.

In general, it can be said that the stages of material preparation have fulfilled most of the stipulated requirements despite the fact that there are still many shortcomings. Raw materials received by processing unit do not fully meet the quality standards set. Fish supplied to SME are the fresh one that has been cleaned. SME only accept clean fish. However, fish supply is not sustainable due to the scarcity of raw materials. This blocked out the production process. The raw material for the fruit is also seasonal, as so every season changes, SME produces processed products with different fruits. Based on observation, the stored fish and fruit are not labeled, so there is no first in first out system in this pre-process.

Production Process of Fisheries and Agriculture

The production process generally includes 3 groups of activity components, involving preparation and handling of materials (including raw materials and auxiliary materials), processing, and packaging up to storage (National Agency of Drugs and Food Control , 2012). The sorting process (sorting of fish and fruit) has been carried out in order to separate the rotten or damaged material to be spared of contamination against other high-quality materials. The fruit sorting process has to pay attention to the fruit maturity level, while the fish sorting process needs more attention to its freshness which can be seen from the organoleptic results. This is related to the quality and yield produced. Field observation shows that fish and fruit have been handled well.

According to Thaheer (2005) the production process and the health and hygiene of workers involved in the processing process must be considered. This becomes very essential to ensure the safety of the products

produced and prevent the spread of disease through foods. According to the P2HP Directorate (2010), there are three groups of people who are not allowed to be involved in the food processing process, which are: sufferers of respiratory infections, people with digestive infections, and sufferers of skin infections. These three types of diseases can be transferred to other people through food that is processed or served by the sufferers. The hygiene of workers must be considered to prevent contamination of food products handled. Therefore, workers must follow adequate sanitation procedures, including: washing hands before work, wearing an effective hair cover, wearing a mask covering the mouth and nose, may not smoking, eating and drinking around the processing area. These regulations have been stipulated in the SME center, yet there are some workers who are lack of discipline in their implementation.

Enviromental Conservation

The efforts to implement green factory have also been done in surrounding. The by-product of fish and fruit processing is used by several people as flour and feed. For the fruits, farmers can use its by-product as providers of rootstock seeds. Skin and pulp have been used as animal feed. Environmental conservation can be endeavored also by the use of ultrafiltration membranes for purifiers and transforming brackish water into drinkable water as an effort to reduce the use of groundwater that exceeds the limit.

CONCLUSION

SME Center still needs a lot of improvements in terms of buildings and production processes since it has D grade and not feasible for an industry. Buildings that are far off from flooding and pollution need to be considered. Clean water and waste management must also be noticed while the production process of GMP training for employees of SME center X Industry needs to be done to gain quality products.

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