Evaluation of good manufacturing practices (GMPs) in traditional fish cracker home industries in Pangkahkulon-Gresik, East Java, Indonesia

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Abstract. Fish crackers are one of the very popular snacks in Indonesia. The production processed of this snack, which starts from handling of raw materials to packaging, must be in accordance with food safety that has been determined by the government through the Food and Drug Supervisory Agency. This study aims to evaluate the implementation of Good Manufacturing Practices (GMPs) in 5 fish cracker home industries in Pangkahkulon Village, Ujungpangkah, Gresik District. The evaluation method used is based on the Indonesia Minister of Industry Regulation No.75/M-Ind/Per/7/2010 and regulation of the head of BPOM No. HK/03.1.23.04.12.2200 of 2012, both was concerning the procedures for Inspection of Home Industry Food Production Facilities. The results indicate that the home industry has not implemented GMPs in accordance with BPOM regulations so that the five SMEs can be categorized at the lowest level (level IV). Some critical findings include the absence of closed waste bins, animals and pets that roam around the production site, do not have a record of the production process and do not have a label that shows the list of ingredients used along with the nutritional value available.

1. Introduction
Pangkahkulon Village is one of the villages on the northern coast of Gresik Regency. According to the Central Statistics Agency (BPS) of Gresik Regency in the year of 2016 this village has an area of approximately 22 km\textsuperscript{2} which is divided into four hamlets. Pangkah Kulon Village is administratively included in the Ujung Pangkah sub-district, Gresik Regency. The northern border of the village is the Java Sea, to the south is Kebonagung Village and Pangkah Wetan Village, while in the west is Banyuurip Village. In 2017, more than 70\% of the Pangkahkulon Village area was fish and shrimp ponds. The population in this village is 8,268 people so that the population density is 380 people/km\textsuperscript{2}, and most (approximately 66\%) are aged between 17-59 years (productive age). Based on the results of the Pangkah Kulon Village Potential Mapping activity funded by the UB Doctoral Service program in 2017, the number of SMEs for fishery products reached 98 SMEs/Home Industries dominated by fish cracker SMEs as many as 68 SMEs [1].
Fish crackers are a traditional food that many Indonesians enjoy [2], [3], Thailand [4], Malaysia [5] and other ASEAN countries [6]. Based on the Indonesian National Standard (SNI) No. 2713.1:2009 Part 1 concerning specifications for fish crackers which has been revised to SNI 8272:2016 concerning Fish, shrimp and mollusk crackers, fish crackers are processed fishery products with fish raw materials undergoing processing, boiling and drying treatment. Crackers are generally made from several carbohydrate-based ingredients in the form of flour, namely rice flour, sago, corn, tapioca which undergoes a gelatinization process by heating at a certain temperature, then formed, then thinly sliced and dried before entering the final stage, namely heating to a temperature of high [7]. The process of making crackers starting from mixing ingredients, making dough to the process of packaging crackers is generally done manually or by using a simple machine. Based on surveys and preliminary observations of the production process carried out at several fish cracker SMEs, it was concluded that most of the fish cracker production processes were thought to have not implemented good food safety quality standards. The findings obtained during the preliminary survey included problems related to the cleanliness of production equipment, lack of quality control of crackers, location and cleanliness of buildings and production facilities, water supply, hygiene and sanitation facilities and activities and the use of unhealthy food additives (FA). This problem is actually also a common problem that is often found in other SMEs in such as fish crackers [8], [9] Smoked Fish [1], Corn Crackers [10] shrimp paste and fish paste [11] and Pindang fish [12].

This research aims to evaluate the implementation of Good Manufacturing Practices (GMPs) in 5 fish cracker home industries in Pangkahkulon Village, Ujungpangkah, Gresik District. The findings of this study are essential for the development of SMEs and activities that must be carried out in order to improve quality standards and food safety of fishery products.

2. Methods
This research was conducted in 5 SMEs located in Pangkah Kulon Fish Cracker Center Village in Ujung Pangkah District, Gresik Regency. The method used in this research is descriptive method, which describes the observed phenomena, events, technology application, and business conditions of samples/object. The procedure in this study following methods proposed by latif [10], [13]. This methods is divided into 3 stages, namely (1) observation of the surrounding environment and buildings and production facilities (2) observation, interviews, and documentation of all activities related to the production process carried out by the five SMEs. (3) Observation directly during the process of making fish crackers to be able to see precisely the movement and behavior of workers at work. The results of the three processes above are matched with the guidelines for food safety and hygiene adapted from the Minister of Industry of the Republic of Indonesia No. 7/ M-Ind /Per /7/2010 and KBPOM regulation no. HK 03.1.23.04.12.22007 year 2012 as follows (Table 1).

Table 1. References to the appraisal of GFPM-IRT

| Rating levels | Amount of Deviation Value | Category |
|---------------|---------------------------|----------|
| I             | Unfavorably 0, Serious 0, Mayor 1, Minor 1 | A (Very Good) |
| II            | 0, 0, 2-3, 1 | B (Good) |
| III           | 0, 1-4, 5 or More, Not used | C (Average) |
| IV            | Yes, Not used, Not used, Not used | D (Less) |

Source: [10,14]
3. Results and discussion
In this research, the scope of the study observed in fish cracker SMEs was from the process of selecting and mixing raw materials to the packaging process. The stages of the production process are selecting raw materials, mixing and making dough, forming dough, steaming, cooling, cutting, drying, and packaging. There are several scopes of observations and inspections [10], [13], [15], [16], [17] carried out in the context of evaluating the implementation of GMP as follows (Table 2).

3.1 Location and production environment
The location of all SMEs were closing to the main road of Pangkahkulon Village which can accessed by van and medium truck except sample number 5 (NIK) are only accessesed by motorcicle. Outside the production site, such as roads, parking lots and yards are well managed.

3.2 Buildings and facilities
The surface of the floor, walls, ceiling, and ventilation is good and not slippery. But most of them are not easy to wash because of their position. The inside of the walls are made of bricks and plastered with mortar then painted in a light color but looks difficult to clean from dirt. The lighting design in the production room is relatively good because each room has its own lighting system. The door to the room is made of dark wood or plywood. so that dirt is not easily visible. In general, the five SMEs have met the minimum standards in this element.

3.3 Production equipment
Production equipment in general is decent and clean made of stainless steel, but there are SMEs whose production equipment is poorly maintained and looks dirty, namely in sample 5 (Figure 1). As for the other 4 SMEs, the surface of the cracker dough making machine, the cracker cutting machine already looks clean and decent.

Figure 1. Production equipment : Mixer

3.4 Water supply
Clean water used by SMEs comes from ground wells and village water pipelines so that cleanliness is guaranteed. This water is used by SMEs to clean raw materials, production equipment and also for cooking purposes.

3.5 Sanitation and employee health and hygiene
Workers do not use gloves at work. There are no special hand washing facilities for workers, the existing hand washing facilities are in the bathroom complete with soap. Based on observations, workers always wash their hands before handling raw materials or products. In general, the cleanliness of workers is well guaranteed, there is only 1 sample that is not good, namely number 2 (FAT)

3.6 Storage condition of raw materials and products
Raw materials and products are generally still stored in the same room even though they are spaced apart and not mixed together. There are only 2 SMEs that separate raw materials and products. The
cleanliness of the storage room is guaranteed with a floor made of ceramic so that it is easy to clean (Figure 2).

![Figure 2. Product storage](image)

### 3.7 Product label
Products are generally not specifically labeled, only wrapped in thin ordinary plastic. The product should be packaged in appropriate plastic with a label along with information on the ingredients and other information such as mutrisi content and distribution permit number (Figure 3)

![Figure 3. Product are generally without appropriate packaging and labels](image)

### 3.8 Production process supervision and product recall
The production process carried out by the five SMEs is carried out directly with supervision by the owner, but only 1 SME has clearly had a person responsible for controlling the quality of production. So if there is a product that does not comply with the standard, it will not be sold or sold at a lower price than it should be. Products that have been circulated to the market are generally sold directly to buyers without a complex supply chain system. This is because generally products are only sold locally and regionally in one province, so there is no product return system if there are defective items that have already been sold.

### 3.9 Documentation of production process
The production process is not well recorded in a clear bookkeeping system. This is actually common in small-scale SMEs because of the low awareness and ability in business management. The records carried out are only related to expenses and income from the business, while the production process and the product validity period to date are not well documented.

| Inspection Topic | Sample 1 (DZA) | Sample 2 (FAT) | Sample 3 (KHA) | Sample 4 (NIH) | Sample 5 (NIK) |
|------------------|----------------|---------------|----------------|----------------|----------------|
| Location / Production Area | Location / Production Area | Location / Production Area | Location / Production Area | Location / Production Area | Location / Production Area |
| Environmental | MI | MA | SE | CR | MI | MA | SE | CR | MI | MA | SE | CR | MI | MA | SE | CR |
| Hygiene | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

![Table 2. GMPs Evaluation Result](image)
| Inspection Topic | Sample 1 (DZA) | Sample 2 (FAT) | Sample 3 (KHA) | Sample 4 (NIH) | Sample 5 (NIK) |
|------------------|---------------|---------------|----------------|----------------|----------------|
| **Building and Facilities Situation** |               |               |                |                |                |
| 2 Production Room | 0             | 0             | 0              | 0              | 0              |
| 3 Floor Situation | 0             | 0             | 0              | 1              | 0              |
| 4 Room ventilation Production equipment/Machinery | 0             | 1             | 0              | 0              | 1              |
| **Surface Condition Maintenance of production equipment Measuring scale Status (accuracy and precision)** | 0             | 0             | 0              | 0              | 0              |
| **Water Supply** |               |               |                |                |                |
| 8 Availability Clean Water | 0             | 0             | 0              | 0              | 0              |
| 9 Source of water supply Sanitation and hygiene |               |               |                |                |                |
| **Cleaning of Facility status** | 0             | 1             | 0              | 0              | 1              |
| 11 Status of Hand wash availability | 0             | 0             | 0              | 0              | 0              |
| 12 Toilet availability and Condition | 0             | 0             | 0              | 0              | 0              |
| 13 Trash Bin Condition | 1             | 1             | 0              | 0              | 0              |
| **Health status of worker** |               |               |                |                |                |
| 14 Worker Dressing | 0             | 0             | 0              | 0              | 0              |
| 15 Hand Washing habit Eating and or drinking during production process Hygiene manager | 1             | 1             | 1              | 1              | 1              |
| 17 Availability Maintenance and Program For Hygiene and Sanitation | 0             | 0             | 0              | 0              | 0              |
| 18 Chemical /disinfectant storage Hygiene Program implementation (routine) | 0             | 0             | 0              | 0              | 0              |
| 20 Pet disturbing (pet nuisance) | 0             | 0             | 0              | 0              | 0              |
| 21 Trash management Storage condition of raw materials and products | 1             | 1             | 0              | 0              | 1              |
| **Raw material and Product stored in the same area Clean and used equipment storage status** | 1             | 1             | 0              | 0              | 1              |
| **Process Controll** |               |               |                |                |                |
| 23 Documentation of production line Food production line implementation | 1             | 1             | 1              | 1              | 1              |
| 24 Food Packaging application | 0             | 0             | 0              | 0              | 0              |
| 25 | 0             | 0             | 1              | 0              | 0              |
| 26 | 1             | 1             | 1              | 1              | 1              |
| 27 | 0             | 0             | 0              | 0              | 0              |
### Inspection Topic

| Inspection Topic                        | Sample 1 (DZA) | Sample 2 (FAT) | Sample 3 (KHA) | Sample 4 (NIH) | Sample 5 (NIK) |
|-----------------------------------------|----------------|----------------|----------------|----------------|----------------|
| 28 Food additive (FA) information      | 1              | 1              | 1              | 1              | 1              |
| 29 Measuring scale                     | 0              | 0              | 0              | 0              | 0              |
| 30 Information list of Food Ingredient | 1              | 1              | 1              | 1              | 1              |
| 31 Nutrition facts                     | 1              | 1              | 1              | 1              | 1              |
| 32 Supervisor qualification            | 1              | 1              | 1              | 0              | 1              |
| 33 Monitoring Process                  | 0              | 1              | 0              | 1              | 1              |
| 34 Mechanism and Implementation of     | 0              | 0              | 0              | 0              | 0              |
| 35 Documentation of Production process | 1              | 1              | 0              | 1              | 1              |
| 36 Documentation data                  | 1              | 1              | 1              | 1              | 1              |
| 37 Worker training Program and Schedule| 1              | 1              | 1              | 1              | 1              |

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### 4. Conclusion

The results indicate that the 5 Fish Crackers home industry has not implemented GMPs in accordance with BPOM regulations so that the five SMEs (UKM) can be categorized at the low level (level III& IV). Therefore several actions should be taken to overcome this condition. Those actions not limited to GMPs training for employee, Food production and distribution permit (PIRT) registration, and introduction of semi modern technology.
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Acknowledgement
This community service activity is part of a series of Partner Village Development Programs (PPDM) Universitas Brawijaya. The author would like to thank LPPM-UB and DRPM Ministry of Research and Technology/BRIN. This activity is financed by the Directorate of Research and Community Service, Deputy for Strengthening Research and Development, Ministry of Research and Technology / National Research and Innovation Agency with a Funding Agreement for the Implementation of Community Service Programs Number: 043/SP2H/PPM/DRPM/2021, March 23, 2021.