HASIL CEK_5.+Proofread_Jihan+Nahda_CLEAN

by Universitas Ahmad Dahlan Yogyakarta 46

Submission date: 08-Nov-2023 01:43PM (UTC+0700)
Submission ID: 2221481153
File name: 5._Proofread_Jihan_Nahda_CLEAN.pdf (429.65K)
Word count: 6720
Character count: 36129

Accepted: 05/08/2023, Revised: 06/10/2023, Published: 31/10/2023

EVALUATION OF THE IMPLEMENTATION OF GOOD MANUFACTURING PRACTICES (GMP) AT PT XYZ UNIT CENGKARENG

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ABSTRACT

The airline catering industry faces challenges in providing food due to diverse requirements and constrained space and resources on airplanes. This research investigates the application of Good Manufacturing Practices (GMP) in aviation catering production, exploring its potential to enhance product quality, adhere to safety and health standards, and satisfy customer expectations. The research methods employed encompassed observation, interviews, and a thorough examination of credible literature sources.The overall GMP implementation at PT XYZ demonstrated 93.59% compliance and 6.41% non-compliance. In conclusion, the adoption of GMP in aviation catering leads to enhanced product quality and compliance with health standards. Through this approach, airline catering companies can ensure that their products meet both customer quality expectations and health regulations.

Keywords: Evaluation, Food safety, Good Manufacturing Practices, Inflight catering

INTRODUCTION

The provision of in-flight meals is an important service offered by airlines to passengers in the commercial aviation industry (Yılmaz & Yücel, 2021). Aircraft catering is a crucial element in this sector, as it has a significant impact on the comfort and safety levels of passengers (Law, 2011). As competition in the aviation industry increases, the quality of food served in-flight has become a major concern. High food safety during processing and serving by aviation caterers is very important. This is done to prevent the possibility of contamination or the risk of poisoning. When a food poisoning situation occurs, it can have serious consequences for passengers as well as the flight crew involved, which can ultimately threaten the safety of the flight itself (Hovora, 2001; Law, 2011).

Foodborne diseases are a constant threat to public health. The emergence of foodborne disease can be caused by contaminated food and water (Jones & Angulo, 2006; Saeed *et al.,* 2021). Based on information from the World Health Organization (WHO), there are an estimated 600 million cases of diseases caused by food contaminated with microorganisms such as bacteria, fungi, viruses and also parasites as well as natural toxic substances, chemicals and genetic factors (Anditiarina *et al.,* 2020; Gonzales-Barron *et al.,* 2021; Jones & Angulo, 2006). In Indonesia, statistics released by BPOM in 2021 showed that the food service industry contributed a percentage of 29% as a cause of food poisoning, placing it as the second highest cause after household cooking (Indraswari, 2023). From 2010 to 2020, Chinese catering service facilities reported 18,331 outbreaks, which resulted in 206,718 illnesses, 68,561 hospitalizations, and 201 deaths (Lu *et al.,* 2023). This is done to prevent the possibility of contamination or the risk of poisoning. When a food poisoning situation occurs, it can have serious consequences for passengers as well as the flight crew involved, which can ultimately threaten the safety of the flight itself (Hovora, 2001; Law, 2011).

Some research results show that there are cases of foodborne diseases found in the in-flight catering industry. In 2013, there was an incident of food poisoning on a China Air plane that happened to passengers after consuming pancakes from the airplane service. In 2016, passengers on an Air Asia flight on the Kuala Lumpur-Serawak route found lizard carcasses in an inflight nasi lemak dish (Wicaksani & Adriyani, 2018). Grout & Speakman (2020) have summarized at least 13 foodborne disease cases associated with commercial air transportation, during 1991-2011. The high rate of food poisoning in the catering industry on air transportation is thought to be due to the fact that the food served on board is prepared in industrial kitchens adjacent to the airport and then transported to the aircraft for storage, heating and serving. The process is quite complex, leading to the risk of food contamination (Grout & Speakman, 2019). In addition, some of the factors that influence the occurrence of foodborne illness include the level of pathogenicity of the causative agent, the method of food distribution, the environment that favors the development of the pathogenic agent and the susceptibility of the host. An emerging issue is foodborne illness caused by bacteria, viruses and protozoa (Gould *et al.,* 2013; Park *et al.,* 2018).

One of the standards that can be applied in the aircraft catering production process to prevent foodborne disease is Good Manufacturing Practices (GMP). GMP is a set of principles and guidelines created to ensure that food and beverages are produced with a high level of safety and quality and meet applicable health standards. The establishment of GMP standards has the potential to reduce the risk of food contamination and poisoning, and improve product quality and safety (Sari, 2016; Setyawati, 2020).

GMP implementation has great significance in ensuring the quality of food and beverages throughout the production, storage and delivery phases, in the context of aircraft catering services. To illustrate, the application of GMP in aviation catering services can ensure proper storage of fresh food ingredients, accurate washing and sterilization of kitchen equipment, and serving of food with hygienic standards and appropriate procedures. Some potential sources of contamination include food handlers, processing equipment and tableware, and the risk of cross-contamination (Grout & Speakman, 2019, 2020; Wicaksani & Adriyani, 2018).

Aircraft catering companies are able to ensure that the products produced comply with the quality standards desired by customers and meet applicable health regulations, through the implementation of GMP guidelines. In addition, the implementation of GMP is also able to improve efficiency and productivity in the production process, resulting in reduced production costs and increased profits for the company. Therefore, the implementation of GMP plays an important role in improving the quality and competitiveness of aircraft catering products.

METHODOLOGY

Materials

The materials used in this research are raw and additional materials needed in the food production process as well as primary data obtained through direct observation and interviews and secondary data sourced from journals, the internet, books related to the topic.

Tools

The tools used in the research include all elements related to a series of production activities. Observations and interviews related to the stages of product manufacturing.

Research Design

This research was conducted using a qualitative design with a cross sectional method, which describes the application of food safety in the food processing process at the research location, then adjusted to the applicable theories, standards and policies.

Research Stages

This research was conducted at PT XYZ within two months, starting from March 6, 2023 to May 5, 2023. The stages of this research are planning, data collection, evaluation, and report preparation.

Methods

Data was obtained from company records and direct observations, as for the data taken, starting from raw materials to distribution. In addition to observations, interviews were also held with supervisors from the company and employees who were directly involved in handling the production process. In supporting the theoretical basis needed for this research, studies were also conducted from various literature sources related to the principles of Good Manufacturing Practices (GMP).

Analysis Procedure

Data was collected by observing various processes, starting from the arrival of raw materials to the final stage of packaging and documentation. There are 11 aspects that are considered in determining whether a facility meets the specified requirements. The research instrument used is a checksheet containing questions related to the assessment criteria.

RESULTS AND DISCUSSION

Table 1. Percentage of Good Manufacturing Practices (GMP) Implementation Based on ISO 22000

No.	Assessment Aspect	Number of Requirements	Total		Percentage	
			Conformance	Non-Conformance	Conformance	Non-Conformance
1.	Food Processing Site Structure & Layout	17	17	0	100.00%	0.00%
2.	Pest Control	6	5	1	83.33%	16.67%
3.	Waste Management	6	6	0	100.00%	0.00%
4.	Facility Desaign Hygiene	13	11	2	84.62%	15.38%
5.	Behavior of Food Handlers	15	14	1	93.33%	6.67%
6.	Production Equipment	18	18	0	100.00%	0.00%
7.	Temperatur & Food Handling Temperature & Time	14	14	0	100.00%	0.00%
8.	Raw Material Management	16	16	0	100.00%	0.00%
9.	Food Storage	35	33	2	94.29%	5.71%
10.	Food Preparation	11	10	1	90.91%	9.09%
11.	Food Distribution	5	4	1	80.00%	20.00%
	Total	156	148	8	94.87%	5.12%

Good Manufacturing Practices (GMP) are the key principles and activities required to maintain hygiene at all stages of the food chain and ensure that the production, handling and presentation of the final product meet safety standards for human consumption (Meghwal *et al.,* 2017; Sudaryantiningsih & Pambudi, 2022; Zubir *et al.,* 2022). PT XYZ has implemented GMP in its production process with the aim of producing safe and quality products. The implementation of Good Manufacturing Practices by PT XYZ refers to the company's policy references in terms of production and service to customers. Based on the observations made at PT XYZ, the evaluation of the feasibility of implementing Good Manufacturing Practices (GMP) is calculated using the percentage of Good Manufacturing Practices (GMP) implementation which can be seen in Table 1.

From the observations made at PT XYZ, it was found that from a total of 156 aspects of Good Manufacturing Practices (GMP), 8 did not meet the criteria. The overall non-conformity of the application of Good Manufacturing Practices (GMP) has a percentage of 5.12% with the percentage of conformity of the application of Good Manufacturing Practices (GMP) as a whole, which is 94.87%. The provisions for the application of Good Manufacturing Practices (GMP) are described in the following scope:

1. Building construction and layout

Figure 1 shows the construction and layout of the building at PT XYZ. PT XYZ has met the requirements according to the prevailing situation at the production site. The percentage of results from this aspect shows 0% non-conformity and 100% conformity. This conformity can be said to be 100% because the criteria and provisions in Permenkes No. 1096/Menkes/Per/VI/2011 have been fulfilled. Overall, the work area layout has been well organized. The work area is divided separately for the raw material and cooked material processing stages, with a clear separation between the raw material preparation room and the cooked material processing room. An adequate amount of production space has been provided. The production hallway can be seen in Figure 2:

Figure 1. Construction and Building Layout

There are 17 criteria that need to be met in terms of buildings and production space. The design, construction and maintenance of buildings should be tailored to the characteristics of the operational process, potential food safety risks that may arise from the process, measures to prevent contamination, durability of the construction, and elimination of risks to the product. Consideration should also be given to potential sources of contamination from the surrounding environment. Area boundaries should be clearly identified, and all areas should be kept free from cross-contamination. Outside areas should be kept free of vegetation and fly numbers controlled. Clean trash cans should be provided, and there should be no piles of items that could become breeding grounds for rats.

The layout of areas in production must be designed, created and maintained to ensure sanitation and efficient work practices. The floor structure at PT XYZ is made according to space requirements, using epoxy flooring in the production area. This floor has the characteristics of water resistance, resistance to salt, acid and other chemicals, resistance to bases, and has a flat, smooth, non-slip surface, not prone to peeling, and easy to clean. The floor in the production room, which also includes the washing area, bathroom, hand washing

area and toilet facilities, is made with sufficient slope to facilitate water flow. In addition, the floor used has been equipped with a drain to facilitate the cleaning process of stagnant water. The epoxy floor is applied to all production rooms, except in the administration area and other facilities such as prayer rooms, canteens, and areas outside the production room.

Figure 2. Production Room Aisle of PT. XYZ

The wall construction in all parts of the production area uses bright white ceramic material with a smooth surface, not prone to peeling, easy to clean, not damp, and has waterproof properties. Wall areas that are continuously exposed to splashing water are coated with waterproof material up to 2 meters from the floor surface with a smooth surface, does not retain dust, and has a bright color appearance. This is so that during the food production process, the risk of foreign object contamination in the product can be minimized. The meeting angle between the wall and the floor is designed with a curved shape to facilitate the cleaning process and prevent the accumulation of dust or dirt. The choice of bright white color is done to facilitate the identification of dirt that may stick, so that it can be cleaned immediately to prevent potential bacterial contamination (Meghwal *et al.,* 2017).

The construction used on the roof and ceiling is made of aluminum which is waterproof, has a flat surface that is easy to clean, strong, does not leak, is resistant to peeling, is resistant to cracks, has no holes, and has a smooth surface. The ceiling height reaches 3 meters from the floor level to avoid hot temperatures in the room, which can indicate obstruction of air circulation in the processing area. The lighting provided is of sufficient intensity to be able to perform inspection and cleaning, and to carry out work efficiently. For each food processing room and handwashing area, rooftop lighting is installed with a minimum brightness of 220 lux and covered with a non-glass cover to avoid possible cross-contamination due to broken lights. All lighting is organized so that it should not cause glare so as not to produce distracting shadows (Sato *et al.,* 2020; Sikora, 2015).

In the production room, the doors use strong and durable plastic curtains to prevent air from entering from outside and this plastic material makes it easier to clean the doors. In some parts of the room, such as the laboratory, aluminum and iron materials are used instead of plastic curtains because the laboratory room is only intended for laboratory staff and also to maintain the safety of the items inside. The door in the chiller room uses iron construction with fiber which aims to inhibit airflow which results in temperature changes in the chiller. The windows in each room use transparent glass so that any dirt can be seen and cleaned immediately. The use of transparent glass also allows visiting guests to see the production process from outside when they come, with a window height of one meter from the floor surface. In some production areas, such as the hot kitchen, washing area, and raw material receiving room, the use of air conditioning is not applied. In the hot kitchen, each cooking utensil has a chimney that functions as a channel for sucking smoke, steam, gas, and can

absorb odors. The surface of the work table where the ingredients are processed is made of aluminum which does not absorb water, is strong, has a flat surface, and can be easily sanitized.

2. Sanitation Facilities

Sanitation facilities include several parts, such as water collection points, water and waste disposal areas, hand washing stations, and toilet facilities (Setyawati, 2020). PT XYZ successfully fulfills 11 out of 13 requirements. However, in this case, the number of toilet and bathroom facilities available at PT XYZ still does not meet the requirements stated in Permenkes No. 1096/Menkes/Per/VI/2011, where at least 1 toilet must be available for every 10 employees. Evaluation of this aspect resulted in a conformity rate of 84.62%. Clean water supply at PT XYZ is ensured to be sufficient for production purposes and meet health quality requirements. This rule aims to maintain public health. The working and production environment at PT XYZ is kept in a clean and organized condition. Cleaners always monitor the cleanliness and condition of each room, and are always ready to clean if needed. Soap, desiccant, and paper towels are always available at each handwashing facility. Similar results were also found in previous studies. GMP implementation at Wong Solo Seutui Restaurant in Banda Aceh City shows good results. It's just that there are some notes to be improved, such as regular monitoring of available sanitation facilities (Zubir *et al.,* 2022).

3. Personnel Hygiene

Employees play an important role in maintaining sanitary hygiene because employees are in direct contact with food. Employees have a requirement to be in good health by wearing uniforms and special work shoes, using personal protective equipment in the form of special clothes, aprons, masks, hairnets, gloves, and safety shoes. Employees involved in the production process are prohibited from having long or colored nails, and are not allowed to use accessories or jewelry, prohibited from eating, drinking or smoking in the production area (Sikora, 2015; Zubir *et al.,* 2022). In addition, employees are encouraged to always wash their hands before and after work. Additional checks carried out when entering the production room are checking through the air shower and using a hair roll which is useful for removing dirt on work clothes such as hair loss. The health and hygiene standards applied to workers certainly ensure that workers who come into direct or indirect contact with processed food will not contaminate it. All employees are required to implement sanitation practices, wear PPE in accordance with applicable regulations, and change gloves every time they process or serve new dishes.There are a total of 15 standards for the personnel hygiene aspect, but PT XYZ still has a non-conformance rate of 6.67%, especially during food preparation, where some employees still violate the rules by not complying with the use of appropriate PPE.

4. Waste Disposal

Waste management is carried out to ensure that processed food products are kept safe from contamination by dirty or unhygienic production environments. There are six requirements that must be met in this regard so as not to jeopardize product safety. The percentage of conformity in terms of this waste management reached 100%. PT XYZ is committed to responsible and sustainable waste management (Meghwal *et al.,* 2017; Sikora, 2015; Zubir *et al.,* 2022). All types of waste generated are managed efficiently so that they do not pollute the environment when released. Waste generated by PT XYZ during the processing process is divided into two categories, namely solid waste and liquid waste. Solid waste consists of the final remains of the production process, while liquid waste comes from water used to wash packaging, equipment, and during the production process. The waste treatment process is carried out using a Sewage Treatment Plant (STP). Liquid waste from various sources at Soekarno Hatta International Airport is flowed to the submersible pump well (lifting pump) and then flowed to the STP through a piping system that works based on gravity and uses a pump system. PT XYZ cooperates with PT Angkasa Pura in waste management. Sewage treatment activities at STP Soekarno Hatta International Airport go

through four stages, namely preliminary treatment, primary treatment, secondary treatment, and tertiary treatment. Wastewater samples are taken every month and tested by a certified external party in accordance with the quality standards set by the Decree of the Minister of Environment 51/MENLH/10/1995 concerning industrial area wastewater quality standards.

5. Pest Control

PT XYZ conducts pest control with the intention of maintaining product quality and safety as well as a clean and healthy work environment. PT XYZ cooperates with Rentokil company in pest control. Pest control can be done by installing fly catchers in almost all areas, hallways before entering the production area. Fly catchers are wall-mounted devices equipped with blue lights. The lamp functions as a sensor attractant from insects so that insects will approach the fly catcher, then in the vicinity the officer has been on guard with an electric racket to kill insects. Of the 6 criteria requirements by PT XYZ, the results obtained 83.33% conformity to the implementation of requirements in the field.

Rodent control such as rats uses rat boxes. A rat box is a catcher box that contains a poison feeder and is equipped with a glue attachment. In addition to the installation of traps, all types of pests are also exterminated by fumigation. Fumigation is the spraying of toxic gas in the room area or on equipment that has been infected by pest animals. In addition, there is a periodic pest control schedule.

6. Production Equipment

Tools that are in direct contact with food are non-corrosive, non-toxic, and easy to clean so as not to cause contamination. Tools and machines are placed according to the flow of the production process, equipped with instructions for use. Each piece of equipment used has a food grade description. Equipment at PT XYZ is registered and meets specifications and feasibility tests. Each piece of equipment must be controlled and stored according to specifications. Machinery and equipment used to process food have been designed, made, or placed in such a way as to ensure product quality and safety. From the 5 aspects of the requirements, a result of 100% was obtained for the conformity of the required criteria.

7. Raw Material Management

Good quality products are influenced by the condition of raw materials that are also good and do not experience contamination. The worker in charge of the ingredient receiving area must carefully inspect all food ingredients received by the company. Thus, the food ingredients received are in goticod condition, free from dirt and defects, and in accordance with the right temperature. Through the requirements set by PT XYZ, the result of conformity to requirements is 93.75% of 16 criteria. The ingredients used are raw materials that are safe to use and not harmful to consumers. The materials are taken from sources that meet the company's standards or specifications to ensure the products produced are of high quality.

At the receiving stage, sorting is done for fruits and vegetables, as well as adjusting the amount of ingredients ordered. For fruit products, measurements were also made regarding the ripeness level of the fruit using a refractometer. For some fruits, cuts were made on the samples to check whether they met the specifications. To take these measurements, random samples are taken. Staff and suppliers must wear neat and clean work uniforms, hairnets and safety shoes. Vehicles used to deliver materials must be in a clean condition, using plastic pallet mats as a base so as not to come into direct contact with the floor and the box is tightly closed.

8. Storage

For large food industries such as airplane catering services, where large quantities of food ingredients need to be processed in stages, food storage is a very important aspect. The diverse characteristics of various types of food ingredients require a variety of storage places to maintain their quality during the processing process. PT XYZ scored 94.29% in this category. Once raw materials that meet the requirements are received, they are immediately

taken to the appropriate storage area. If food ingredients are used immediately, after being weighed and supervised by the storage staff, they are taken to the food preparation area. All items are stored according to their type and separated in the preparation process based on the same category.

Storage locations are organized using shelves that do not come into direct contact with walls or floors. This is done to prevent contamination and simplify the cleaning process. The storage room must be kept clean, the chiller door must always be closed, the room temperature is kept stable, and every product that enters the chiller must be labeled and follow the FIFO (First In First Out) principle by referring to the date listed on each basket of materials or products. Items that are produced first are placed at the very top so that they will be taken first by employees when used (Rahmadhani & Sumarmi, 2017). In this context, the food preparation process at PT XYZ involves separating the preparation of vegetables/fruits and meat (including meat of four-legged animals, poultry, and seafood). This room separation not only eases the preparation process, but also helps prevent cross-contamination between raw materials. Each item received is immediately organized accordi to its place and characteristics, either in the dry store, cold store, frozen store room as shown in Table 2.

Table 2. Material Specifications Based on Storage Temperature

Type of Item	Storage Temperature
Frozen Product (beef, mutton, chicken, fish, scallops, nuggets, and prawns)	(-18)-(-30) ℃
Chilled Product (sayur dan buah, jus, *yoghurt*, susu,*caviar, whipped cream*)	0-5 ℃
Dry goods (seasonings, chicken eggs, oil, rice, bottled water, etc.)	20-25 ℃

9. Production Process

The production process is controlled to prevent product quality degradation, such as cross-contamination. Each stage of production is supervised by a Quality Control officer. The supervision aims to prevent or correct the situation if deviations are found that can reduce product quality and safety. This supervision is carried out on an ongoing basis. Ingredients that have been cut, sorted and prepared are processed through the cooking process. Factors such as temperature and processing time have a very important impact on food processing, therefore temperature control must be done appropriately. There are 14 criteria used to assess the suitability of the requirements that have been set. The evaluation results showed 100% conformity. The quality and safety of the final product must be routinely tested and monitored before the product is shipped as required by the World Food Safety Guidline issued by IFSA (International Flight Service Association). The controls to be carried out in the cooking process are presented in Table 3.

Tabel 1. Pengendalian Suhu dalam Proses Pemasakan

Materials Name	Cooks Temperature
Meat (beef, mutton)	Minimal 65 ℃
shellfish, *whole muscle*	Minimal 65 ℃
Milk (*unpasteurized dairy*)	Minimal 72 ℃
Coconut Milk	Minimal 72 ℃
Egg (*unpasteurized egg*)	Minimal 74 ℃
Pieces of meat, fish, shellfish	Minimal 74 ℃
Beef steak/grill	Minimal 65 ℃

10. Product Label and Description

After the processing and packaging process is complete, the product will be labeled. The purpose of this labeling is to make it easier to know the production date. Labels have different colors according to the day of arrival of the goods. The color of the label for each day

is differentiated in order to see the difference in days through colors that can make it easier to identify the product Table 4.

Table 4. Label Terms of Each Process

No.	Process	Label Terms	label content
1.	*Receiving*	1. Blue for monday 2. Green for thursday 3. Red for wednesday 4. Yellow for thursday 5. Brown for friday 6. Orange for saturday 7. Purple for sunday	• *Item* • *Weight* (kg/pcs) • *Receiving date* • *Supplier*
2.	*Storage*	1. Blue for jan-feb 2. Green for mar-apr 3. Red for mei-jun 4. Yellow for jul-aug 5. Brown for sep-oct 6. Orange for nov-dec	• *Item* • *Weight* (kg/pcs) • *Receiving date* • *Expired date*
3.	*Production*	1. Blue for monday 2. Green for tuesday 3. Red for wednesday 4. Yellow for thursday 5. Brown for friday 6. Orange for saturday 7. Purple for sunday	• *Item* • *Production date*
4.	*Dishing*	1. Blue for monday 2. Green for tuesday 3. Red for wednesday 4. Yellow for thurday 5. Brown for friday 6. Orange for saturday 7. Purple for sunday	• *Item* • *Production date*

11. Distribution

Transportation and distribution arrangements are carefully made to prevent product damage or contamination. During the process of transporting finished products, supervision is implemented to prevent errors in transportation, which can damage the quality of processed food and increase the risk of foodborne illness. There are five criteria requirements that must be met in terms of transportation. PT XYZ has achieved a 100% conformity score for this criterion as it has met all the requirements.

The means of transportation used to distribute food to the aircraft uplift location are box cars and high-lift trucks. Before the flight, the food distribution equipment used to store the trays containing the food is a trolley with wheels, which is equipped with a cooling mechanism using ice cubes, because the transport vehicle does not have cooling facilities. Meals should arrive at the aircraft at least half an hour before departure. Once the food is on board, it is received by the cabin crew, and the temperature of the food is checked again to ensure that it does not exceed 10℃ by the handling (operation) staff.

Based on these aspects, further identification is needed regarding the source of the problem in the occurrence of contamination in the production process using a fishbone diagram. A fishbone diagram or cause and effect diagram is a tool in identifying or tracing causes and effects to find the root cause of a problem (Sinurat *et al.,* 2022). The fishbone diagram can be seen in Figure 3.

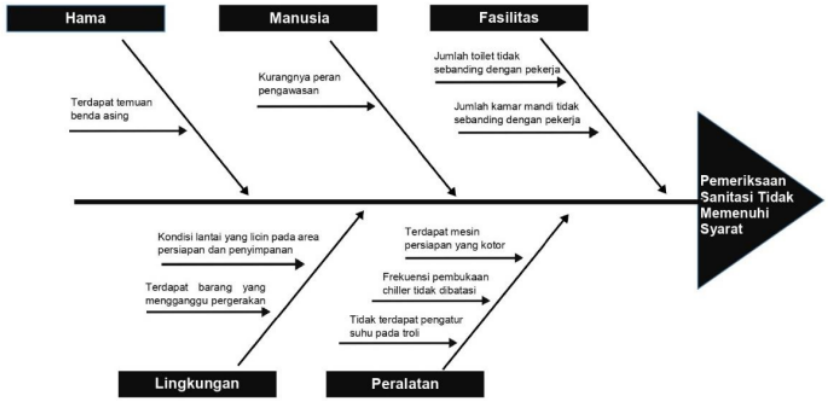

Figure 3. Fishbone Diagram

Based on Figure 3, it can be seen that several factors have not implemented Good Manufacturing Practices (GMP) at PT XYZ, namely in terms of the environment, pests, people, facilities, and equipment. In the pest factor, foreign objects are found in the production process which can have a negative impact on product quality, company reputation, and even consumer safety. To solve this problem, companies must implement a strict quality control system during the production process. This involves thorough inspections and checks to detect foreign objects from the beginning to the end of the production process.

In environmental factors, slippery floor conditions when wet in the preparation area (vegetable pre-cut) due to the washing process and in the storage area (freezer) due to ice crystals. This can cause accident risks for employees. In addition, there are still items in the receiving area that are waiting to be handled and not immediately stored in the storage area. This makes it difficult for employees to find the necessary goods and the possibility of goods being exposed to inappropriate environmental conditions can damage product quality. To overcome this problem, steps can be taken such as keeping the floor clean and dry and scheduling the defrosting process to ensure the freezer storage area is free of ice crystals.

On the human factor, lack of supervision affects sanitation in production with employees found to be wearing masks incorrectly (not covered up to the nose). Improperly worn masks can cause contaminated airborne particles to transfer from employees to other products or surfaces, which can lead to cross-contamination and the potential spread of disease. To address this issue, corrective action must be taken immediately. Employees who violate the rules should be reprimanded or sanctioned accordingly to ensure future compliance.

On the facility factor, a small number of toilet/urinal facilities can disrupt the production process as a limited number of toilets/urinal facilities can lead to long lines, especially during breaks or rest periods. Employees have to wait longer to use the facilities, resulting in time lost from production. This accumulated time can negatively impact the overall productivity of the factory or production facility. Therefore, it is important for companies to ensure that sufficient sanitation facilities are available and in adequate condition to meet the needs of all employees. This will help maintain employee productivity for a smooth production process.

In the equipment factor, there are vegetable washing machines that are not clean and dry as a result of the washing process, restrictions on the frequency of opening and closing cold storage that have not been set, there is no temperature control on the trolley. If there are no restrictions on the opening and closing frequency of cold storage, employees may tend to open and close it more often than necessary. This can lead to a decrease in cold storage efficiency. Cold air escaping every time the door is opened can cause the temperature inside the cold room to fluctuate, which can affect the quality and freshness of the stored products. Also, when there is no temperature control on the trolley or storage device used to transport

the products, it can cause problems in maintaining the quality and freshness of the products. To solve this problem, regular monitoring of the washing process can be done to ensure proper quality and hygiene, the use of automatic sensors on cold storage doors can also be used to be able to detect the presence of people and automatically open or close the doors as needed, and the selection of trolleys equipped with temperature control can be done to set and maintain the right temperature according to the needs of the products to be stored.

CONCLUSIONS

Based on the objectives regarding the application of GMP (Good Manufacturing Practices), it can be concluded that Good Manufacturing Practices (GMP) are important in improving the quality of aircraft catering products by ensuring food safety, hygienic food handling, and maintained product quality through the use of quality raw materials and controlled production processes. In aircraft catering production, GMP procedures are implemented to meet health standards. These include the use of safe and quality raw materials, strict sanitation monitoring, hygienic food handling and storage, separation between raw and cooked food, appropriate temperature control, and clear labeling. GMP ensures that food served to passengers meets high standards of hygiene and safety. GMP implementation is important in improving the quality of aircraft catering and reducing the risk of contamination and food poisoning. The overall non-conformity of GMP implementation has a percentage of 6.41% with an overall percentage of conformity of implementation of 93.59%. Non-conformities are found in the aspects of structure & layout of food processing places, pest control, design of personal hygiene facilities, hygiene behavior of food handlers, receipt of raw materials, food storage, and food preparation.

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