Fisheries Journal, 14(3), 1609-1620 (2024)
http://doi.org/10.29303/jp.v14i3.925

ANALYSIS OF THE IMPLEMENTATION OF GOOD MANUFACTURING PRACTICES (GMP): A CASE STUDY IN TWO FISH FREEZING INDUSTRIES IN DENPASAR BALI

Analisis Penerapan Good Manufacturing Practices (GMP): Studi Kasus di Dua Industri Pembekuan Ikan di Denpasar Bali

Resti Nurmala Dewi*, Ni Putu Ayu Dyah Muncani, Ni Putu Dinda Krisna Putri

Marine Product Processing Study Program, Marine and Fisheries Polytechnic Jembrana

Pengambengan Village, Negara District, Jembrana Regency Jembrana, Bali

*Corresponding Author: restinurmaladewi@gmail.com

(Received June 2th 2024; Accepted September 19th 2024)

ABSTRACT

One of the quality control systems that is crucial to establish for fisheries products is good manufacturing practices (GMP). Nonetheless, a number of fisheries processing sectors, including the seafood freezing sector, continue to have multiple GMP deviations. Therefore, the purpose of this study is to examine how GMP is being applied to two fish freezing companies that process sea bass (Lates calcarifer) and tuna (Thunnus albacares) in Denpasar, Bali. Using the gap analysis approach based on Minister of Industry Regulation Number 75 of 2010 concerning GMP, this research was conducted for three months (January – March 2022). The methods used for gathering data were focus groups discussion (FGD), observations, and interviews with managers, supervisors, and quality control (QC). From the research results, it was found that the implementation of GMP in the two fish freezing industries had met the criteria based on applicable regulations with a conformity percentage of 97.70% (tuna) and 98.39% (sea bass). As for the 18 GMP aspects, there are several deviations that occur in tuna freezing factories (6 aspects) and sea bass (4 aspects). Thus, improvements need to be made to aspects of buildings, sanitation facilities, process supervision, laboratories, employees as well as maintenance and sanitation based on the technical and managerial recommendations provided.

Keyword: Fish processing industry, Frozen fish, Gap analysis, GMP, Quality control

ABSTRAK

Good manufacturing practices (GMP) merupakan salah satu program pengendalian mutu produk perikanan yang sangat penting untuk dilakukan. Akan tetapi, beberapa penyimpangan GMP masih banyak ditemukan di industri pengolahan perikanan seperti industri pembekuan ikan. Oleh karena itu, penelitian ini bertujuan untuk menganalisis penerapan GMP di dua pabrik pembekuan ikan yang berlokasi di Denpasar Bali dengan komoditas tuna (Thunnus albacares) dan kakap putih (Lates calcarifer). Penelitian ini dilaksanakan selama 3 bulan (Januari – Maret 2022) dengan menggunakan metode analisis kesenjangan berdasarkan Permenperin Nomor 75 Tahun 2010 tentang GMP. Teknik pengambilan data dilakukan dengan

wawancara, observasi dan focus group discussion (FGD) bersama quality control (QC), supervisor dan manajer perusahaan. Dari hasil penelitian didapatkan bahwa penerapan GMP di dua industri pembekuan ikan telah memenuhi kriteria berdasarkan aturan yang berlaku dengan persentase kesesuaian sebesar 97,70% (tuna) dan 98,39% (kakap putih). Adapun dari 18 aspek GMP, terdapat beberapa penyimpangan yang terjadi di pabrik pembekuan tuna (6 aspek) dan kakap putih (4 aspek). Dengan demikian, perlu dilakukan perbaikan pada aspek bangunan, fasilitas sanitasi, pengawasan proses, laboratorium, karyawan serta pemeliharaan dan sanitasi berdasarkan rekomendasi teknis dan manajerial yang diberikan.

Kata Kunci: Analisis kesenjangan, GMP, Ikan beku, Industri pengolahan ikan, Pengendalian mutu

INTRODUCTION

One of the good sources of nutrition for human growth is fish (Farida *et al*., 2023). However, fish have weaknesses because they are easily damaged (perishable food). Therefore, to maintain the quality and nutritional content of fish for a long time, it is necessary to store fish at low temperatures (freezing) (Dewi *et al.*, 2023). Freezing is the process of storing fish at temperatures below 0°C to inhibit the growth of microorganisms, stop the activity of spoilage bacteria and maintain fish nutrition (Utari *et al*., 2022). Misrijal *et al*., (2017) also stated that with the freezing process, the quality and shelf life of fish can be maintained. Sari (2016) added that processed fishery products preserved at low temperatures can last a long time because standard conditions can inhibit and stop microbiological activity, enzymes and chemical reactions (Utari *et al*., 2023). Therefore, the freezing process is widely applied in the fisheries processing industry, especially if the final product is frozen fish.

To ensure product quality, maintain consumer trust and increase competitiveness of frozen fish products produced, companies need to implement production handling in accordance with GMP (Good Manufacturing Practice). GMP is a guideline for good and correct processed food production methods to produce products that meet safety and quality requirements (Hanidah *et al*., 2019; Lapene *et al*., 2021). The implementation of GMP is very much needed to help the fisheries industry comply with applicable food safety regulations and standards, both in local and international markets, so that the products produced can meet consumer expectations. The scope of GMP consists of 18 aspects including location, buildings, sanitation facilities, machinery and equipment, materials, employees and others (Dewanti & Hariyadi, 2013; Ma'roef *et al.,* 2021; Dewi *et al.,* 2022). However, the implementation of GMP in several companies sometimes experiences deviations so that it can often have an impact on the processes and products produced.

Based on the description above, it is necessary to conduct an analysis of the implementation of GMP in the fish freezing industry so that deviations that occur can be identified. Technical and managerial recommendations can also be provided when GMP deviations occur. In this study, a case study of the analysis of the implementation of GMP was carried out in two fish freezing companies located in Denpasar Bali with frozen pocket tuna (*Thunnus albacares*) and white snapper fillet (*Lates calcarifer*) commodities.

RESEARCH METHODS

The study was conducted for three months in two fish freezing companies located in Denpasar, Bali. The data collection method refers to Dewi *et al*., (2023); Febrianti & Dewi (2024) using several techniques, namely (i) direct observation is a data collection technique by observing the implementation of GMP in the company naturally without any intervention; (ii) interviews are face-to-face conversations or through other media with respondents, aiming to

obtain in-depth information regarding the implementation of GMP through the questions asked; (iii) forum group discussion (FGD) is a structured discussion between researchers and the company with the aim of obtaining in-depth views, opinions, and experiences regarding the implementation of GMP; (iv) documentation is data collection by collecting, analyzing, and concluding information from written documents, photos, videos, or other sources relevant to the implementation of GMP in the company; and (v) and literature study is the process of reviewing existing literature, such as books, scientific journals, articles, and other relevant sources so that theories, concepts, and previous research results can support the current research topic. Purposive sampling technique is also used in determining the source of informants to provide appropriate and comprehensive data (Hasan *et al.,* 2018). Purposive sampling technique is a data collection method in which informants are selected based on the most appropriate criteria because they are considered to have relevant characteristics to answer research questions (Hasan *et al*., 2018). The informants used were employees of quality control, production and laboratory, supervisors and managers. The data collection scheme in this study can be seen in Figure 1.

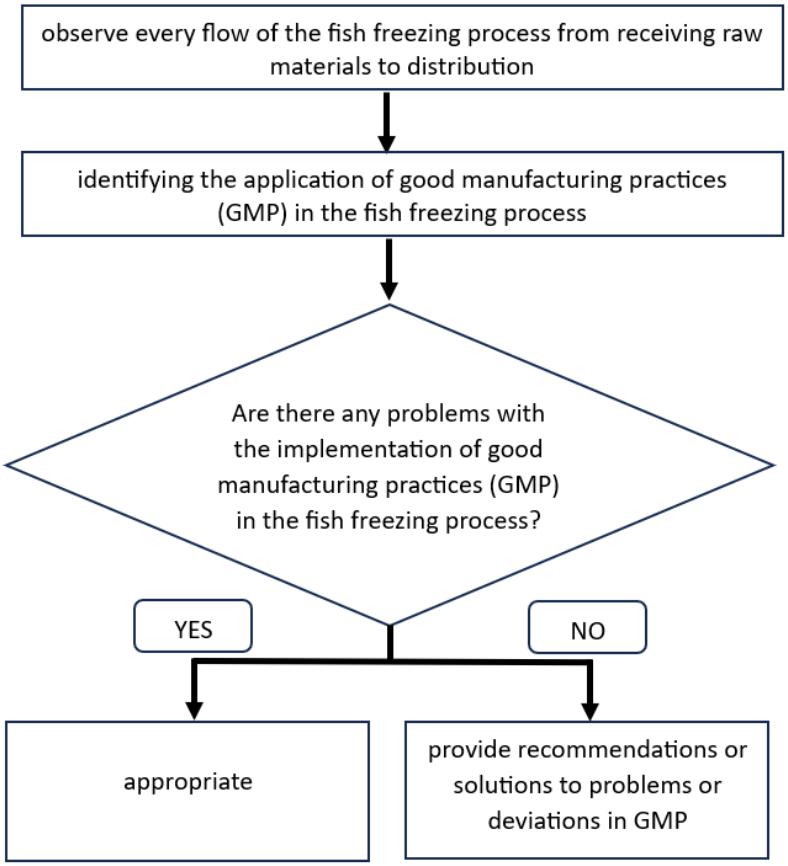

Figure 1. GMP Observation Process Flow Diagram

The data obtained are then analyzed using gap analysis to determine the gap between GMP standards and actual conditions in the field. The results of the analysis are then used to formulate technical and managerial recommendations so that ideal conditions according to applicable standards can be achieved. The suitability value of GMP implementation is carried out based on a weighting system (Bakhtiar & Purwanggono, 2018):

a. Score 1 (the company does not do this);
b. Score 2 (the company knows that the activity is important but does not or has not been carried out or the activity requirements have not been met);
c. Score 3 (the company carries out the activity but is only recorded);
d. Score 4 (the company carries out the activity but is inconsistent); and
e. Score 5 (the company carries out the activity well and perfectly).

Calculation GMP implementation in the factory freezing of fish refers to Dewi *et al* ., (2023) with equality following :

$$\%Implementation = \frac{\sum score\ of\ each\ parameter}{\sum maximum\ score} x100\%$$

With category conformity based on Regulation of the Minister of Industry of the Republic of Indonesia Number 75 of 2010 concerning Guidelines for Good Manufacturing Practices (GMP) as following (Herdhiansyah *et al*., 2021):

a. 75-100% (GMP implementation has been fulfil standard);
b. 50-74% (GMP implementation is still must fixed For reach condition standard);
c. 1-49% (GMP implementation is still very low and necessary repair significant).

RESULTS

Based on Table 1, it can be seen that the percentage of compliance with the implementation of GMP in the tuna pocket freezing factory is 97.70%. This shows that the implementation of GMP in the company has met the standards according to the Regulation of the Minister of Industry of the Republic of Indonesia Number 75 of 2010 concerning Guidelines for Good Manufacturing Practices.

Table 1. Gap Analysis of GMP Implementation in Factories Freezing Tuna Fish Pocket Shape

No.	GMP aspects	Number of Parameters	Total Score of Each Parameter	Maximum Score Amount	% Implementation
1	Location	7	35	35	100.00
2	Building	35	168	175	96.00
3	Facility Sanitation	24	113	120	94.17
4	Machinery and equipment	13	65	65	100.00
5	Material	9	45	45	100.00
6	Process Monitoring	26	129	130	99.23
7	Final Product	3	15	15	100.00
8	Laboratory	3	13	15	86.67
9	Employee	8	35	40	87.50
10	Packaging	8	40	40	100.00
11	Labels and Descriptions Product	2	10	10	100.00
12	Storage	9	45	45	100.00
13	Maintenance and Sanitation Program	24	114	120	95.00

No.	GMP aspects	Number of Parameters	Total Score of Each Parameter	Maximum Score Amount	% Implementation
14	Transportation	3	15	15	100.00
15	Documentation and Record Keeping	1	5	5	100.00
16	Training	6	30	30	100.00
17	Withdrawal Product	6	30	30	100.00
18	Implementation Guidelines	3	15	15	100.00
Average Implementation Score					**97.70**

Meanwhile, the implementation of GMP in the frozen white snapper fillet factory is much better compared to the pocket tuna freezing factory with an average value of 98.39%. Of the 18 aspects of GMP, there are four aspects that experience deviations, namely sanitation facilities, process supervision, laboratories and employees (Table 2).

Table 2. Gap Analysis of GMP Implementation in White Snapper Fillet Freezing Factory

No.	GMP aspects	Number of Parameters	Total Score of Each Parameter	Maximum Score Amount	% Implementation
1	Location	7	35	35	100.00
2	Building	35	175	175	100.00
3	Facility Sanitation	24	118	120	98.33
4	Machinery and equipment	13	65	65	100.00
5	Material	9	45	45	100.00
6	Process Monitoring	19	127	130	97.69
7	Final Product	3	15	15	100.00
8	Laboratory	3	12	15	80.00
9	Employee	8	38	40	95.00
10	Packaging	8	40	40	100.00
11	Labels and Descriptions Product	2	10	10	100.00
12	Storage	9	45	45	100.00
13	Maintenance and Sanitation Program	24	120	120	100.00
14	Transportation	3	15	15	100.00
15	Documentation and Record Keeping	1	5	5	100.00
16	Training	6	30	30	100.00
17	Withdrawal Product	6	30	30	100.00
18	Implementation Guidelines	3	15	15	100.00
Average Implementation Score					**98.39**

From Table 1 and Table 2 it can be seen that there are still some deviations in the implementation of GMP in the tuna and white snapper fillet freezing factory. A comparison of the gap between the two companies can be seen in Figure 2. Aspects of sanitation facilities, process supervision, laboratories and employees experienced deviations in both companies. While deviations in the aspects of buildings, maintenance and sanitation programs only occurred in the tuna freezing industry.

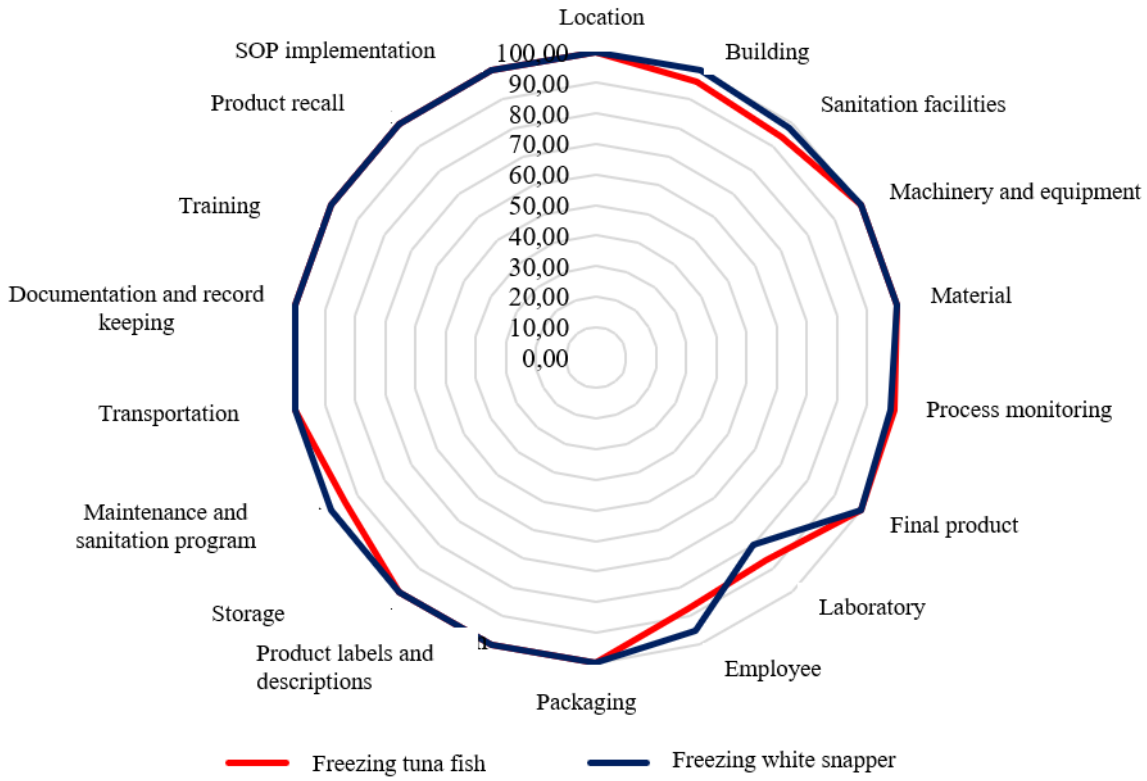

Figure 2. Comparison of GMP Implementation Gaps

In order to overcome and take corrective action on these gaps, technical and managerial recommendations are needed as shown in Table 3.

Table 3. Recommendations for GMP Improvement in Factories Freezing

GMP aspects	Findings The Gap	Freezing Tuna Fish	Freezing Snapper Fish	Technical Recommendations	Recommendation Managerial
Building	Uneven floor in raw material receiving area; The presence of depressions that cause water to pool in the raw	√	-	1. Patching cracked floors and coating with epoxy; 2. Level it by adding cement to the depression until it is level and	Companies need to carry out monitoring and evaluation facilities and infrastructure in a way periodically in the company. In addition, the team monitoring and evaluation is also

GMP aspects	Findings The Gap	Freezing Tuna Fish	Freezing Snapper Fish	Technical Recommendations	Recommendation Managerial
	material receiving area.			re-coating it with epoxy.	necessary formed so that when There is damage and deviation, action quick correction can done.
Facility Sanitation	There are still water taps that need to be manually rotated.	√	√	Replace the faucet accordingly standard like a tap being stepped on so that hand No touch direct with a water tap that can cause the occurrence contamination.	Company through team *procurement* and team quality need replace tools and installation others who don't fulfil standard.
Process Monitoring	A number of employee Not yet consistent use tools protector such as work clothes , hats and shoes rubber as well as always wash hand before enter place production	√	√	The supervisor provides reprimand in a way oral to employees who do not using PPE complete.	Companies need to apply sanctions firm for employees who repeatedly violate rules and regulations office.
Laboratory	A number of laboratory tools need calibrated and updated.	√	√	Do rejuvenation tool laboratory specifically For tools used For determine quality material raw material/product such as thermocouples, pH meters and others.	Company through team *procurement* and team quality need renew and or replace tool laboratory that does not fulfil standard.
Employee	There are still a number of employees who wear watches and	√	√	The supervisor provides reprimand in a way oral to employees who do not comply rules in the process room.	Companies need to apply sanctions firm for employees who repeatedly violate rules and regulations office.

GMP aspects	Findings The Gap	Freezing Tuna Fish	Freezing Snapper Fish	Technical Recommendations	Recommendation Managerial
	jewelry to in process space				
Maintenance and Sanitation Program	Pests were found in the water channels.	√	-	Checks are carried out on every water drainage channel	Companies need to apply sanctions firm for employees who are responsible for implementing the sanitation program.

DISCUSSION

GMP Gap Analysis in Tuna Pocket and White Snapper Fillet Freezing Plant

From the results of the GMP gap analysis as stated in Table 1, there are still six aspects that experience deviations such as in the aspects of buildings, sanitation facilities, process supervision, laboratories, employees and maintenance and sanitation programs in the tuna freezing industry. The condition of the floor in several areas in the production room was found to be uneven, causing puddles. In addition, there are still manual sliding doors in the process area causing the building aspect to only get 96%. Surya *et al*., (2024) stated that buildings are a standard aspect that needs to be met by companies because the entire production process is carried out in that area. Buildings must be designed to minimize the risk of physical, chemical, and microbiological contamination of fishery products. This includes the arrangement of production areas, ventilation, drainage, floors, and the use of building materials that are easy to clean. Buildings that comply with safety and health standards help protect workers and the surrounding environment, allowing for effective cleaning and sanitation to maintain hygienic standards and product safety, which in turn supports the sustainability of industry operations (Dewi *et al*., 2023; Ma'Roef *et al*., 2021).

In terms of sanitation facilities (94.17%), some sinks were not equipped with hand washing soap and there were still some water taps that had to be turned manually. Good sanitation facilities, such as hand washing facilities, sanitation rooms, and cleaning tools, are very important to prevent microbiological, chemical, and physical contamination of fishery products during the production process (Siahaan *et al*., 2022). Washing hands properly is the main step to prevent the spread of contaminants, such as bacteria and viruses, from workers to fishery products. This is important to do because hands often interact directly with products during the production process. Meanwhile, in the process supervision section, there are still employees who do not wear standard uniforms such as hats, boots or rubber shoes and work clothes. Employees also have not completely washed their hands regularly before entering the production area so that this aspect only scored 99.23%. Strict supervision during each stage of production ensures that fishery products meet the established quality standards, from receiving raw materials to the final product. Good supervision helps identify and address problems early on, thereby reducing the risk of defective or unsafe products when they reach consumers (Pesulima & Nahak, 2021).

In the laboratory section, the company only got 86.67% because the factory does not yet have its own laboratory to carry out quality and safety control of raw materials, semi-finished materials and final products. Some measuring instruments used are also not calibrated regularly

to ensure their accuracy. The laboratory allows routine testing of raw materials, in-process products, and final products to ensure that the materials analyzed meet the established quality and safety standards (Lapene *et al*., 2021). Through microbiological, chemical, and physical analysis, the laboratory can detect contamination that may not be visible to the naked eye, such as pathogenic bacteria, chemical residues, or heavy metals accurately so that the role of the laboratory is very important in the fisheries processing industry (Farida *et al*., 2023; Dewi *et al*., 2023). In terms of employees (87.50%), there were many deviations that occurred because some employees were still found not wearing uniforms or personal protective equipment (PPE) according to regulations such as hats or head coverings, shoes, gloves. Employees also do not implement good sanitation and hygiene because they still wear jewelry, watches and others into the production room and do not wash their hands regularly when entering the process area. Employees must be trained and understand GMP in order to apply the correct procedures in every stage of production, from handling raw materials to product packaging, to ensure that the products produced are of high quality and safe (Surya *et al*., 2024). The implementation of maintenance aspects and sanitation programs also only achieved 95% because damaged and unrepaired ventilation holes were found, causing sources of contamination to enter the process area. Good maintenance of equipment and production facilities can prevent damage that can cause product contamination. An effective sanitation program ensures that the production area remains clean from germs and contaminants (Sandrasari *et al*., 2018).

Meanwhile, the implementation of GMP in the frozen white snapper fillet factory is much better than the frozen tuna factory with an average value of 98.39%. However, in terms of sanitation facilities (98.33%), the company has not equipped the process area with first aid kits to support employee hygiene facilities in the event of an injury or work accident in the field. Adequate sanitation facilities can help maintain the health and safety of workers, which contributes to productivity and prevention of diseases that can affect product quality. Appropriate sanitation facilities and infrastructure are part of fulfilling food safety regulations and standards, which are important for maintaining consumer confidence and business sustainability (Siahaan *et al*., 2018). In terms of process supervision, many employees still do not wear gloves into the process room so that this aspect can only reach a value of 97.69% causing potential contamination and deviations to occur. With effective process supervision, the fisheries industry can ensure that every step in production is carried out correctly, producing products that are safe, quality, and in accordance with applicable standards. Meanwhile, the laboratory aspect only reaches 80% because the company still relies on external laboratories and does not yet have a private laboratory to check several simple quality parameters in the company. In fact, laboratory data helps management make important decisions regarding quality management, problem identification, and implementation of necessary corrective actions. With adequate laboratory facilities, the fisheries industry can maintain and improve product quality, ensure consumer safety, and meet regulatory requirements (Lapene *et al*., 2021). In addition, the employee aspect also has several deviations because the use of PPE has not been fully used so that the value of this aspect is only 95%. Well-trained employees will understand and comply with industry standards and food safety regulations, which are essential to maintaining the integrity of the production process and the company's reputation. Employees will also be naturally aware of the importance of occupational safety and hygiene to help maintain a healthy and safe work environment, which in turn supports smooth operations and product quality.

GMP Improvement Recommendations for Freezing Plants

Figure 2 shows that many deviations occurred in the tuna freezing factory with a total of 28 parameters and scores ranging from 2-4. However, in the white snapper freezing factory,

only 10 parameters were found with values ranging from 2-4. Each company had the same deviations in four aspects of GMP, namely sanitation facilities, process supervision, laboratories and employees. Meanwhile, deviations in the aspects of buildings and maintenance and sanitation programs only occurred in the tuna freezing factory. The implementation of GMP aims to ensure that frozen fish products produced by both factories are processed under hygienic conditions to prevent microbiological, chemical and physical contamination (Dewi *et al*., 2023; Sari *et al*., 2016). With GMP, the quality of fishery products can be maintained consistently in order to meet consumer expectations and maintain the company's reputation. When a GMP deviation is found, corrective actions for the gap need to be taken by referring to the recommendations given. Corrective actions can be in the form of technical and managerial recommendations that aim to address and prevent recurrence of problems found during the production process (Surya *et al*., 2024). Technical recommendations involve repairing or replacing facilities and infrastructure that are not functioning properly, improving sanitation procedures, or rearranging the layout of the facility to avoid cross-contamination. Meanwhile, managerial recommendations can include retraining employees on GMP procedures, reviewing and revising SOPs (Standard Operating Procedures), and increasing internal supervision and audits to ensure consistent compliance with GMP standards. The combination of technical and managerial actions is essential to ensure that frozen fish products produced remain safe, of high quality, and in accordance with applicable regulations. From Table 3, there are several technical and managerial recommendations that can be applied in tuna and white snapper freezing factories. All recommendations cover the six aspects that have deviations, namely the building aspect, sanitation facilities, process supervision, laboratory, employees, and maintenance and sanitation programs.

CONCLUSION

Deviations in the implementation of GMP can cause the emergence of food products that do not meet standards in fish freezing factories. From the results of observations, the implementation of GMP in the tuna and white snapper freezing industry located in Denpasar Bali still meets the requirements but deviations were found so that the GMP implementation conformity value was 97.70% and 98.39%. All factories experienced deviations in the aspects of sanitation facilities, process supervision, laboratories and employees. While in the tuna freezing factory, there were two aspects that also experienced deviations, namely buildings and maintenance and sanitation programs. Improvements in the implementation of GMP can be done by implementing the technical and managerial recommendations provided so that deviations in the fish freezing process can be minimized according to applicable rules and standards.

ACKNOWLEDGEMENT

Thanks to the Jembrana Marine and Fisheries Polytechnic for their support so that the research can be completed properly.

REFERENCES

Al-Hasan, H. S., Akbar, M. A., & Surachman, A. E. (2018). Analisis Penerapan Program GMP dan 5P terhadap Kinerja Karyawan di PT Kalbe Morinaga Indonesia. *Jurnal MBIA*, *17*(2), 11–22.

Dewanti, R., & Hariyadi. (2013). HACCP (*Hazard Analysis Critical Control Point*) Pendekatan Sistematik Pengendalian Kemanan Pangan. Dian Rakyat. Jakarta, 30-31.

Dewi, R. N. (2022). Occupational Health and Safety Risk Analysis Using AS/NZS Standards 4360:2004 in the Fish Meatball Industry. *Jurnal Teknik Industri*, *25*(1), 31-42. https://doi.org/10.9744/jti.25.1.31-42.

Dewi, R. N., & Farida, I. (2023). Pengaruh Suhu Penerimaan Sampel dan Bentuk Olahan Ikan Tuna (*Thunnus* sp.) terhadap Kadar Histamin Menggunakan Metode Elisa. *Buletin Jalanidhitah Sarva Jivitam*, *5*(1), 55 – 62. http://dx.doi.org/10.15578/bjsj.v5i1.12423.

Dewi, R. N., Budiadnyani, I. G. A., Febrianti, D., & Venn, D. F. P. (2023). Pengujian Organoleptik dan Deteksi Logam Berat pada Bahan Baku dan Produk Bakso Ikan Lemuru (*Sardinella lemuru*) dari Selat Bali. *JPB Kelautan dan Perikanan*, *18*(2), 147-162. http://dx.doi.org/10.15578/jpbkp.v18i2.973.

Dewi, R. N., Febrianti, D., & Panjaitan, F. C. A. (2023). Analisis Gap pada Penerapan *Good Manufacturing Practice* (GMP) di Pabrik Pengalengan Ikan Lemuru (*Sardinella lemuru*). *Prosiding Seminar Nasional Kelautan dan Perikanan*. Bitung, 12 September 2023. hlm. 223-237.

Farida, I., Dewi, R. N., & Ramadhani, A. F. (2024). Pengujian Total Bakteri dan Formalin pada Beberapa Ikan dan Produk Olahan Perikanan di Pasar Tradisional Kecamatan Negara, Jembrana, Bali. *Buletin Jalanidhitah Sarva Jivitam*, *5*(2), 167 – 177. http://dx.doi.org/10.15578/bjsj.v5i2.13156.

Febrianti, D., & Dewi, R. N. (2023). Analisis Finansial Penggunaan Panel Surya pada Budidaya Udang Vaname. *Buletin Ilmiah Marina Sosial Ekonomi Kelautan dan Perikanan. 10*(1), 11-23. http://dx.doi.org/10.15578/marina.v10i1.12625.

Hanidah, I., Mulyono, A. T., Andoyo, R., Mardawati, E., & S. Huda. (2019). Penerapan *Good Manufacturing Practices* pada Produksi Sistik Ebi sebagai Upaya Peningkatan Kualitas Produk Olahan Ikan di Pesisir Eretan – Indramayu. *Agricore: Jurnal Agribisnis dan Sosial Ekonomi Pertanian Unpad*, *3*(1), 1–9. https://10.24198/agricore.v3i1.17585.

Herdhiansyah, D., Gustina, G., Patadjai, A. B., &. Asriani, A. (2021). Kajian Penerapan *Good Manufacturing Practices* (GMP) pada Pengolahan Keripik Pisang. *Agrointek: Jurnal Teknologi Industri Pertanian*, *15*(3), 845–853, doi: 10.21107/agrointek.v15i3.10037.

Lapene, A. A., Sipahutar, Y. H., & Ma'roef, A. F. (2021). The GMP and SSOP Lemuru Fish (*Sardinella longiceps*) Canning in Vegetable Oil. *Aurelia Journal*, *3*(1), 11–24.

Ma'roef, A. F., Sipahutar, Y., & Hidayah, N. (2021). Penerapan *Good Manufacturing Practices* (GMP) dan sanitation *Standard Operating Procedure* (SSOP) pada Proses Pengalengan Ikan Lemuru (*Sardinella longicep*) dengan Media Saus Tomat. *Simposium Nasional VIII Kelautan dan Perikanan, Makassar*. Makassar. hlm. 160-171.

Misrijal., Ratna., & Siregar K. (2017). Rancangan Bangun Mesin *Freeze Storage* Sistem Kompresi Uap pada Pembekuan Ikan Tuna (*Thunnus* sp.). *Prosiding Seminar Nasional Perhimpunan Teknik Pertanian Banda Aceh*, Aceh. hlm 89-98.

Pesulima, W., & Nahak, M. T. M. (2021). Kesesuaian Penerapan GMP dan SSOP pada Proses Produksi Tuna Loin Beku di UPI CV XXX Kupang. *Jurnal Bahari Papadak, 2*(2), 123-130.

Purwanggono, B., Bakhtiar, A., & Rahman, R. (2018). Analysis of ISO 9001: 2015 Certification Readiness of JP-Graha Product of Jasaraharja Putera Using Gap Analysis. *SHS Web of Conferences, 49*, 01005. EDP Sciences.

Sandrasari, D. A., Kholil, K., & Utomo, L. (2018). Kajian Pengembangan Industri Rumahan Ikan Asap di Kabupaten Kendal Melalui Penerapan (*Good Manufacturing Practice*). *Jurnal Industri Kreatif dan Kewirausahaan*, *1*(2), 124-131.

Sari, F. N. (2016). Implementation of Good Manufacturing Practices (GMP) in the Kitchen Hospital. *Jurnal Kesehatan Lingkungan*, *8*(2), 248–257.

Siahaan, I. C. M., Nugraha, B. R., Rajab, R. A., & Rasdam. (2022). Penerapan *Good Manufacturing Practices* (GMP) dan *Sanitation Standard Operating Prosedure* (SSOP) pada Proses Pengolahan Tuna Loin (*Thunnus* sp.) di Unit Pengolahan Ikan di Nusa Tenggara Timur. *Jurnal Vokasi Ilmu-Ilmu Perikanan, 3*(1), 13-17.

Surya, D. A. A., Zuraida, I., Pamungkas, B. F., Irawan, I., & Kusumaningrum, I. (2024). Penerapan Sistem *Good Manufacturing Practices* (GMP) pada Proses Pembekuan Ikan Layur di CV. Sinar Harapan Berau. *Jambura Fish Processing Journal, 6*(1), 1-14. https://doi.org/10.37905/jfpj.v6i1.18082.

Utari, S. P. S. D., Dewi, R. N., & Febrianti, F. (2022). Analisis Kandungan Histamin pada Ikan Tuna (*Thunnus maccoyii*) Bentuk Loin di Denpasar, Bali. *Berkala Perikanan Terubuk*, *50*(3), 1685-1689.

Utari, S. P. S. D., & Dewi, R. N. (2023). Analisis Organoleptik, Proksimat dan Logam Berat pada Keripik Mangrove *Bruguiera gymnorrhiza. Journal Perikanan, 13*(4), 979-990. http://doi.org/10.29303/jp.v13i4.668