



Processing feasibility study of canning teaching factory (TEFA) fish processing unit in Politeknik Negeri Jember as a medium-large-scale industry

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ABSTRACT

Fisheries are sector with great potential to meet food needs. Teaching Factory Canning Politeknik Negeri Jember (Polije) is one of the Fish Processing Units (UPI) engaged in canning seasoned sardines. Teaching Factory Canning Polije is a UPI included in the medium-large category. This research aims to determine the processing feasibility of canning teaching factory. Data were collected by interview and checklist analysis referring to the Ministry of Marine Affairs, namely the Decree of the Minister of Marine Affairs and Fisheries No.Kep.01/MEN/2007. The application of basic eligibility requirements is carried out by analyzing whether there is a discrepancy with existing regulations or deviations, which are then synchronized with the value of the eligibility criteria. The production process of Teaching Factory Canning has followed the processing feasibility certification set by KKP No.Kep.01/MEN/2007 with good eligibility criteria. The assessment is based on 6 minor deviations, 7 significant deviations, and 1 serious deviation. In addition, the GAP Analysis of the UPI TEFA Canning Polije Processing Feasibility Certification showed that the basic feasibility had met the basic requirements and 1 general requirement by correcting the deviations found.



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INTRODUCTION

Fisheries are a sector with great potential to meet food needs in Indonesia. The number of captured fisheries commodities in Indonesia in the first quarter of 2022 reached 1.9 million tons. The magnitude of this potential is accompanied by the number of fish processing units (UPI) in Indonesia. The growth of business actors in the form of Fish Processing Units in the first quarter of 2022 reached 57,450 UPI from previously in units¹, only reaching 55,046 units (KKP 2022). These fish processing units are in micro, small, and medium enterprises (MSMEs) and medium-large enterprises. The fish processing unit at Jember State Polytechnic in the form of Teaching Factory Canning is one of the UPI that operates in the medium-large category.

Teaching Factory Canning has produced several processed fish products, including canned fish (sardines), balado tuna. The fisheries sub-sector is the source of food and nutrition for the people of Indonesia. Apart from being a source of protein, fish is also a functional food that has essential meaning for health. Therefore, fish is included as a perishable food. One way to extend the shelf life of fish is through the canning process. Canning is one way of preserving food through processing, which is packaged hermetically or using a very tight, watertight cover to minimize oxidation damage and taste changes and then sterilized (Brilliantina et al. 2022).

The general obstacle faced by fish processing units is that several essential eligibility criteria for processing have not been fulfilled, so the product quality is not guaranteed. Basic feasibility needs to be implemented and tested for feasibility to ensure product quality and safety. This study aims to evaluate the feasibility of the TEFA Canning Polije processing unit.

METHOD

The materials used in the research and field observations were information obtained from UPI employees such as the production manager, technical manager, quality assurance manager, research and development staff, and quality builder in TEFA Canning Polije. The tools used are basic eligibility questionnaires, stationery, and checklist-recording sheets as a means of data collection. Supporting equipment such as cameras, gloves, masks, head coverings, and work

uniforms for work equipment at UPI TEFA Canning Polije.

The research was conducted by collecting data by interview and checklist analysis referring to the Ministry of Marine Affairs regulation, namely the Decree of the Minister of Marine Affairs and Fisheries No.Kep.01/MEN/2007. The lability requirements are applied by analyzing whether there is a discrepancy with existing regulations or deviations, which are then synchronized with the value of the eligibility criteria, as shown in Table 1.

The preparation of the classification of deviations is as follows (KKP 2011).

- 1) Minor deviations are deviations which, if not corrected, will affect the quality of the food.
- 2) Major deviations are deviations if no action is taken, affect food safety.
- 3) Serious deviations are deviations will affect food safety if no corrective action is taken.
- 4) If not corrected, critical deviations will immediately affect food safety.

RESULTS AND DISCUSSION

The Teaching Factory Canning Polije fish processing unit is located in Jember and is within the main campus of the Jember State Polytechnic. UPI's production capacity is around 700kg per production, producing ± 1200 cans of canned sardines in various variants. The process of making canned sardines by TEFA Canning is shown in Figure 1.

Evaluation of UPI in the Implementation of Basic Eligibility Requirements

The result of the production process evaluation was carried out in the form of suggestions for improvement and follow-up plans in Table 2.

Minor Deviation

There were 6 minor deviations found in UPI TEFA Canning Polije. There is no/lack of emergency exit signs related to areas outside the process, and ensuring that they are always locked/not accessing the entry and exit of the workforce is one of the minor irregularities that has been found. It is also necessary to give a sign in each process room with instructions on how to wash hands use process clothes as warning signs that eating, drinking, and smoking are prohibited. This corrections step is shown in Figure 2.

Table 1 Feasibility Criteria Value

Rating	Criteria Value			
	Minor	Major	Serious	Critics
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

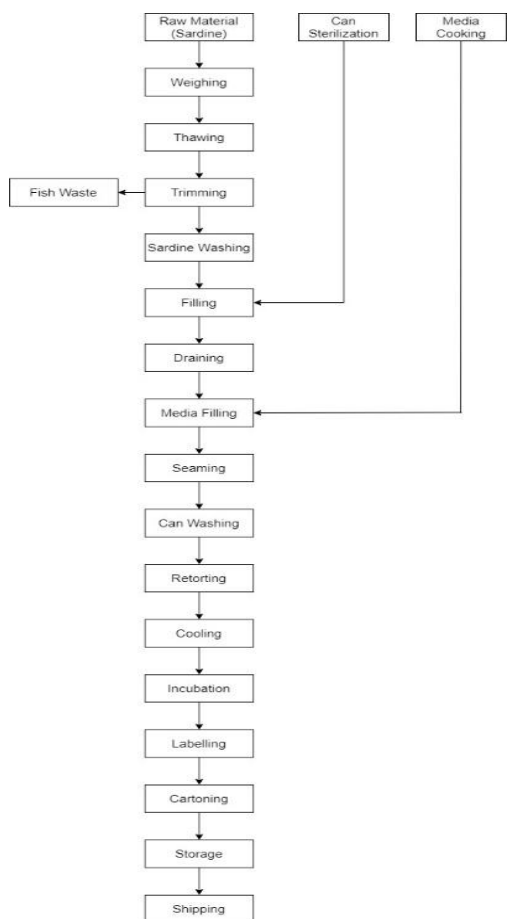


Figure 1 Process of making Canned Sardines



Figure 2 Signs on every process rooms

Other minor irregularities found are acted upon by making SOPs for using the equipment at each stage of the process (use of baskets with different colors for cutting stages, yield bins, and cutting waste). The equipment at each stage of the process aims to minimize contamination from raw materials that have not been processed by cutting, cutting materials, and waste from the cutting process. The use of each piece of equipment is related to the efficiency and hygiene of production flow. Amin et al. (2018) said that the main room building and the complementary room that are not separated between processing rooms and become close together cause the material flow to be less effective, efficient, and easily contaminated.

The findings are followed up by replacing the cleaning equipment with waterproof equipment, providing a particular storage area, and providing a process shoe/booth storage rack as shown in Figure 3. Water-resistant equipment facilitates cleaning so contaminants will not be left in the cleaning equipment, which can later lead to contamination.

Major Deviation

There are 7 major deviations found in UPI TEFA Canning Polije. The first deviation requires corrective action per the format's quality guide according to Permen KP No. 17 of the year 2019 (Peraturan Menteri Kelautan dan Perikanan, 2019).

The next deviation is related to the lighting in the process room, which needs improvement in replacing the dead lights in the steaming/exhausting room and numbering the lamps and mapping the lamps in the process room. Lighting affects employee performance simultaneously. Every increase in lighting (Lux) is predicted to increase employee performance by 0.271 units (Tachyudin 2016).



Figure 3 The storage rack was upgraded

Another aberration found at TEFA Canning Polije relates to clean water. The source of clean

water to carry out the process of sanitizing the processing room is a major deviation at TEFA Canning Polije because there has not been any testing of process water or standardized, clean water supply. This is because the groundwater resources in the UPI TEFA Canning area are not very good.

Foot sinks at employee entrances that are not up to standard are one of the major irregularities that must be dealt with. The existence of a foot sink at the entrance aims to reduce contamination from the handler's footwear before entering the production room. In addition, hand-washing faucets must be operated without using hands to avoid recontamination from hands to hand washing faucets and back to hands after washing.

Furthermore, it is necessary to monitor contamination from rodents/rats in TEFA Canning Polije as a major deviation because it can allow rats to enter the production room and endanger the processed product.

Table 2 Suggestions for improvement and follow-up plans

No.	Clausul	Suggestions for improvement
1	Ia Major	Adjust the quality guide to the format according to the Minister of Marine Affairs and Fisheries Regulation No. 17 of 2019
2	IIIa Minor	Add/mark the emergency exit door related to the area outside the process room and ensure it is always locked/not accessible to enter and exit the workforce.
3	IIIg Major	Replace the dead lights in the process room (steaming/exhausting). Number the lights and map them.
4	IV Minor	Make Standard Operational Procedures for the use of the equipment at each stage of the process (use of baskets with different colors for cutting stages, yield storage, cutting waste)
5	Va Serious	Perform testing of raw materials according to established monitoring procedures.
6	VIIIa Major	Conduct process water testing according to Fish Quarantine Agency, Quality Control, and Safety of Fishery Products (BKIPM) technical instructions regarding water use for the treatment process.
7	VIII Major	Provide a water source for the process room sanitation process. Marking/numbering water faucets and mapping them out.
8	XIIc Minor	Mark each process space.
9	XIIIb Minor	Replace cleaning equipment with equipment that is waterproof and provides particular storage areas.
10	XIVa Major	Repairing the foot sink at the employee entrance
11	XIVb Major	Repairing a broken hand washing faucet at the employee entrance. The hand wash faucet should not be operated by hand. Provide excellent and correct hand-washing instructions.
12	XVc Minor	Provide process shoe/boot storage rack
13	XIVh Minor	Added instructions on how to wash hands, use processed clothes, warning signs that it is forbidden to eat, drink, and smoke
14	XXa Major	Provide a mouse trap facility

* Processing Feasibility Certificate (SKP) supervision questionnaire result on TEFA Canning

Table 3 Basic requirements and conditions at UPI TEFA Canning

No.	Basic requirements	UPI condition
1	Fishery Business Permit (IUP) and or Fishery Business Permit in the fishery sector issued by the Minister of Marine Affairs and Fishery Trading Business Permit (SIUP)	UPI TEFA Canning has an active IUP and SIUP
2	Have GMP and SSOP documents and applications	UPI TEFA Canning has documents and applies GMP and SSOP
3	Active production process	UPI TEFA Canning operates 30 days a month

*Regulation of UPI, General directorate P2HP 2013

Table 4 General requirements and conditions at UPI TEFA Canning

No.	General requirements	UPI condition
1	UPI has a place/unit that handles processing, packaging, and/or storage	Handling, processing, packaging, and storage are carried out in one production unit
2	Have a Regional Quality Guardian evidenced by a certificate from the Provincial Office in charge of Marine Affairs and Fisheries.	There is no regional quality supervisor from the Jember Marine and Fisheries Service yet.

*Regulation of UPI, General directorate P2HP 2013

Serious Deviation

There was 1 serious deviation found in UPI TEFA Canning Polije. Raw material testing has not been carried out according to established monitoring procedures. TEFA Canning Polije needs to test raw materials according to established monitoring procedures. Testing of raw materials has an impact on the products produced by an industry.

The key to a quality product lies in the integrated production process with the variable raw materials and labor quality. A reliable workforce with selected quality raw materials will facilitate the production process, escorted by strict quality control. This will ultimately result in a high-quality product (Sentosa 2019).

A review of mackerel species postmortem quality by Sone, Skara, and Olsen (2019) shows that the quality of the product was changed based on the raw material, including variation in species, raw material properties (PH, fat content, freshness, product type) and processes (such as thawing and freezing methods), and also storage temperature. While it is well established that mackerel fillets exhibit increased susceptibility to quality loss during storage, knowledge needs remain as regards, e.g., the effect of raw material, freezing, thawing, use of glazing, antioxidants, and packaging on the fillet quality and storage stability.

Gap Analysis of Processing Feasibility Certificate (SKP)

Gap analysis in preparation for processing feasibility aims to evaluate the feasibility of processing in a company. If a gap is found, it is hoped that the company can improve all aspects of the feasibility. The feasibility aspects include company facilities and design, company GMP and SSOP, company scheme and layout, and production process flow so that products are safe and avoid cross-contamination.

Directorate General P2HP No. Per.09/DJ-P2HP/2010 explained that a processing feasibility certificate given to the UPI if it has implemented GMP and meets SSOP requirements following standards and regulations from competent authorities and attaches IUP, SIUP, Notary Deed of Company Establishment (except small businesses), general company data, and Lease agreement (if lease). SKP submission requirements include basic requirements and general requirements. The feasibility of the processing unit is analyzed for conformity to the agreed requirements. The basic requirements and conditions of UPI can be seen in Table 3, while the general requirements are in Table 4.

CONCLUSION

The UPI value of TEFA Canning Polije has met the basic eligibility requirements with the category of deviation / SKP rating Good with details of 6 minor deviations, 7 major, and 1

serious. Analysis of the Gap SKP UPI TEFA Canning Polije shows that the basic eligibility has met the basic requirements and 1 general requirement by correcting the deviations found.

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REFERENCES

- Amin, Mochamad Zainul, Lilik Pujantoro E N, and Nurjanah. 2018. The Implementation of GMP and SSOP at Semi-Dried Anchovy Fish Processing Units in Tuban. *JPHPI*, Vol 21. No 3:406-413. doi.org/10.17844/jphpi.v21i3.24710
- Brilliantina, A., D. K. Wardani, P. T. Fadhila, B. Hariono, And R. Wijaya. 2022. Accelerated Shelf Life Test Method With Arrhenius Approach For Shelf Life Estimation Of Tongkol 'Euthynnus Affinis' Balado In Cans. *Iop Conf. Ser. Earth Environ. Sci.*, Vol. 980, No. 1. Doi: 10.1088/1755-1315/980/1/012038
- Dirjen Pphp. 2010. Persyaratan, Tata Cara Penerbitan, Bentuk Dan Format Sertifikat Kelayakan Pengolahan (Skp). No. 1, Pp. 1–18.
- [KKP] Kementerian Kelautan Dan Perikanan. 2011. Pedoman Teknis Penerapan Sistem Jamina Mutu Dan Keamanan Hasil Perikanan. *Pedoman Tek. Penerapan Sist. Jaminan Mutu Dan Keamanan Has. Perikan.*, Vol. 2009.
- [KKP] Kementerian Kelautan dan Perikanan. 2022. Rilis Data Kelautan Dan Perikanan Triwulan I Tahun 2022
- Peraturan Menteri Kelautan Dan Perikanan. 2019. Peraturan Menteri Kelautan Dan Perikanan Republik Indonesia Nomor 17/Permen-Kp/2019 Tentang Persyaratan Dan Tata Cara Penerbitan Sertifikat Kelayakan Pengolahan. Vol. 53, No. 9, Pp. 1689–1699.
- Sentosa, E. E. T. 2019. Pengaruh Kualitas Bahan Baku, Proses Produksi Dan Kualitas Tenaga Kerja Terhadap Kualitas Produk Pada Pt Delta Surya Energy Di Bekasi. *Lilmu Manaj.*, Vol. 14, No. 1, Pp. 1–16. doi: 10.47313/oikonomia.v13i2.506
- Sone, I., Skåra, T. & Olsen, S.H. 2019. Factors influencing post-mortem quality, safety and storage stability of mackerel species: a review. *Eur Food Res Technol* **245**, 775–791. Doi: 10.1007/s00217-018-3222-1
- Tachyudin, M., Solichin, and Mardji. 2016. Pengaruh Tingkat Kebisingan Dan Pencahayaan Terhadap Kinerja Pada Karyawan Cv. Mitra Jaya Malang. *Jurnal Teknik Mesin*. Vol.24 no.1. <http://journal2.um.ac.id/index.php/jurnal-teknik-mesin/article/view/518>
- Yuwono, B., F. R. Zakaria, And N. K. Panjaitan. 2012. Study Of The Factors That Influence The Continuity Of Good Manufacturing Practices And Sanitation Standard Operating Procedures Application In Processing Of Fish Fillet In Java. *Manaj. Ikm*, Vol. 7, No. 1, Pp. 10–1, <http://journal.ipb.ac.id/index.php/jurnalmpi/>